行政院農業委員會林務局

捐助國際保育計畫報告

（100 年彙整）

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2010 年贊助地球協商報計畫成果摘要

國際永續發展協會為非營利民間組織，總部設於加拿大。IISD 的報導部門(簡稱 IISDRS，即 IISD Reporting Services)於 1997 設立，出版品包括：

- *Earth Negotiations Bulletin* (主要出版品)
- The *Linkages* World Wide Web (包含所有 ENB 編輯群蒐集的資料)
- *Linkages updates* (報導 Linkages 網站最新資訊的雙週刊)
- *Your Meeting Bulletin* (之前的名稱為永續發展 Sustainable Developments)
- *ENB On the Side*、*MEA Bulletin* (多邊環境公約 Multilateral Environmental Agreement 相關刊物)。
- *Climate Policy & Practice* (2008 年起報導氣候變遷相關活動)。
- *SIDS Policy & Practice* (報導開發中小島國家永續發展相關活動)
- *Biodiversity Policy & Practice* (報導生物多樣性相關議題)

ENB 為一頁雙面的出版品，於聯合國相關環境及發展相關會議期間每日出版。除紙本外，也有網路版。每次會議結束後，ENB 編輯群另編纂一份約 10,000-18,000 字的網路版會議摘要及分析。許多需要瞭解環境及永續發展政策的聯合國代表、非政府組織和聯合國工作人員，一致肯定 ENB 是一份重要參考資料。外交官、聯合國工作人員、政府官員、非政府組織、商業界、媒體、學術界也對 ENB 的客觀和完整報導，給予高度評價。ENB 的讀者約有 75,000 人。

ENB 於環境及發展相關協商會議期間，提供平衡、迅速、客觀的報導。並希望能達成下列目標：

一、於會議期間創造一個公平的資訊空間。
二、促使國際協商過程更公開透明。
三、提供實用資訊給決策者和有興趣影響決策過程的人士。
四、於國際會議期間，將各政府機構、非政府組織和聯合國相關活動公告周知。
五、運用新的資訊技術，提供即時的資訊給決策者參考。
六、提供環境相關國際會議資料給學術界運用。
七、維持可信賴的資訊來源，將環境相關協商過程資料提供給決策者參考。

ENB 共有 28 冊，包括聯合國環境及發展會議(United Nations Conference on Environment and Development, UNCED)、聯合國永續發展委員會(United Nations Commission on Sustainable Development, CSD)、聯合國人口和發展會議(United Nations Conference on Population and Development, CSD)、聯合國跨界魚群與高度洄游魚群會議(UN Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks)、生物多樣性(Biological Diversity)、氣候變遷(Framework Convention on Climate Change, UNFCCC)、森林政策(Forest Policy)、濕地公約(Convention on Wetlands, Ramsar Convention)、遷移性物種公約(Convention on Migratory Species, CMS)、瀕臨絕種野生動植物國際貿易公約(即華盛頓公約 Convention on International Trade in Endangered Species of Wild Fauna and Flora, CITES)、國際熱帶木材委員會(International Tropical Timber Council, ITTC)等。

1996 至 2010 年間，ENB 共報導 485 場以上的會議。2010 年報導之 27 項會議請參考所附清單。詳細清單及報導內容，目前尚未上網，未來可於請參閱網站 http://www.iisd.ca/meetings/2010.html。

- 生物安全議定書(Cartagena Protocol on Biosafety)相關會議
- 遷移性物種公約(Convention on Migratory Species, CMS) 相關會議
- CITES 第 15 屆締約國大會
- 生物多樣性公約(Convention on Biological Diversity, CBD)獲取和惠益分享(Access and Benefit Sharing, ABS)相關會議
- UNFCCC 相關會議
- 第 18 次聯合國永續發展委員會(United Nations Commission on Sustainable Development, CSD) 會議
- 生物多樣性公約科諮機構第 14 屆會議
- 聯合國跨界魚群與高度洄游魚群會議(UN Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks)
- 蒙特婁議定書(Montreal Protocol 主要為關切臭氧層，管制氟氯碳化物)相關會議
- 海洋法(Law of the Sea)相關會議
- 聯合國糧食暨農業組織(UN Food and Agriculture Organization, FAO)林業委員會(Committee on Forestry)第 20 次會議
- 生物多樣性公約第 10 屆締約方大會
- ITTC 相關會議
- 斯德哥爾摩公約(Stockholm Convention on Persistent Organic Pollutants, POPs)相關會議
- 巴塞爾公約(Basel Convention 主要管制管有害廢棄物) 相關會議
- 鹿特丹公約 (Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, Rotterdam Convention 主要是管制 31 項化學品及農藥) 相關會議
- 關於核損害民事責任之維也納公約(Vienna Convention on Civil Liability for Nuclear Damage)相關會議
- 持久性有機污染物審查委員會(POPs Review Committee, POPRC) 相關會議



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Meetings Covered by the *Earth Negotiations Bulletin*, 2010

Meeting	Date and Location
Ad Hoc Open-ended Informal Working Group on Marine Biodiversity to study issues relating to the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction	1-5 February 2010, New York
Second meeting of the Group of the Friends of the Co-Chairs on Liability and Redress in the context of the Cartagena Protocol on Biosafety	8-12 February 2010,
CMS Sharks III (Third Meeting on International Cooperation on Migratory Sharks under the Convention on Migratory Species)	8-12 February 2010, Manila, Philippines
UNEP Governing Council/Global Ministerial Environment Forum + Combined ExCOP for Basel, Stockholm and Rotterdam Conventions	22-26 February 2010, Bali, Indonesia
CITES COP-15	13-25 March 2010, Doha
Ninth Round of Consultations for Parties to the Agreement for the Conservation and Mgmt of Straddling Fish Stocks and Highly Migratory Fish Stocks	16-17 March 2010, New York
Ninth meeting of the CBD's *Ad Hoc* Open-ended Working Group on Access and Benefit-sharing (ABS 9)	22-28 March 2010, Cali Colombia
UNFCCC Climate Talks: AWG-KP 11 and AWG-LCA 9	9-11 April 2010, Bonn
CSD 18 and Rio+20 Prepcom	CSD: 3-14 May 2010, New York; Rio+20 Prepcom: 17-19 May
CBD SBSTTA-14 & Third Meeting of the Working Group on Review of Implementation of the Convention (WGRI 3)	10-21 May (SBTTA) and 24-28 May (WGRI), Nairobi
Resumed Review Conference on the Agreement for the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks	24-28 May 2010, New York
UNFCCC First Sessional Period 2010 (Subsidiary Bodies meetings)	31 May – 11 June 2010, Bonn
First Session of the INC to Prepare a Global Legally Binding Instrument on Mercury	7-11 June 2010, Stockholm
Montreal Protocol OEWG 30	15-18 June, Geneva

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11th Meeting of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea	21-25 June 2010, New York
Resumed Ninth meeting of the CBD's Ad Hoc Open-ended Working Group on Access and Benefit-sharing (ABS 9)	10-16 July 2010, Montreal
UNFCCC AWG-LCA 11 and AWG-KP 13	2-6 August, Bonn
Interregional Negotiating Group on ABS	18-21 September, Montreal
Mauritius Strategy+5 Review	24-25 September, UN Headquarters, New York
UNFCCC additional round of negotiations	Tianjin, China, 4-9 October
20th Session of the FAO Committee on Forestry	4-8 October, Rome
IPCC 32	11-14 October, Busan, Republic of Korea
Sixth Meeting of the POPs Review Committee	11-15 October, Geneva
CBD COP 10 and COP/MOP 5	11-29 October, Nagoya, Japan Note: COP/MOP (CMP): 11-15 Oct, COP: 18-29 Oct
Montreal Protocol MOP 22 and Vienna Convention COP 9	8-12 November Bangkok, Thailand
UNFCCC COP 16 and Kyoto Protocol COP/MOP 6	29 November – 10 December, Cancun, Mexico
ITTC 46	13-18 December, Yokohama

陸沙卡協定工作小組計畫報告摘要

陸沙卡協定之全名為合作執法遏阻非法野生動植物貿易陸沙卡協定(The Lusaka Agreement on Co-operative Enforcement Operations Directed at Illegal Trade in Wild Fauna and Flora)。陸沙卡協定於 1994 年 9 月在尚比亞首都陸沙卡，由肯亞、烏干達、南非、坦尚尼亞、史瓦濟蘭及尚比亞共同簽訂，協定原文由聯合國秘書長收存，並於 1996 年生效。Lusaka Agreement 的目標為減少非法野生動植物貿易，並設 Task Force 負責執行任務，工作項目包括蒐集、分析及調查非法野生動植物貿易資料，緝捕中盤商、走私者及犯罪集團等(可越界追捕)。陸沙卡協定目前有七個締約國，包括剛果共和國、肯亞、賴比瑞亞(Liberia)、賴索托、烏干達、坦尚尼亞及尚比亞。南非、衣索匹亞和史瓦濟蘭僅簽署協定，尚未成為會員國。

陸沙卡協定工作小組於 1999 年 6 月 1 日設立，第一任執行長(Director)為 Mr. Adan Dullo，Mr. Dullo 原任肯亞野生動物署(Kenya Wildlife Service, KWS)副署長及野生動物情報部門負責人。1999 年 4 月曾與當時任職以色列自然暨保護區署(Israel National Nature and Parks Authority, INNPA) 之 Dr. Bill Clark 一起來台訪問。Mr. Dullo 於 2002 年 3 月 8 日因車禍喪生後，由坦尚尼亞籍 Mr. Musa Lyimo 代理執行長。2002 年 12 月起新執行長坦尚尼亞籍 Mr. Emily S. Kisamo 上任，2009 年 2 月 28 日任期屆滿後，現由剛果籍 Mr. Bonaventure Ebayi 接任。

目前締約國都已借調人員至 LATF 工作。陸沙卡協定工作小組成立迄今與各締約國 LATF 國家執行機構(LATF National Bureau)共同進行查緝工作或辦理執法訓練班。非締約國部分，已和波札那(Republic of Botswana)、喀麥隆、埃及、衣索匹亞、那米比亞(Namibia)、奈及利亞、迦納、南非和史瓦濟蘭等國政府單位和執法人員合作。另外，LATF 與華盛頓公約(Convention on International Trade in Endangered Species of Wild Fauna and Flora, CITES)、非洲野生動物保育組織(Organization for Conservation of African Wildlife, OCFSA)國際刑警組織(Interpol-ICPO, International Criminal Police Organization)和國際海關組織(World Customs Organization, WCO)簽署合作備忘錄，合作查緝非法野生動植物相關活動。LATF 也與其他國際組織建立合作關係，例如聯合國環境總署(United Nations Environment Programme, UNEP)等。

LATF 歷年來提供之成果報告主要成果包括：

2000 年間，LATF 籌設工作已接近完成，預計於 2001 年 4、5 月間，每一會員國指派野生動物執法人員至位於肯亞 Nairobi 的 LATF 總部報到，分配任務。屆時此一國際團隊即可推動查緝工作打擊野生動物犯罪。LATF 2000 年間陸續推動之各項計畫，舉例如下：

一、2000 年 6 及 7 月，LATF 購置兩部公務車(4x4 Toyota Land Cruiser Station Wagon 及 4x4 Saloon car)，由農委會贊助經費支用。

二、2000 年 7 及 8 月，LATF 支援於肯亞 Naivasha 地區舉辦為期 3 週的野生動物執法訓練計畫，課程包括情報蒐集、調查及起訴等基本訓練，有 25 位來至 11 個非洲國家的執法人員參加。

三、2000 年 9 月，美國魚類暨野生動物署(US Fish & Wildlife Service, USFWS)贊助 LATF 購買 i2 情報軟體，並訓練工作人員使用該軟體。目前使用 i2 情報軟體的單位包括國際刑警組織(Interpol)、美國聯邦調查局(Federal Bureau of Investigation, FBI)、US FWS 執法單位(Office of Law Enforcement)等。

四、LATF 現有 VHF 通訊系統，預計 5 月能完成安裝 HF 通訊系統。屆時 LATF 與 6 個會員國即擁有迅速安全的現代化通訊，包括語言、傳真、資料、E-mail 等。因為非洲國家的公用通訊系統經常不太可靠，建立 LATF 專屬通訊系統，就執法工作而言有其必要性。

五、LATF 已配備衛星電話及無線電通訊系統，由農委會贊助經費支用。

六、LATF 已聘用技術或行政專家負責電腦、會計、行政管理等工作。這些專家都需通曉英文及法文(非洲有 20 國通用語言為英文，22 國通用語言為法文)。

七、LATF 籌組的技術團(technical mission)到坦尚尼亞國家公園(Tanapa)評估其野生動物執法能力，並促成坦尚尼亞和肯亞野生動物主管單位簽署備忘錄。

八、LATF 參與查緝工作，通常以肯亞-坦尚尼亞、肯亞-衣索匹亞邊界地區為主，並破獲數個野生動物犯罪集團，其中 1 名已因謀殺警察而被起訴。

2001 年，LATF 活動與工作計畫包括：

一、查緝工作：LATF 進行野生動物相關執法工作，包括逮捕盜獵者，查獲非法走私野生動物或產製品等，舉例如下：

1. 野味(Bushmeat)：2001 年 11 月於烏干達查獲 bushmeat，逮捕 12 人，其中 5 人移送法辦，1 人已被判 6 個月有期徒刑，1 人被判罰金，其餘 3 案審理中。2001 年 12 月於同地點再度查獲 100 公斤 bushmeat。
2. 象牙：
   (1) 2001 年 11 月於坦尚尼亞查獲 22 件象牙，重 45 公斤。逮捕 1 人，案件審理中。後續調查又逮捕 1 人，並繼續追查其餘涉案人。
   (2) 破獲前案後，坦尚尼亞執法人員陸續查獲 4 件非法盜獵或販賣象牙案，共逮捕 5 人。
   (3) 於肯亞查獲象牙中盤商 1 人。
   (4) 於肯亞查獲 34 件象牙雕刻品，逮捕 3 人，沒收運輸象牙產製品汽車 1 部。
3. 斑馬皮：於坦尚尼亞查獲 13 張斑馬皮，逮捕 4 人。後續搜查發現斑馬

肉及剝皮工具，並循線追查斑馬來源。

二、訓練

1. 2000 年 8 月，LATF 在肯亞舉辦為期 3 週的野生動物執法訓練計畫，有 26 位來至 11 個非洲國家的執法人員參加，講師來自美國、德國、奧地利和以色列。
2. 2001 年 6 月，LATF 辦理情報蒐集相關訓練，培訓坦尚尼亞國家公園工作人員。
3. 2001 年 6 月，加拿大環境部遴派精通法語工作人員，協助訓練講法語的剛果共和國執法人員。LATF 工作人員在剛果時，巡察幾個伐木區，查獲 bushmeat 販賣集團，逮捕數人，沒收 bushmeat 及槍枝。

三、計畫

1. 持續進行野生動物相關執法工作，優先項目包括：非法買賣象牙案、非法買賣 bushmeat 案及非法買賣野生動物活體(寵物貿易)案。
2. LATF 需要設立一個基金(Trust Fund)，以提供日後穩定的經費來源。
3. LATF 總部現位於肯亞野生動物署內，長程來看，LATF 需要設立一個自己的總部。
4. LATF 已進入實際在 6 個非洲國家查緝野生動物相關案件的階段，有些國家距離很遠，有些查緝地點路況不佳，某些季節還可能無法經由陸路抵達。非洲的飛機班次經常變動，行程不容易掌握。例如由肯亞首都 Nairobi 到坦尚尼亞的 Selous Wildlife Reserve，搭一般飛機要兩天行程，再加上 300 公里路程，若直接開 Cessna 206 六人座小飛機過去，只要 4 小時。因此，LATF 需要購買一部飛機，以增加其查緝任務的機動性。
5. LATF 需要擴大其合作對象，例如與各國執法機構、保育團體或民間人士合作等。LATF 也將設立網站，提供民眾檢舉管道。
6. LATF 工作人員都受過執法訓練，i2 情報分析訓練。LATF 無線通訊網也已建設完成，可與各非洲國家相關機構聯繫。LATF 近期將配置測謊設備，以加強其情報蒐集的能力。未來，LATF 需要發展其鑑定能力，確保查緝現場蒐證方法正確，LATF 需要發展其整體分析能力，運用查緝及訊問得到的資料，強化 LATF 打擊犯罪的能力。

2002 年 LATF 工作情形如下：

- 6 個締約國借調人員至 LATF 工作。LATF 成立迄今已和波札那、喀麥隆、埃及、衣索匹亞、那米比亞、奈及利亞、迦納、南非和史瓦濟蘭的政府單位合作，也與部分國家的執法人員共同進行查緝工作。
- 2001/2002 年度，LATF 和各國及國際相關執法單位合作，在非洲各地逮捕涉及非法野生動物案件的核心份子 25 人，查獲超過 7 公噸象牙(包括在新加坡查獲的 6.5 噸)及其他野生動物個體或產製品。

- LATF 辦理訓練班、其他活動、會計報表以及 LATF 所出版 2002 年 1 至 3 月通訊及摺頁均有提供我國參考。
- LATF 於人員 2002 年 11 月參加第 12 屆華盛頓公約締約國大會時將其摺頁置於會場，該摺頁印有贊助單位，包括 Council of Agriculture of the Republic of China (Taiwan)等文字。

2003 年，LATF 提供 2 份成果報告，分別為 2003 年 5 月至 7 月及 8 月至 10 月之工作情形，主要成果如下：

一、2003 年 6 月逮捕兩人企圖非法販賣三件象牙(45kg)。

二、接獲大象在肯亞與坦尚尼亞邊境 Trans Mara Region 被盜獵情報，經調查肯亞部分係馬賽族人以有毒的箭殺死大象，而坦尚尼亞的大象係被槍殺。另發現有人兜售 50 件象牙。

三、調查發現有人在肯亞的 Laikipia 地區兜售 34 件象牙。

四、與華盛頓公約植物委員會及其他執法機構合作，攔阻由索馬利亞走私多肉植物案。

五、2003 年 6 月 1 日在剛果共和國 Maya Maya 機場沒收 10 件非法走私象牙(57kg)，目的地為貝南(Benin)。

六、肯亞與坦尚尼亞查緝人員，召開會議討論邊境 Trans Mara Region 查緝野生動物相關案件事宜。

七、自泰國政府於機場沒收由坦尚尼亞走私的 510 kg 象牙和 3.8kg 犀牛角後，著手調查相關涉案人及走私路線。

八、與剛果共和國查緝單位合作，查獲兩件非法販賣象牙案(分別為 23 件加工象牙，47 件計 22kg 成品和半成品象牙製品)。

2004 年，LATF 提供成果報告，主要成果如下：

執法訓練部分

- 2004 年 2 月，LATF 針對會員國和 LATF 執法人員辦理講師訓練班(Train the Trainers)課程，有 26 人參加，講師包括華盛頓公約秘書處、國際刑警組織秘書處、肯亞和義大利警政單位。
- Train the Trainers 訓練班結束後，剛果和烏干達分別辦理國內相關訓練。烏干達野生動物署(Uganda Wildlife Authority, UWA)辦理的訓練班有 72 位野生動物執法人員參加。剛果的兩週訓練課程有 16 位剛果野生動物部(Congo Wildlife Department, CWD)的執法人員參加。

會議和公務部分

- 參加華盛頓公約秘書處和美國魚類暨野生物署(USFWS)合辦之執法人員專

家會議。

- 參加第六屆非洲東部國家警察主管會議。
- LATF 和非洲野生動物保育組織(OCFSA)簽訂備忘錄，合作查緝非法野生動植物相關活動。

執法部分

一、LATF 和剛果執法單位 CWD 合作，逮捕 13 名嫌犯，沒收 746 件未加工和已加工象牙、1 張豹皮、1 根豹尾和 4 台象牙加工機器。

二、LATF 和 CWD 合作，逮捕 10 名嫌犯，查獲 1 隻 10 歲的黑猩猩、沒收 55m^3 之非法木材。

三、LATF 和肯亞野生動物署合作，逮捕 12 名嫌犯，沒收 26 根象牙。

四、LATF 和 KWS 合作，逮捕 1 名嫌犯，沒收 14 張蟒蛇皮、一隻鼓身蛇(puff adder)。

五、LATF 和 KWS、檢疫單位合作，於機場查獲 6 隻幼黑猩猩和 4 隻 Guenon monkey。

六、LATF 和坦尚尼亞、泰國執法單位合作，逮捕 4 名嫌犯，沒收 2 根犀牛角。

七、LATF 和烏干達 UWA 合作，逮捕 4 名嫌犯，沒收 4 張豹皮、3 根象牙、11 公斤河馬牙。

八、LATF 和尚比亞野生動物署(Zambia Wildlife Authority, ZAWA)合作，逮捕 3 名嫌犯，沒收 4 對象牙。

國際查緝部分

一、持續調查在新加坡查獲的 6.5 公噸象牙和 42,000 個印材(hanko seals)案。

二、LATF 持續調查在中國上海查獲的 3.3 公噸象牙案。

2005 年，LATF 提供之成果報告，主要內容如下：

- 完成「2002 年在中國上海查獲 3.3 公噸象牙案」之後續調查，並將報告交給烏干達參考，以利辦理後續起訴嫌犯事宜。本調查發現這批象牙來源國為剛果民主共和國，但出口紀錄列為烏干達。
- 參加「犀牛和象安全小組(Rhino and Elephant Security Group)」暨「國際刑警組織(Interpol)環境犯罪工作小組」會議。
- 赴衣索匹亞洽商越境執法相關合作事宜，並鼓勵衣索匹亞加入陸沙卡協定。
- 剛果查緝及機構間諮詢會議
  1. 至剛果民主共和國、中非共和國(The Central African Republic)和喀麥隆 3 國邊界地區，以及加彭(Gabonese Republic)和安哥拉(Angola)邊界地區，進行查緝，沒收非法買賣之象牙及木材。並與當地執法人員洽談遏止違法案件事宜。

2. 召開各國執法單位合作研討會，共有 32 人參加，包括警察、海關、出入境管制、司法界、軍方情報單位、野生動物保育機構等人員。

- 召開烏干達和剛果跨界會議，建立合作機制。
- 持續調查在新加坡查獲的 6.5 公噸象牙案。
- 坦尚尼亞案及越南/香港沒入象牙案之調查
  1. 協助坦尚尼亞野生動物主管單位，調查變造 CITES 出口許可案。
  2. 協助調查「2004 年 10 月越南查獲 800kg 象牙案」，查出象牙來源為坦尚尼亞，逮捕 4 名嫌犯。持續追查潛逃華裔主嫌，後來在古巴逮捕到案。
- 在肯亞調查非法象牙和檀香(sandalwood)案。
- 參加東非警長合作機構會議。
- 參加巨猿存續計畫會議(Great Apes Survival Project Meeting, GRASP)。
- 參加 CITES 研討會。
- 參加在聯合國環境總署(UNEP)召開的 Green Customs Initiative 會議。

2006 年，LATF 提供之成果報告包括辛巴威、肯亞和烏干達訓練班報告、財務報告、2006 年 7 月至 12 月成果報告等，主要成果包括：

- 2006 年 7 月至 12 月執行 6 次聯合執法行動，逮捕 11 名嫌犯。合作查緝國家包括剛果、肯亞、尚比亞、烏干達等。
- 持續調查 3 件馬尼拉查獲走私象牙案，臺灣查獲象牙案，泰國查獲陸龜案。
- 參加「肯亞和坦尚尼亞跨境野生動物安全會議(The Kenya-Tanzania Cross Border Wildlife Security Meetings)」暨「剛果和剛果民主共和國跨境野生動物安全會議」。
- 人才培訓方面包括發展新的查緝技巧，並於剛果、剛果民主共和國、肯亞、尚比亞等國辦理 7 次訓練班。
- 參加國際會議包括國際刑警組織(Interpol)野生動物工作小組會議和參東非警長合作機構會議(Eastern Africa Police Chiefs Co-operation Organization Annual General Meeting)等。
- 與其他國際組織合作方面，於 2006 年 10 月與 Interpol-ICPO 簽訂備忘錄；完成與國際海關組織(WCO)之備忘錄初稿；與 UNEP 持續合作等。
- 資訊交換與宣傳方面，持續與 CITES 和 Interpol 交換情報資訊，於報刊或雜誌發表文章，活動情形列入網站。

2007 年執行工作包括：

- 2007 年 8 月，LATF 與 Zambia Wildlife Authority 進行聯合查緝行動，調查的地點為尚比亞東部省分之 Luangwa Boma, Luangwa Bridge, Nyimba, Petauke 和 Chipata 等地區。

- 2006 年 7 月，臺灣查獲來自坦尚尼亞的 5.2 噸象牙，LATF 與 Interpol 派員來台蒐集資料後，持續調查坦尚尼亞涉案人。
- 2007 年 8 月 29 至 31 日，參加在蒲隆地(Bujumbura, Burundi)召開之東非警長合作機構會議，共有 11 國派代表參加。
- LATF 與剛果共和國查緝單位暨 LATF 國家執行機構(Congo National Bureau, BNAL)聯合調查布拉柴維爾(Brazzaville)和 Pointe Noire(諾亞港，另譯黑角)兩地區非法走私象牙和其他非法野生物貿易案。
- 2007 年 11 月 29 至 30 日，參加「肯亞和烏干達跨境野生動物安全會議(The Kenya-Uganda Cross Border Wildlife Security Meetings)」。
- LATF 與坦尚尼亞 3 個機關(自然資源暨觀光部野生動物司 Ministry of Natural Resources and Tourism's Wildlife Division，以下簡稱 Tanzania Wildlife Division (TWD)、Tanzania National Parks 和 Ngorongoro Conservation Area Authority)合辦執法訓練班，共有 54 人參訓，分別來自 16 個執法單位。

2008 年，LATF 報告及查緝資料摘要如下：

我國所贊助 US$25,000，截至 2008 年 12 月底，使用 US$6,185.97，其餘經費將分配於 2009 年一般運作和執法行動。2008 年 11 月查緝行動說明如下：

- 經過數月的情報蒐集，2008 年 11 月 15 至 19 日，LATF 會同剛果執法機構 BNAL，查緝 Pointe Noire 非法野生動物貿易市場，逮捕 3 名 DRC 籍嫌犯，查獲 774 件象牙雕刻，計 20 公斤，嫌犯已移送法辦。
- 情報顯示位於剛果和喀麥隆邊境的 Quesso 有非法野生動物貿易活動，例如動物活體(巨猿類)、象肉、象牙、其他 bushmeat 和木材產製品。而 Brazzaville 則為非法野生動物集散地，2008 年 11 月 20 至 27 日展開查緝行動。逮捕 2 名嫌犯(剛果警察人員)企圖販賣大猩猩嬰兒，後續調查發現嫌犯以當地貨幣 FCFA35,000 (US$70)購買，試圖以 FCFA250,000 (US$500)賣出。查獲之幼猩猩立刻被送往大猩猩保護區 Lession Louna Natural Reserve 收容。
- 於 Brazzaville 各處蒐集情報，包括 4 個公有市場、2 個河港和 1 處國際機場。剛果北部 Quesso 和 Ngombe 兩鎮之調查發現，剛果當地野生動物販賣者協助喀麥隆商人將動物活體和象牙運出邊界。將持續蒐集情報，時機成熟時，再規劃查緝行動。
- 2008 年 2 月，於剛果逮捕喀麥隆籍嫌犯 1 人，非法持有象牙、豹皮和其他野生動物製品。
- 剛果政府對聯合執法行動之成果相當滿意，並希望 LATF 未來能繼續合作打擊非法野生動物貿易，以及辦理執法訓練班。

2009 年「支援陸沙卡協定工作小組及締約國執法計畫」，計畫報告摘要如下：

一、剛果

- 2009 年 9 月，LATF 和剛果執法單位進行為期 6 天之 Operation Coton Blanc，追查 195 根象牙走私案來源，逮捕嫌犯 8 人，後被判刑 1-2 年，罰金 CFA 1-2 百萬(US$2,000-4,000)。
- 2009 年 10 月，LATF 協調剛果執法單位於 Mbomo 查緝非法買賣象牙案，逮捕嫌犯 2 人，其中 1 人主要與中國籍人士共涉走私 100 公斤象牙。兩人均移送法辦。
- 2009 年 9 月 4-7 日，於 Kabo/Quesso 召開跨境會議，LATF 及剛果、喀麥隆、中非共和國等 30 位執法人員參加。

二、肯亞

- 2009 年 3 月，LATF 和 KWS 共同策劃情報蒐集行動，反制肯亞和索馬利亞(Somalia)邊境象牙走私集團活動。資料顯示 2008 年 7 月盜獵及武器走私者 5 人非法獵殺 37 頭大象，並將 74 根象牙運至 Wajir 和 Isiolo 掩埋。LATF 和 KWS 研擬策略緝捕嫌犯和找出埋象牙地點。
- 2009 年 4 月，LATF 和 KWS 共同調查由坦尚尼亞載運 703 公斤象牙進入肯亞案，逮捕 2 人(肯亞和坦尚尼亞籍各一人)，均被判 2 年刑期，象牙及車輛沒收。
- 2009 年 6 月，LATF 提供情報給 KWS，因而查獲象牙中盤商非法持有 71.5 公斤象牙。嫌犯移送法辦，被罰 12,000 Shilling (約 US$1,600)。
- 2009 年 8 月，LATF 和 KWS 於肯亞、衣索匹亞和索馬利亞邊界執行 Operation Owl 行動，證實索馬利亞 Bullahawa 有藏匿 1 噸象牙，已持續監測，防止上開象牙流入市場。
- 2009 年 7 月 14 日，肯亞奈洛比機場查獲藏在木箱中的 223.4 公斤象牙和 5 根犀牛角(15.3 公斤)通報為藝品，預定由莫三比克(Mozambique)經由肯亞奈洛比、泰國曼谷運至寮國永珍(Vientiane)。LATF 和 KWS 調查本案並提供資料給 Interpol、CITES 秘書處、莫三比克 CITES 管理機構、國際海關組織(WCO)等單位參考運用。
- 2009 年 9 月 29 日，肯亞奈洛比機場沒入 532 公斤象牙，LATF、KWS 和肯亞警察單位後續調查發現本案和同年 9 月 27 日於衣索匹亞機場查獲由奈洛比運入之 637 公斤象牙目的地都是泰國。被逮捕的嫌犯 2 人均移送法辦。
- 2009 年 7 月 1-4 日，LATF 參加肯亞和坦尚尼亞邊境安全會議。

三、坦尚尼亞

- 2009 年 3 月，越南查獲 6.2 噸象牙，LATA、WCO 非洲東南部聯絡辦公室(East and Southern Africa Regional Intelligence Liaison Offices, RILO-ESA)、Tanzania Wildlife Division (TWD)、Interpol 持續偵察，於坦尚尼亞逮捕嫌犯 4 人並移送法辦。另規劃越南部分之後續調查。
- 2009 年 5 月，LATF 和坦尚尼亞 National Bureau 執行 Operation Track

Ivory 任務，逮捕嫌犯 8 人(中國和坦尚尼亞籍各 4 人)，查獲象牙 2 根、加工象牙一批、斑馬皮和貝殼。

- 2009 年 3 月 1 日和 4 日，菲律賓馬尼拉機場分別查獲 3,378 公斤和 1,483 公斤象牙，兩批象牙均由坦尚尼亞出口，標示為塑膠廢棄物。2009 年 6 月，LATF、Interpol 和 TWD 持續追查，於坦尚尼亞逮捕嫌犯 5 人，並移送法辦。規劃 2010 年 3 月至馬尼拉進行後續調查。
- 2009 年 4 月 20 日，荷蘭阿姆斯特丹機場查獲 82 隻豹紋陸龜(Leopard Tortoise)，2009 年 7 月，LATF、TWD 和坦尚尼亞警察單位調查發現這批陸龜由坦尚尼亞機場寄出郵包，目的地為香港，已鎖定一名嫌犯，並持續偵察中。
- 2009 年 6 月，LATF 調查香港沒收 3 件郵包案，包括 120 隻豹紋陸龜、27 隻尼羅巨蜥(Nile lizard, *Varanus niloticus*)、20 隻青蛙和 20 隻螳螂。3 件快遞郵包係由坦尚尼亞機場寄出，已逮捕嫌犯 5 人，並移送法辦。
- 2009 年 8 月，LATF 和和坦尚尼亞執法單位聯合偵辦越南沒入 2 噸(769 件)象牙案，這批象牙由坦尚尼亞運出，標示為貝殼。已鎖定一名嫌犯。
- 2009 年 5 月，LATF 參加於坦尚尼亞舉辦之野生動物執法研討會。

四、烏干達

- 2009 年 3-4 月，LATF 與烏干達野生動物署(UWA)、烏干達犀牛基金會(Rhino Fund Uganda)密切合作，推動 Operation Save Rhino 計畫，成功滲透野生動物犯罪集團，因而攔阻 Ziwa 保護區犀牛盜獵案，逮捕假冒線民的嫌犯 1 人，判刑 18 月。

五、尚比亞

- 2009 年 8 月，LATF 與尚比亞野生動物署(ZAWA)共同執行 Operation Spike 行動，遏止野生動物產製品非法貿易，主要目標為 bushmeat，查獲野味 25 公斤、2 隻豹紋陸龜、1 張麝貓皮、3 張鱷魚皮。逮捕嫌犯 5 人並移送法辦，作案車輛沒收。

六、國際會議

- 2009 年 9 月 21-25 日，LATF 參加 Interpol 野生動物犯罪工作小組於巴西召開之會議，並提出報告。

2010 年「支援陸沙卡協定工作小組及締約國執法計畫」，成果摘要如下：

執法部分

一、剛果

2010 年 6 月展開 4 次查緝行動，查獲 12 根象牙(100kg)，逮捕嫌犯 5 人。

二、肯亞

- 調查衣索匹亞查獲 637kg 象牙案，蒐集到的證據強化於肯亞起訴嫌犯 2 人之證據。

- 調查泰國曼谷查獲 239 根象牙(2,075kg) 案，於肯亞奈洛比逮捕嫌犯 1 人，2010 年 5 月於法院被控非法持有狩獵紀念品。
- 2010 年 1 月，調查線民通報之盜獵案，逮捕嫌犯 11 人，查獲 2 根犀牛角(7.2kg)。
- 調查 2010 年 4 月越南查獲 2,194kg 象牙案，2010 年 6 月於肯亞 Mombasa 逮捕嫌犯 1 人。
- 2010 年 7 月 14 日泰國 Suvarnabhumi 機場查獲 117 根象牙和 9 件小塊象牙，共計 765 kg。LATF 和 KWS 協同調查於肯亞奈洛比逮捕嫌犯 2 人，7 月 18 日移送法辦。
- 調查 2010 年 8 月於肯亞奈洛比機場查獲 317 根象牙(1,467kg) 案。
- 2011 年 1 月 17 日，一名中國籍旅客由剛果民主共和國金夏沙經由肯亞奈洛比赴北京，於肯亞機場被查獲攜帶 65 kg 象牙未附合法文件，1 月 18 日移送法辦，1 月 19 日法院判處有期徒刑 3 個月可易科罰金。

三、坦尚尼亞

- 調查 2010 年 10 月由坦尚尼亞非法輸出 1.5 噸至香港案，逮捕嫌犯 3 人(其中 1 人為中國籍)，並移送法辦。
- 2009 年 8 月越南沒入由坦尚尼亞運出之 769 根象牙(2,005.6kg)，LATF 和坦尚尼亞執法單位聯合偵辦此案，於 2011 年 1 月 4 日逮捕一名中國籍嫌犯，並移送法辦。

四、烏干達

2010 年 1 月美國查獲來自烏干達之走私象牙案，美國魚類暨野生動物署(USFWS)提供情報資料給 LATF 及烏干達查緝單位，偵察後於同月份逮捕涉案人，並移送法辦。

五、尚比亞

2011 年 1 月，LATF 與尚比亞野生動物署(ZAWA)共同執行 Operation Western Mansion 行動，查緝 5 天動員 12 人，查獲野味(bushmeat) 47 公斤、半成品象牙 56 公斤、48 隻豹紋陸龜。逮捕嫌犯 2 人並移送法辦。

跨境會議

2010 年 8 月 31 日至 9 月 5 日，召開肯亞和坦尚尼亞野生動物工作人員跨境會議。

能力訓練

- 2010 年 1 月於剛果共和國召開執法訓練班，受訓者計 20 人。
- 2010 年 2 月於烏干達召開執法訓練班，調訓該國各類查緝單位人員 20 人。

報告附件一為 LATF 收支表，附件二為 LATF 發動之偵察及其他贊助單位支助之活動，包括查緝案 3 件、訓練班 3 次、研討會 3 次、參加國際會議包括世界海關會議等共 3 次。

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PROGRESS /ACCOUNTABILITY REPORTS ON ACTIVITIES UNDERTAKEN BY THE TASK FORCE WITH THE FINANCIAL SUPPORT OF THE FOREST BUREAU-COA

FEBRUARY 2011

LUSAKA AGREEMENT ON CO-OPERATIVE ENFORCEMENT OPERATIONS DIRECTED AT ILLEGAL TRADE IN WILD FAUNA AND FLORA

"FIGHTING WILDLIFE CRIME IN AFRICA"

INTRODUCTION

This report highlights the Lusaka Agreement Task Force (LATF) activities for the period January 2010 to February 2011. These activities comprised law enforcement activities (including investigations and Intelligence gathering), cross-border law enforcement meetings and Capacity building Programmes (training and wildlife law enforcement interagency workshops). The report also outlines some of the activities undertaken and facilitated by LATF and support of other collaborating/development partners and donors.

LATF deeply appreciates the invaluable support from the Forest Bureau, COA that was instrumental in undertaking these activities.

ACTIVITIES

I. LAW ENFORCEMENT OPERATIONS

1. CONGO (BRAZZAVILLE)

In June 2010, LATF supported through facilitation and co-ordination four operations in Mbomo, Impfondo and two at Point Noire, Southern Congo. The operations resulted into recovery of 12 elephant tusks weighing 100kg and arrest of five suspects. Prosecution of three cases was concluded resulting in prison probation of three years as well as fines of CFA300, 000 (USD 667) and compensation for damage of CFA 2million (USD 4,500)

2. KENYA

2.1 Investigations into 637kg of elephant ivory seized in Bole International Airport-Addis Ababa

In January 2010, LATF jointly with KWS Officials and Kenya Police travelled to Addis-Ababa Ethiopia to carry out investigations into illegal trafficking of elephant ivory i.e. 55 tusks with net weight of 454 kg that was seized at the Bole International Airport in Addis Ababa on 27th

September 2009 originating from Nairobi, Kenya. The Officers collected vital intelligence that was used to strengthen the prosecution of two (2) suspects in Kenya.

2.2 Investigations into 2tonnes of elephant ivory seized in Bangkok Thailand (January 2010)

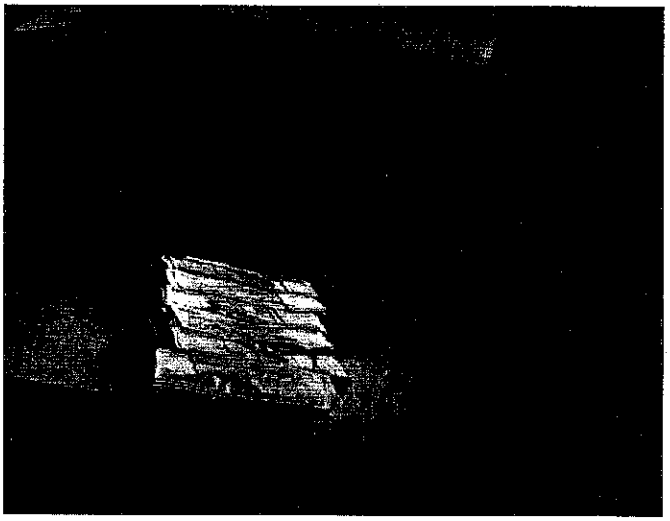
In January 2010, 239 elephant tusks weighing 2,075kg were seized in Thailand disguised as Telecommunication equipment for repairs from Kenya. LATF jointly with the Kenya Wildlife Service (KWS) and Police investigated the case. One suspect was arrested in Nairobi and arraigned in court in may 2010 with three counts of illegal possession of game trophies and the hearing started on 30/06/2010. The case is ongoing.



Excerpt from a Kenyan local newspaper showing the suspect being arraigned in Court

2.3 Rhino poaching investigations in Central Kenya

In January 2010, a joint operation carried out in Nyeri-Central Kenya by LATF and KWS to probe on information received alleging rhino poaching and illegal trade in the area resulted in arrests of eleven suspects and recovery of two pieces of white rhino horns weighing 7.2kgs, cash amounting to KShs 600,000 (USD 7500) meant for purchase of the horns and a motor vehicle (Toyota Prado). The suspects were arraigned before a magistrate's court in Nairobi.



2 rhino horns recovered in the Operation

2.4 Investigations into illegal ivory shipment seized in Haiphong, Vietnam

On 29th April 2010, elephant tusks weighing 2,194kg was seized in Haiphong Vietnam concealed in 90 bags of dried seaweed in container and declared as sea weed algae. LATF jointly with KWS, Customs and Criminal Investigation Department (Police) investigated the case in Mombasa, Kenya in June 2010. One suspect was arrested.



Truck that transported the contraband ivory to the Port for onward shipment to Haiphong, Vietnam

2.5 Investigations into illegal ivory shipment seized in Thailand

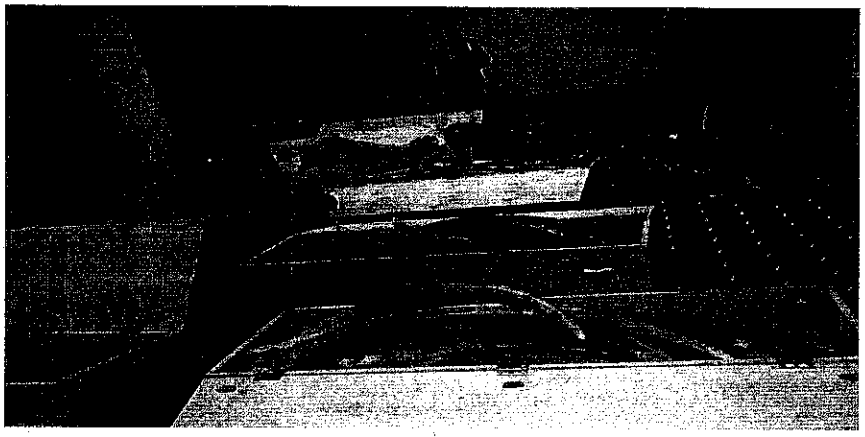
On July 14, 2010, at 02:00pm, officers of Thai Customs' Investigation and Suppression Bureau at Suvarnabhumi Airport searched packages imported into the country from Kenya. Officers received information from an informant that the imported packages were carrying elephant ivory, which is a prohibited product in Thailand. The declaration paper of these packages declared that they were plastic folders, wooden furniture and papers in 6 pallets, weighing 850 kg. However in these pallets, officers found 117 elephant ivory tusks and 9 small ivory pieces, with a total weight of 765 kg. The shipment also contained a fake rhino horn, weighting 0.3 kg. Royal Thai Customs estimated the value of the illegal items to be approximately THB 38.4 million (about 1.2 million USD). LATF jointly with KWS and Police investigated the case in Nairobi, Kenya. Two (2) suspects were arraigned in a Kenyan law court on 18/07/2010 and the case is ongoing.



Part of the contraband ivory displayed by Royal Thai Customs officials at the Suvarnabhumi Airport

2.6 Investigations into seizure of elephant ivory in transit to Malaysia

In August 2010, 317 elephant tusks (1467kg) were seized at JKIA hidden in wooden boxes disguised as Avocado and destined for Malaysia. LATF jointly with KWS and Interpol NCB Nairobi carried out investigations in Nairobi.



Part of the ivory seized at JKIA, Nairobi

2.7 Arrest of a Chinese national in Nairobi

On 17th Jan 2011, a Chinese travelling from Kinshasa via JKIA to Beijing was arrested in possession of 65kgs of elephant ivory in two suitcases without any accompanying documents. LATF jointly with KWS arranged for the prosecution of the suspect who was charged before a magistrate's Law Court in Nairobi on 18th Jan 2011. He pleaded guilty to two counts of illegal possession of wildlife specimens. On 19th January 2011, the suspect was convicted and sentenced at the law court to a fine of ksh 50,000 (US$ 625) or to imprisonment of 3 months jail in default, which he paid and was released.



Suspect arrested with the 65kg of contraband ivory

3. TANZANIA

3.1 Investigations and Operations into Illegal export of 1.5tonnes of ivory to Hongkong originating in Zanzibar

In October 2010, the Lusaka Agreement Task Force jointly with Tanzania Wildlife Division and National Central Bureau INTERPOL-Dar es Salaam arrested a king pin (Chinese national) of illegal trafficking of 1.5 tonnes of African elephant ivory to Hong Kong from Zanzibar-Tanzania. In the same operation, a General Manager of a Clearing and Forwarding Company in Zanzibar that facilitated the shipment of the contraband and two other suspects were arrested in Zanzibar – Tanzania as part of a continuing investigation into the seizure that started in September, 2010.

The suspects were jointly charged at Kisutu Residents Magistrates Court in Dar es Salaam for committing an economic crime. Anyone found in possession of, dealing, transferring, or exporting any government trophy in contravention of the provisions of the Tanzanian Wildlife Conservation Act No 5 of 2009, the CITES Implementation Regulations and Economic and Organized Crime Control Act commits an offence and upon conviction shall be liable to a fine, to imprisonment or to both with variations depending on the count. The fines charged range from twice to 10 times the value of the trophy involved, while the imprisonment term range from 2 years to 20 years (minimum) and 5 years to 30 years (maximum).



Investigations team at work at Malindi Port , Zanzibar- Tanzania.

3.2 Investigations into illegal export of elephant tusks to Vietnam originating in Zanzibar

A suspect of Chinese origin was arrested on 4th January 2011 in Dar es Salaam, Tanzania following investigations into 769 pieces of elephant tusks, weighing 2005.6 kg seized in Vietnam originating from Zanzibar in August 2009 which was coordinated by the LATF.

The arrested suspect is believed to be one of the kingpins in the smuggling ring, which is illegally exporting elephant tusks to the Far East from the region. The suspect was charged at Kisutu Residents Magistrates Court in Dar-es-Salaam for committing an economic crime.



Officials with some of the ivory seized in Vietnam

4. UGANDA

4.1 Illegal ivory trade investigations in Kampala, Uganda

Following criminal intelligence received from the US Fish and Wildlife Service on ivory smuggled into the USA from Uganda, in January 2010, a joint operation involving LATF, the Uganda Wildlife Authority (UWA) and Uganda Police was conducted to identify and arrest the

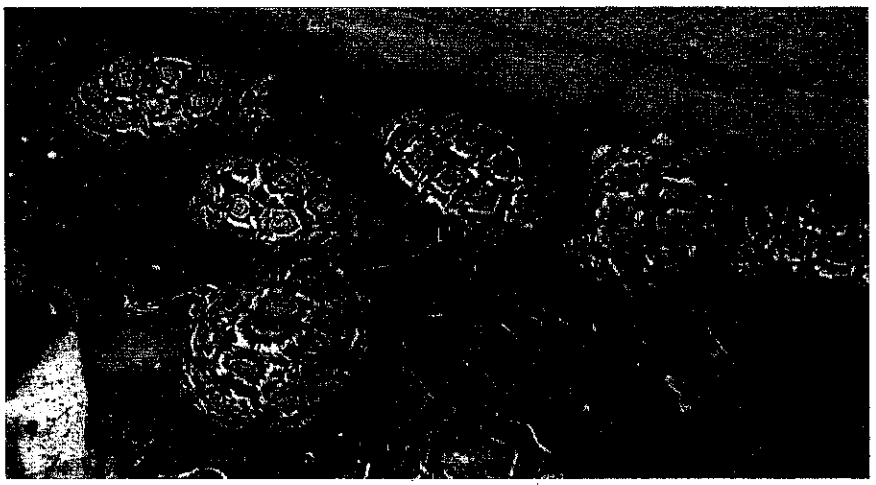
local based international ivory smuggler in Kampala involved in the shipment. In the same month, the suspect was arrested and arraigned in Court in Kampala in connection with smuggling of ivory into United States of America from Uganda. LATF obtained sufficient documentary evidence from its partner in the USA (US Fish and Wildlife Service) and availed the same to the Ugandan authorities to support the ongoing prosecution of the suspect.

5. ZAMBIA

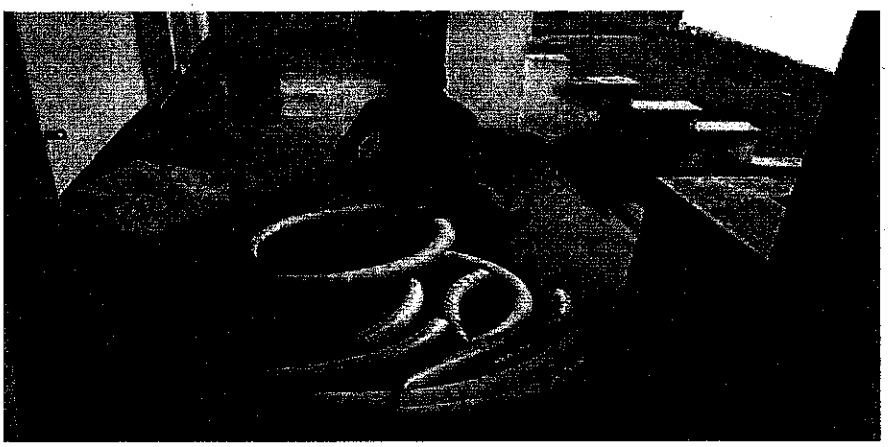
5.1 Operation " Western Mansion"

In January 2011, LATF and the Zambia Wildlife Authority (ZAWA) conducted a joint law enforcement operation code named 'Western Mansion" in Lusaka which extended to the Southern and Western provinces of Zambia in towns of Gweembe and Sesheke.

The five-day operation which mobilized 12 officers from ZAWA, Zambia Police Service, and Enforcement Commission and under LATF's co-ordination was carried out from 20th of January 2011. The operation resulted in the arrest of two suspects and recovery of 47kg of bushmeat, 56kg of semi-worked elephant tusks and 48 live leopard tortoises. During the operation, the team also collected vital intelligence that will be used in future operations. The suspects have been arraigned in Court of Law for prosecution. This is a result of an effective national interagency collaboration and co-ordination led by the Lusaka Agreement Task Force.



Some of the tortoises seized in the operation



Seized elephant ivory and the suspect arrested



Arrested suspect with the recovered bushmeat

Conclusion on Law Enforcement Operations

The Lusaka Agreement Task Force jointly with Law Enforcement Agencies in and out of the Lusaka Agreement Member States is stepping up its cooperative Law Enforcement undertakings to address the ever increasing problem of ivory smuggling from the region. LATF calls for continued support from all the collaborating agencies, individuals and development partners to join hands in these endeavors.

II. CROSS BORDER MEETINGS

1. The twenty first (21st) Kenya/Tanzania Wildlife Officers Cross Border Meeting

Cross border meetings are convened and facilitated by LATF between neighbouring countries to foster cooperation in handling wildlife issues particularly security threats to wild fauna and flora across the borders.

The 21st Kenya/Tanzania Wildlife Officers Cross border meeting took place from 31st August 2010 to 5th September 2010 at the Leopard Lodge in Voi Kenya and attended by 36 wildlife officers from Kenya and Tanzania and a LATF Officer. The Director of LATF, Mr. Bonaventure Ebayi presided over the opening session of the meeting.

The meeting adopted resolutions that included formation of task forces for identifying strategic areas of focus and reviewing progress and challenges of cross border wildlife Security. Furthermore the meeting discussed and underscored the need to convene Regional Wildlife Directors' meetings as an agreed strategy to enhance cross border mechanism through direct interaction at policy and decision making level and that such a forum should be an immediate culmination of a wildlife officers cross border meeting.

This Cross border meeting was a testimony of capitalized knowledge, experiences and human resources in addressing critical transnational wildlife conservation issues. LATF congratulated

the officers and their agencies for the achievement and encouraged them to continue working in the same spirit.



The participants of the 21st Kenya/Tanzania Wildlife Officers Cross Border Meeting

III. CAPACITY BUILDING PROGRAMMES

1. TRAINING

1.1 Training of Wildlife law enforcement agencies in Congo

The training was conducted in January 2010 and focused on detection and surveillance technology. It drew twenty participants from law enforcement agencies in the Republic of Congo. The training was held at the Odzala-Kokoua National Park headquarters in Mbomo.

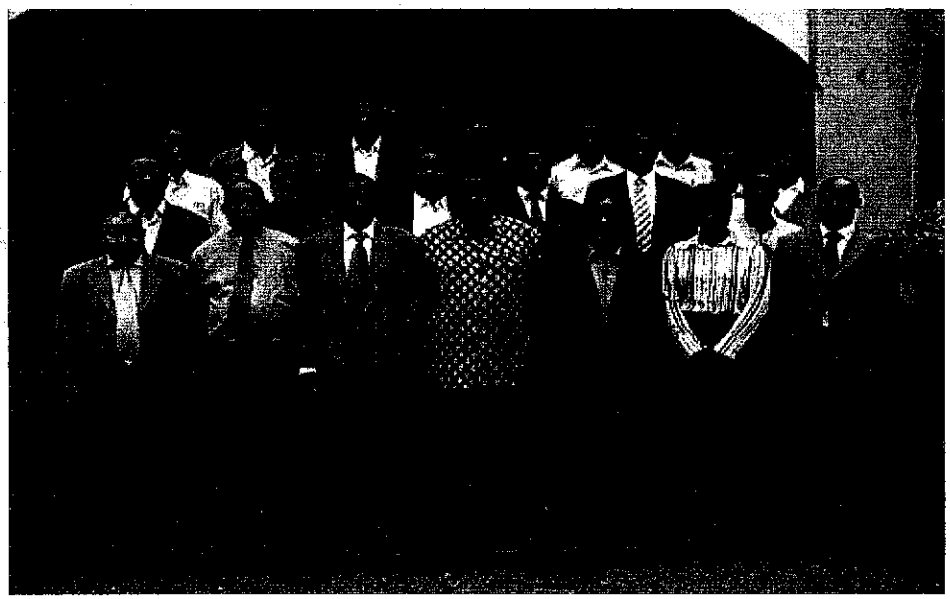
IV. INTER-AGENCY WILDLIFE LAW ENFORCEMENT WORKSHOPS

1. Inter-agency Wildlife Law Enforcement Training Workshop in Uganda (February 2010)

Over twenty law enforcement officers from different national agencies in Uganda participated in training workshop held at Masindi Hotel, Uganda from 8th to 11th February 2010. The participants were drawn from entry/ exit points including Customs, Immigrations, Civil Aviation Authority, National Forestry Authority, Ministry of Tourism Trade and Industry (MTTI), Ministry of Agriculture (Veterinary), Police/Interpol NCB, Wildlife and Judicial. Partners from cargo handling like ENHANS at Entebbe International Airport also participated.

The workshop was opened by Amb. Julius B. Onen- the Permanent Secretary of the Ministry of Tourism Trade and Industry. In his opening speech he stated that wildlife crime is increasingly becoming a complex and dynamic phenomenon which poses an enormous challenge to law enforcement agencies in terms of both skills and resource requirements. He further said that the Government of Uganda recognizes that interagency cooperation is one of the most important tool needed to effectively fight the ever-increasing sophistication in wildlife crime.

The workshop participants recommended for the formation of a Wildlife Crime fighting Committee from relevant national agencies.



Participants of the training workshop. Permanent secretary is in front row, fourth from right

V. FINANCIAL ACCOUNTABILITY REPORT

The summary of the accountability showing how the funds were disbursed to support the above activities is attached to this report as **ANNEX I.** We wish to profoundly thank the Forest Bureau-COA for the continued support and cordial working relationship.

ANNEX II

ACTIVITIES UNDERTAKEN AND FACILITATED BY LATF AND SUPPORT OF OTHER LATF DEVELOPMENT PARTNERS

1. LAW ENFORCEMENT OPERATIONS

1.1 Investigations into 2 tons of elephant ivory ivory seized in Haiphong, Vietnam

In January 2010, LATF working jointly with the Tanzania Wildlife Division (TWD) and Interpol National Central Bureau (NCB) Dar-es-Salaam arrested the main suspect in connection with illegal export of 769 pieces of elephant tusks, weighing 2005.6 Kg seized at the port of Hai Phong, Vietnam in August 2009. The contraband was disguised as sea shells and believed to have originated from Zanzibar. This arrest followed intensive investigation coordinated by LATF that started in September 2009. The arrested suspect was indicated as the exporter on the contraband's accompanying documents. The investigations have enabled collection of intelligence on the *modus operandi*, trade routes and possible destinations of elephant tusks in the Far East from the region.



The elephant tusks cut into pieces and concealed amongst packages full of sea shells

1.2 Investigations into Illegal export of 4,861kg of ivory seized in Manila, The Philippines originating in Dar-es-Salaam, Tanzania

These were follow up investigations concerning the seizure of elephant ivory with total weight of 4,861kg by the Bureau of Customs (BOC) at the port area in Manila, the Philippines in June 2009. The ivory had originated from the port of Dar es Salaam, Tanzania. Following the information, a combined investigation team was constituted comprising officers from the Tanzania Wildlife Division (TWD), Interpol NCB – Dar es Salaam and LATF.

The investigations revealed that on diverse dates between October 2008 and March 2009 seven (7) suspects made all necessary shipping arrangements for two containers to be shipped from Dar-es-Salaam port to South harbor Port, Manila. The consignments had been declared as recycled plastic wastes. The suspects were arrested and arraigned in Kisutu Resident Magistrates' Court in Dar-es-Salaam but hearing was deferred pending finalization of investigations.

For purposes of completing the investigations to strengthen prosecution of the suspects, LATF led a team of five (5) investigators comprising officers from Interpol NCB, the Wildlife Division and the office of Director of Public Prosecution (DPP) – Dar es Salaam to Manila, The Philippines from 6th to 12th March 2010 to obtain further evidence from persons of the seizing authorities.



Investigation team with commissioner of Customs in The Philippines

The team verified the seized elephant ivory and collected documents and other evidence from relevant authorities in Manila (The Philippines) that was presented in court to strengthen the prosecution of the suspects charged with the illegal shipment of the contraband. The case is ongoing.



The team verifying the seized elephant ivory with their Philippine's counterparts

5.1 Lusaka law enforcement Operation

On 15th June 2010, members of a Joint Operation Team involving the Lusaka Agreement Task Force and Zambia Wildlife Authority raided business premises at the Downtown Shopping Complex in the central business district of Lusaka. The operation resulted in the arrest of two suspects who were found in possession of a leopard skin. The two were successfully prosecuted on 18th July 2010 and sentenced to 5 years imprisonment each with hard labour. This operation clearly demonstrates that illegal trade in wild cat products continues to be a major challenge.



Suspects arrested displaying some specimens seized in the operation

2. CAPACITY BUILDING PROGRAMMES

2.1 TRAINING

2.1.1. LATF and IFAW hold a regional Training Workshop on Combating Illegal Trade

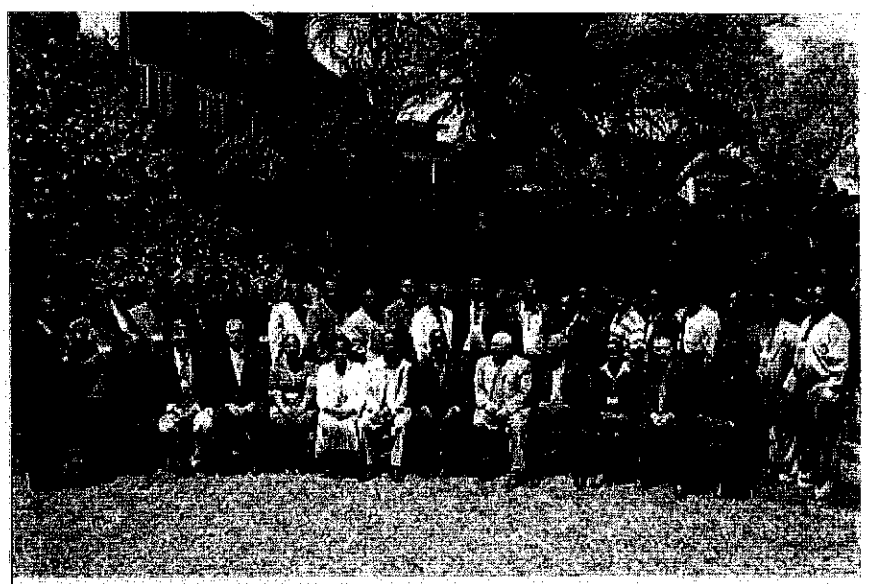
The Lusaka Agreement Task Force (LATF) in collaboration with the International Fund for Animal Welfare (IFAW) held a regional training workshop for senior conservation managers and law enforcement officers from thirteen African countries. The workshop was held at Fair View Hotel in Nairobi, Kenya from 12th to 15th October 2010

under the theme 'Combating Illegal Wildlife Trade in Africa.' The training was aimed at equipping the officers with more knowledge and skills in combating wildlife crime in Africa through building a common understanding of the threats to wildlife resources. It provided an opportunity for participants to exchange experiences and gain deeper insights into nature and substance of wildlife crime on the African continent.

The participants were from Botswana, Burundi, Democratic Republic of Congo, Republic of Congo, Ethiopia, Kenya, Malawi, Rwanda, South Africa, Swaziland, Tanzania, Uganda and Zambia while resource persons were provided for by Kenya National Intelligence Academy, INTERPOL General Secretariat, IFAW Regional Office East Africa, IFAW Dubai and the Lusaka Agreement Task Force.

The training workshop was officially opened by Honourable Dr. Noah Wekesa, Kenya's Minister for Forestry and Wildlife, who commended the organizers of the workshop for their tireless efforts in combating illegal wildlife trade. Dr. Wekesa called upon wildlife law enforcement agencies in Africa to promote co-operation in fighting the ever increasing sophistication of wildlife crimes. He noted that it was only through increased collaboration amongst agencies that the scourge of illegal trade in wildlife can be contained.

Also present at the workshop were the IFAW Executive Vice-President, Mr. Azzedine Downes, the Regional Director of IFAW East Africa, Mr. James Isiche, the Director LATF, Mr. Bonaventure Ebayi and the Director of Kenya Wildlife Service, Dr. Julius Kipng'etich who closed the workshop.



IFAW - LATF REGIONAL TRAINING WORKSHOP ON COMBATING ILLEGAL WILDLIFE TRADE
12TH - 15TH OCT 2010 NAIROBI - KENYA

2.1.2 ASEAN-WEN Regional Investigator Course (RITC) and LATF's Partnership with ASEAN-WEN

In line with its Strategic Plan 2005-2015, LATF seeks strategic partners in order to enable it to effectively combat illegal trade in wild fauna and flora. In this regard, the LATF Intelligence Officer Mr. Karl Karugaba represented the Task Force at the ASEAN-WEN Regional Investigator Course (RITC) that took place from 1st to 5th November 2010 at the International Law Enforcement Academy (ILEA) and Rama Hotel in Bangkok, Thailand. The training was followed from 8th to 12th November 2010 by a series of meetings with Thai authorities (Royal Thai Police, Royal Thai Customs, National Parks, Wildlife and Plant Conservation Department.

There were 29 representatives from 11 countries including investigators from Brunei, Cambodia, China, India, Indonesia, Kenya, Laos PDR, Malaysia, Myanmar, Thailand and the Lusaka Agreement Task Force. Resource person included officers from Thai Police, FREELAND Foundation, UNODC, UNEP, ICPO-INTERPOL and Chulalongkorn University.

The objective of the training was for sharing of information on illegal trade in big cats, pangolins and elephant ivory with a view to effectively curtail wildlife crime. LATF shared with participants its experience in wildlife law enforcement focusing on contraband ivory which in the recent past has been smuggled in large quantities to South East Asia. The training culminated in development of law enforcement Action plans for big cats, pangolins and elephant ivory.

Officers from Kenya Wildlife Service (KWS) and LATF held a series of meetings with Thai authorities focusing on co-operation between Africa and Thailand in investigation of cases of illegal trade in elephant ivory. The meetings were convened against the background of seizure of over 5,000 kg of elephant ivory originating from East Africa between 2008 and 2010. The Thai authorities pledged to enhance cooperation with LATF and Lusaka Agreement Parties in the investigation of wildlife cases.

The Task Force and representatives of ASEAN-WEN expressed interest for developing a Memorandum Understanding between the two organizations after due consultations.



Part of ivory from Uganda seized at Suvarnabhumi Airport January 2009, Courtesy Royal Thai Customs



Ivory from Kenya seized at Suvarnabhumi airport April 2010, Courtesy Royal Thai Customs

2.1.3. Training on Criminal Intelligence Analysis and Real-time Analysis Intelligence Database (RAID).

A regional training course in criminal intelligence analysis and Real-time Analysis Intelligence Database (RAID) was organized and conducted by the Lusaka Agreement Task Force (LATF) in conjunction with INTERPOL General Secretariat between 22nd November 2010 and 10th December 2010 at the Kenya Wildlife Service Headquarters, Nairobi. Its main purpose was to equip law enforcement officers with the requisite knowledge and skills to enhance enforcement of environmental and related laws as well as compliance with Multilateral Environmental Agreements (MEAs) and international conventions in Africa. The training brought together officers from some Lusaka Agreement member states while the trainers were drawn from INTERPOL Lyon and INTERPOL Regional Bureau in Nairobi.



Group photo of training participants

2.2 INTER-AGENCY WORKSHOPS

2.2.1 LATF convenes a Wildlife law enforcement inter-agency workshop in Dar-es-Salaam, Tanzania

During 20th- 22nd January 2010, the Lusaka Agreement Task Force (LATF), Tanzania Wildlife Division (TWD) and Interpol General Secretariat co-organized an inter agency wildlife law enforcement awareness workshop in Dar-es-Salaam, Tanzania. The workshop that drew 30 participants from 13 different institutions was held in fulfillment of the LATF's mandate as provided in the Lusaka Final Act and LATF's Strategic Plan concerning building capacities; facilitate co-operation and collaboration of the Law Enforcement Agencies in fighting illegal trade in wild fauna and flora at national, regional and international levels. The workshop was funded by the Interpol General Secretariat.

The participants at the workshop noted with concern the alarming frequency and volumes of seizures of wildlife specimens indicating originating from and or transported through Tanzania. They further, noted the need for concerted efforts and networking to effectively curtail illegal trade in wildlife specimens. As the result, the workshop recommended for the Government to

consider, as a matter of urgency, establishing a forum (standing committee or taskforce) that will involve relevant stakeholders to address the escalating problem of illegal trade in wildlife specimens.



Dar-es-Salaam workshop participants in a group photo

2.2.2 LATF's capacity building program delivers a new inter-agency Wildlife Forum in Zambia

This was revealed at the Zambia Interagency Wildlife Law Enforcement Workshop held in Lusaka from 26th – 28th January 2010. The workshop was held under the two year (2008–2010) capacity building program of work for the Lusaka Agreement Task Force (LATF). It was jointly organized by LATF and the Zambia Wildlife Authority (ZAWA) while funding was provided by Interpol General Secretariat. Durign the workshop, an interagency wildlife forum for investigators, prosecutors and magistrates in Zambia was established.

The workshop was organized as part of the capacity building program being implemented by the Task Force. It was designed to contribute to the efforts aimed at improving the collective capacity of law enforcement agencies in Zambia to fight wildlife crime. The workshop drew 27 representatives from the ZAWA, Zambia Police Service, Drug Enforcement Commission, Office of the Director of Public Prosecutions and Department of Justice.

The newly established Interagency Wildlife Forum will provide a platform for wildlife investigators, prosecutors and magistrates to engage dialogue and social networks that are vital in the fight against wildlife crime. The forum will also generate opportunities for the various agencies to work together and to pool scarce financial and human resources. ZAWA was nominated to provide secretariat services to the forum while LATF is expected to provide technical support.



Group photo of inter-agency workshop Participants

2.2.3 LATF promotes networking to combat trafficking of wildlife products in Tanzania

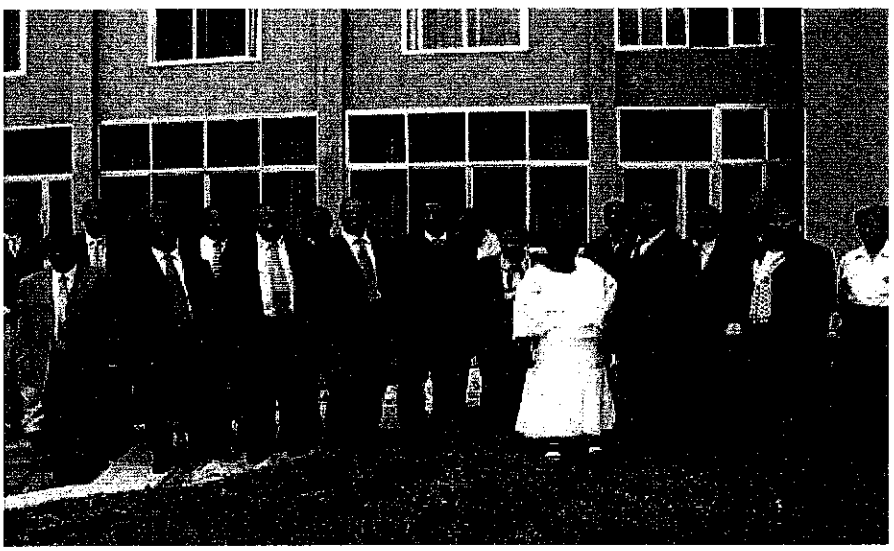
One of the Lusaka Agreement Task Force missions is to complement and support the Parties' efforts in reducing and ultimately eliminating illegal trade in wild fauna and flora. Following the escalating trend of illegal trafficking in wildlife specimens particularly elephant ivory, the Task

Force (LATF) is spearheading efforts to establish an institutional network to deal with the situation through holding a series of national interagency workshops.

From 5th to 7th May 2010, LATF in partnership with Tanzania Wildlife Division and Interpol General Secretariat (IPSG) co-organized an Inter-Agency Wildlife Law Enforcement Awareness workshop in Arusha, Tanzania. Selected government Law Enforcement Agencies and some stakeholders who are directly and/or indirectly involved in the enforcement of wildlife law participated in the workshop.

This was the second workshop in Tanzania in 2010 after the one in Dar es Salaam January 2010. The objective of this workshop was to share understanding on the value and role of interagency law enforcement in combating illegal trade in wild fauna and flora and strategize on how to improve information sharing as well as networking on wildlife law enforcement. This was achieved by participants unanimously resolving to establish focal points in key agencies engaged in combating wildlife crimes and forming a wildlife forum that will involve relevant stakeholders to facilitate effective communication, networking and address the escalating problem of illegal trade in wildlife specimens.

The Participants were content that the objectives of the workshop were achieved and encouraged more of such forums in future.



Group photo of the workshop participants of the workshop

2.3 REGIONAL AND INTERNATIONAL CONFERENCES

2.3.1 LATF participates at the World Customs Organization (WCO) Enforcement Committee Meeting

The Director of the Lusaka Agreement Task Force (LATF) Mr. Bonaventure Ebayi and the Field Officer-Law Enforcement Mr. Adan Mohamed Alio participated in the World Customs Organization (WCO) Enforcement Committee Meeting that was held from 2nd to 5th March 2010 at the Headquarters of WCO in Brussels, Belgium. The meeting was attended by National Contact Points, heads of RILOs and representatives of regional and other international organizations such as CITES. The meeting reviewed various reports of operations undertaken by different Customs Administrations, RILOs and other affiliate organizations for the year 2009. Various proposals for activities to be undertaken during 2010 were received and considered for approval. The committee subsequently endorsed a number of the proposals related to the work of customs.



From right to left, Director LATF, Secretary General WCO and a LATF Field Officer in charge of Law Enforcement

During the meeting the LATF Director made a courtesy call on the Secretary General of WCO, Mr. Kunio Mukuriya and briefed him on some of the major challenges in fighting illegal trade in wild fauna and flora. He commended the Secretary General of WCO for his outstanding leadership and the Permanent Technical Committee of WCO for inviting Lusaka Agreement Task Force to the meeting. Mr. Mukuriya assured the Director LATF that WCO will continue to support LATF's effort in fighting Environmental crime. The LATF Director also gave an overview on the Lusaka Agreement and outlined the activities undertaken and achievements made by the Task Force during the year 2009. In his remarks, the Director further thanked RILO Eastern and Southern Africa as well as RILO Asia - Pacific for their cooperation with LATF in 2009 and requested other RILOs to support LATF enforcement activities by sharing information on wildlife seizures and related illegal activities.

2.3.2 LATF participates at the 17th session of the African Forestry and Wildlife Commission

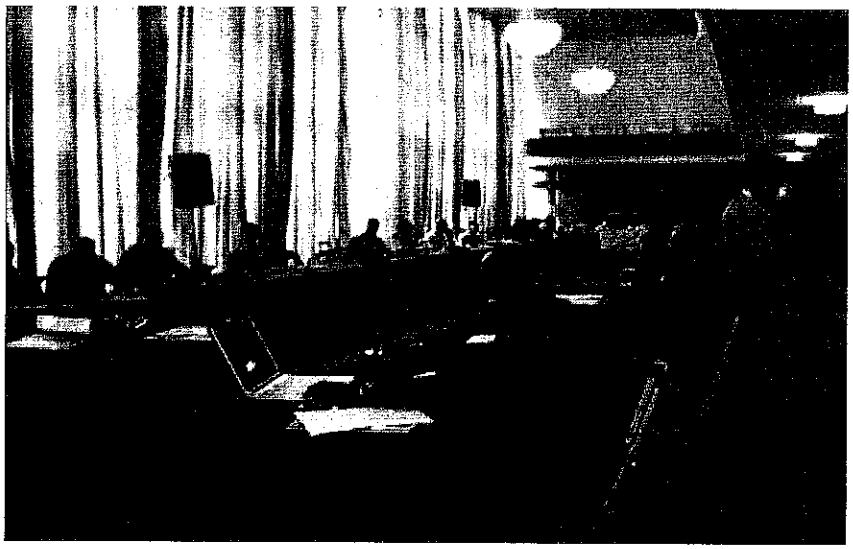
The Lusaka Agreement Task Force (LATF) at the occasion of the 17th Session of the African Forestry and Wildlife Commission (AFWC) held in Brazzaville, Republic of Congo 20th – 26th February 2010. During that occasion which also included the pre-session workshop on Climate Change and the first African Forestry and Wildlife Week, LATF organized a side event on The Lusaka Agreement: A Regional Approach to Combat Illegal Trade in Wild Fauna and Flora. The side event was attended by 38 participants from Burundi, Congo Brazzaville, D.R. Congo, Senegal, Guinea, Kenya, Malawi, Nigeria, Swaziland, Tanzania, UK and USA. There were also participants from international institutions including FAO, UNEP, SADC, CIC (International Council for Game and Wildlife Conservation) and UNESCO.

The objectives of the side event were to: highlight the need for regional interstates cooperation in wildlife and forestry law enforcement; raise awareness on the Lusaka Agreement and activities of its Task Force in supporting efforts of the Parties to combat illegal trade in wild fauna and flora and urge for more membership/accession to the Agreement and partnership with the Task Force.

The Director of the Task Force gave a Key Note Statement and presented a paper on the Lusaka Agreement. The main highlights emerging from the side event was awareness and better understanding of Lusaka Agreement and the work of its Task Force. The participants appreciated the work LATF is doing in Parties and the need for more African States to accede to the Lusaka Agreement in order to ensure comprehensive coverage of the continent and to further address trans-boundary wildlife and forestry crimes.



Director of LATF giving Key Note Statement at the 17th Session of AFWC



Director LATF presenting a paper during a side event

2.3.3 LATF participates in the 9th World Customs Organization (WCO) Regional Intelligence Liaison Office (RILO) ESA & NCP Administrative Meeting at Victoria, Mahe Islands-Seychelles

LATF participated in the 9th RILO ESA National Contact Points administrative meeting from 11th to 14th October 2010. During the meeting LATF officer, Mr. Adan Mohamed Alio made a presentation on LATF's present activities as well as shared LATF's experience on issues related to wildlife law enforcement including seizures made with assistance from customs authorities and cooperation with WCO/RILOs.

The Meeting was opened by the Principal Secretary of the Ministry of Finance of the Republic of Seychelles and attended by ten (10) National Contact Points of RILO ESA. The Members of RILO-ESA are Seventeen (17) countries. Those who participated are from Botswana, Kenya, Lesotho, South Africa, Namibia, Mauritius, Seychelles, Uganda, Zambia and Zimbabwe. The officers underscored the importance of networking and collaboration among their agencies in ensuring the international trade is always done in accordance with laws and regulations including compliance with MEAs and internationally agreed standards.

The meeting urged all the RILO ESA member countries to accede to Lusaka Agreement on cooperative enforcement operations directed at illegal trade in wild fauna and flora as well as to support LATFs efforts to fight illegal trade in wildlife in the African region.



The participants at 9th WCO-RILO ESA NCP Meeting in Mahe, Seychelles

ANNEX I

LUSAKA AGREEMENT TASK FORCE
FOREST BUREAU, COA
FUND ACCOUNTABILITY STATEMENT: FEBRUARY 2011

SUMMARY		US$
Balance B/F	1st January 2010	-
Amount of Donation : *Receipt no. '00363 of 20th August 2010*		30,000
Expended Amount to Date:		
	Amount Expended as Below	(31,428)
Excess of expenditure over funds received (covered by LATF)		(1,428)

ANALYSIS OF EXPENDITURE

PV No.	Voucher Date	Description of Expenditure	Amount Foreign currency	Amount US$
LAW ENFORCEMENT OPERATIONS				
CONGO (BRAZZAVILLE)				
Ivory Investigations in Congo (Brazzaville)			**FCFA**	**US$**
08202	12-Mar-10	Intelligence gathering mission in Congo incl informant allowances		234
SUB-TOTAL				234
KENYA				
Investigations into seizure of 637kg of ivory seized at Bole Intl Airport in Addis Ababa from JKIA Nairobi (January 2010)				
08120	26-Jan-10	Food and Accomodation for LATF Officer		1,000
08120	26-Jan-10	Taxi hire in Nairobi and Addis Ababa		38
08120	26-Jan-10	Communication (airtime)		25
08120	26-Jan-10	Miscelleneous expenses - porter wages at airport		6
Intelligence Gathering Field Mission in Nyeri Central Kenya - Rhino poaching				
08105	12-Jan-10	Food and Accomodation for LATF Officers and backup team		797
08105	12-Jan-10	Fuel for Operation vehicle		53
08105	12-Jan-10	Communication (airtime)		27
08105	12-Jan-10	Informant allowances and expenses		150
SUB-TOTAL				2,096
TANZANIA			**TShs**	**US$**
Investigations into ivory seizure 1505.4kg - seized in Hongkong orginating from Zanzibar (September 2010)				
08415	8-Oct-10	Food & Acomodation for LATF Field Officer in Zanzibar		1,400
08415	8-Oct-10	Communication (airtime)		63
08415	8-Oct-10	Airport transfers		75
09973	8-Oct-10	Airticket : African Tropical Safaris		481
Investigations into ivory seizure 2 tonnes - seized in Vietnam originating from Zanzibar (January 2011)				
08503	1-Feb-11	Food and Accomodation for LATF Officer		600
08503	1-Feb-11	Air ticket : Nairobi - Dar- Nairobi		300
08503	1-Feb-11	Taxi charges for airport transfers		64
08503	1-Feb-11	Communication (airtime)		25
08503	1-Feb-11	Lunch & refreshments -back up team		12
SUB-TOTAL				3,020
UGANDA			**UG Shs**	**US$**
Illegal ivory trade investigations in Kampala, Uganda (January 2010)				
08106	12-Jan-10	Food and accomodation expenses - LATF Intelligence Officer		1,000
08106	12-Jan-10	Communication (airtime)		42
08106	12-Jan-10	Car hire		146
08106	12-Jan-10	Informant allowances and expenses		37
04787	28-Jan-10	Airticket : Nairobi - Entebbe - Nairobi		491
SUB-TOTAL				1,716
ZAMBIA				
Operation "Western Mansion" - Lusaka (January 2011)			**ZK**	**US$**
08508	15-Feb-11	Car hire for the operations	10,200,000.00	2,140
08508	28-Feb-11	Fuel for car hire	3,428,014.60	719
08508	28-Feb-11	Communication (airtime)	500,000.00	105
08508	28-Feb-11	Food & Acomdation allowances for ZAWA Officers (back up team)	5,250,000.00	1,101
08508	28-Feb-11	Informants allowances	1,500,000.00	315
08508	28-Feb-11	Food and Accomdation for LATF Field Officer		1,400
08508	28-Feb-11	Luggage expenses		120
SUB-TOTAL				5,900

PV No.	Voucher Date	Description of Expenditure	Amount Foreign currency	Amount US$
CROSS BORDER MEETINGS				
21st Kenya/Tanzania cross border security meeting - Voi (September 2010)				
08386	30-Sep-10	Food & Accomodation for LATF Director, Field Officer and Driver		650
SUB-TOTAL				650
CAPACITY BUILDING PROGRAMMES				
TRAINING				
Congo Brazzaville - Training Workshop			FCFA	US$
08126	31-Jan-10	Hire of vehicles and taxi charges	543,950.00	1,265
08127	31-Jan-10	Stationery, printing and communication (airtime)	203,200.00	473
08128	31-Jan-10	Accomodation for participants	335,000.00	779
08129	31-Jan-10	Food and refreshments for participants	415,700.00	967
08130	31-Jan-10	Out of pocket allowances for participants	393,000.00	914
08131	31-Jan-10	Food & Accomodation for LATF Officer		750
04787	2-Jan-10	Airticket: Nairobi - Brazzaville - Nairobi		1,096
SUB-TOTAL				6,243
INTER-AGENCY WORKSHOPS				
Inter-agency workshop - Masindi, Uganda (February 2010)				
08162	15-Feb-10	Transport: Hire of bus, transport refunds, taxis and fuel		1,122
08163	15-Feb-10	Out of pocket allowances for training participants		2,606
08163	15-Feb-10	Food & Accomodation for LATF Field Officer		1,200
08164	15-Feb-10	Food & Accomodation for training participants		6,641
SUB-TOTAL				11,570
GRAND TOTAL				31,428

Exchange Rate Used:	***1US$ = ZK***	***4,766.67***
	1US$ = KShs	***80.00***
	1US$ = UGShs	***2,020.00***
	1US$ = FCFA	***430.00***
	1US$ = TShs	***1,300***

國際野生物貿易研究委員會計畫報告摘要

國際野生物貿易研究委員會(Trade Records Analysis of Flora and Fauna in Commerce, TRAFFIC International)於 1976 年由世界自然基金會(World Wide Fund for Nature, WWF)和國際自然保育聯盟(The International Union for Conservation of Nature, IUCN)共同設立。TRAFFIC Network 於全球將近 30 國，8 個地區約有 30 個分部辦公室，100 餘位工作人員。TRAFFIC 主要任務為監測國際間野生動植物貿易現況。TRAFFIC 為世界公認主要的野生物貿易監測組織及對華盛頓公約(Convention on International Trade in Endangered Species of Wild Fauna and Flora, CITES)運作有深入瞭解的國際民間團體(Non-Governmental Organization, NGO)。TRAFFIC 與 CITES 秘書處有簽訂合作備忘錄(MOU)，與世界海關組織(World Customs Organization)也有密切合作關係。TRAFFIC 也與數個國家政府機構(尤其是查緝單位)簽訂 MOU。

TRAFFIC 工作案例舉例如下：

- 英國犯罪情報署(National Criminal Intelligence Service, NCIS)於 2002 年設立時，TRAFFIC 與該署的野生動物犯罪情報小組(National Wildlife Crime Intelligence Unit, NWCIU)合作，TRAFFIC 並於 2003 年支援一名人員至 NWCIU 工作。2006 年 10 月，國家野生動物犯罪小組(National Wildlife Crime Unit, NWCU)設立。之後與 TRAFFIC 持續合作，協助查獲多起違法案件。
- 持續調查象牙貿易現況為 TRAFFIC 重點工作。大象貿易資訊系統(Elephant Trade Information System, ETIS)截至 2008 年 12 月 31 日止，已有 13,220 筆資料。CITES 常設委員會討論象牙案時，TRAFFIC 提供近期查獲大量非法象牙案等相關資料，供與會者參考。例如 TRAFFIC 於 CITES 第 15 屆締約國大會提出 ETIS 報告(CoP15 Doc. 44.1 Annex)，說明 1992 至 2009 年非法象牙貿易之趨勢，供各締約國參考。
- 支援 CITES 運作為 TRAFFIC 工作項目之一，例如針對 CITES 第 12.5 號決議，TRAFFIC 調查發現亞洲大型貓科動物原產國相關法令之缺失，成功移送法辦案例稀少，刑罰太輕無法遏阻犯罪行為，庫存品管理情況不明，欠缺執法能力等問題。TRAFFIC 與其他團體於第 58 屆 CITES 常設委員會期間，建議原產國每年向常設委員會報告，執行 CITES 第 12.5 號決議相關措施，此提案並於 CITES 第 15 屆締約國大會討論。
- 與東南亞國協(Association of South East Asian Nations, ASEAN)會員國合作，設立東南亞野生動物執法聯絡網(Wildlife Enforcement Network，簡稱 ASEAN-WEN)，並持續辦理訓練班。
- 持續提供南亞環境合作計畫(South Asia Co-operative Environment Programme, SACEP)成員諮詢服務，並協助設立南亞野生動物執法聯絡網(South Asia Wildlife Enforcement Network, SAWEN)，共同合作打擊非法野生物貿易。

TRAFFIC International 2010 年計畫主要成果包括：

壹、支援全球執法行動

一、調查國際主要非法貿易案

- 蒐集情報、查緝沒入、貿易路線和走私方法等資料。

- 確認非法國際野生物貿易重大案件資料。
- 經由 TRAFFIC 聯絡網調查需優先處理案例。
- 提供調查資料，以利相關單位採取行動遏止非法貿易。

建立資料監測網，蒐集野生物貿易資料供分析和研議後續行動之用。彙集全球查緝沒入資料，大宗資料來自東南亞、東亞、南亞和非洲。資料分析可協助確認野生動物犯罪行為之熱點(hotspots)。TRAFFIC 調查發現近年來馬達加斯加 Critically Endangered 陸龜運往東南亞之數量遽增，經與 IUCN/SSC 淡水龜和陸龜專家小組合作，因而於中國、印尼、馬來西亞、泰國查獲相關非法貿易案。

二、蒐集、分析及傳送非法貿易情報資料

- 持續更新資料至情報分析資訊管理系統。
- 支援 EU TWIX。
- 傳遞情報資料給各國執法機構，以決定後續調查和行動。
- 及時提供情報資料協助查緝違禁品和走私者。
- 研發情報分析和傳遞技術。

TRAFFIC 負責設立及維護的歐盟野生物貿易資料交換系統(EU Trade in Wildlife Information eXchange, EU-TWIX)持續運作，參與此計畫者包括 27 個歐盟國家、Croatia、Montenegro、挪威、Serbia、瑞士和烏克蘭，使用者逾 470 餘人，目前資料庫中已建立 31,000 筆沒入資料(seizures records)。

發出 7 次 EU-TWIX Enforcement Alerts (查緝警報)，主要是陸龜走私方法、非法貿易路線、人工繁殖之情形、鑑定資料等。結果包括：

- 世界海關組織徵詢分享使用 EU-TWIX Alerts，尤其是由馬達加斯加非法輸出之訊息。
- 法國海關設立 EU-TWIX 看板，並與 EU-TWIX 成員分享訓練資料。
- 經由 TRAFFIC Japan 協助，提供日本海關非法陸龜貿易訓練資料。
- 經由 EU-TWIX 系統，找到非法貿易運作地點。

TRAFFIC 蒐集到之老虎、犀牛、大象、海龜等情報資料，協助各國查緝單位查獲非法貿易案件。例如印度逮捕盜獵者和中國查獲象牙案等。

三、決定執法問題需優先改善項目，並提出改進方案

- 研究及登錄執法成效不佳之問題。
- 與各國政府、CITES 秘書處、國際刑警組織、UNODC 和世界海關組織合作，提倡補救措施。
- 增加各界對非法貿易議題之瞭解，包括各國政府、執法機構、CITES 常設委員會、議題相關團體如貿易公會和民間團體等。
- 繼續充實 TRAFFIC 能力訓練計畫，訓練對象包括政府執法機構和野生動物執法聯絡網之熱點。

主要成果包括：

- TRAFFIC 研究調查報告，凸顯野外捕捉爬蟲類卻聲稱為人工繁殖案例。

- 2010 年南非有 320 頭犀牛被盜獵，為數十年來最嚴重之損失。而越南非法貿易犀牛角情形增加，兩者間似有關連，為此 TRAFFIC 居間聯繫，安排兩國雙邊會談，促成兩國查緝單位之合作。
- 協助馬來西亞設立跨部會任務小組，處理非法盜獵和非法佔用情形。
- 彙集莫三鼻克和坦尚尼亞象牙貿易資料，供執法單位運用。
- 推動偵測犬計畫，辦理訓練課程，協助查出非法野生動物產製品例如虎骨、虎皮、豹骨、豹皮、熊膽汁製品等。
- TRAFFIC 提供金屬探測器，協助印度 Rajaji 國家公園和老虎保護區發現 30 個捕獸夾。並協助印度辦理執法訓練班，共有 350 餘人參訓。
- TRAFFIC 泰國非法象牙貿易調查，發現泰國為亞洲最大非法象牙市場，TRAFFIC 並協助泰國辦理查緝訓練班。2010 年 2 月泰國海關查獲該國有史以來這大宗象牙走私案，沒入 2 噸(239 根)非洲象象牙。4 月再度沒收 1.4 噸(296 根)象牙，7 月又查獲 800 公斤象牙。
- TRAFFIC 協助俄羅斯辦理查緝訓練班。
- 透過 ASEAN-WEN 系統，辦理執法訓練班，共有 60 多個國家級政府單位參與，650 餘人受訓。

貳、推動修改野生動物貿易政策

一、支援華盛頓公約

- TRAFFIC 和 WWF 及 IUCN 合作，提供相關參考資料供 CITES 第 18 屆植物委員會、第 24 屆動物委員會、第 58 屆常設委員會和第 15 屆 CITES 締約國大會討論。
- 第 15 屆 CITES 締約國大會期間，提供「附錄物種修訂提案分析與建議」供與會者參考，分析部分有英、法、西班牙文版，建議部分除上述三種語言外，還有中文和日文版。
- 第 15 屆 CITES 締約國大會議題中，TRAFFIC 重點關注者包括老虎和其他亞洲大型貓科動物、非法象牙貿易、列入附錄標準等。

二、支援多邊合作，鼓勵合法和永續性野生動物貿易

- 參加生物多樣性公約(Convention on Biological Diversity, CBD)第 14 屆科諮機構會議(SBSTTA 14)。TRAFFIC 重點議題為永續利用，包括野生動物作為肉類來源和藥用植物貿易等。
- 參加生物多樣性公約第 10 屆締約方大會，TRAFFIC 重點議題為減少非法和非永續野生物貿易之方法。TRAFFIC 於會期間辦理 2 次 side event，分別凸顯藥用植物貿易、野生動物貿易和保護區議題。
- 參加漁業和貿易管理相關會議，例如區域性漁業管理機構會議。討論以貿易措施永續性管理魚類資源之可行性、鮪魚管理和誤捕議題。
- 參加聯合國世界糧農組織(FAO)相關會議，討論 CITES 和鯊魚議題。
- 參加國際熱帶木材組織(International Tropical Timber Organization, ITTO)相關會議，檢討 ITTO 指南和永續森林經營管理。
- 參加於俄羅斯聖彼得堡召開之國際老虎論壇。13 個原產國同意合作推動全球老虎拯救計畫(Global Tiger Recovery Programme, GTRP)。
- TRAFFIC 各地工作人員努力將議題聚焦於盜獵和貿易面向，提高媒體曝光率，促使決策者重視此議題。包括出版泰國和緬甸大型貓科動物

非法貿易議題之報告，以及製作影片 Closing a Deadly Gateway 描述緬甸邊界非法貿易情形等。

- 促進非洲中部國家加強野生動物貿易管理合作，準備 2 份文件供非洲中部森林委員會(Central African Forest Commission, COMIFAC)討論。

參、宣導成果和影響抉擇

一、以網際網路宣導永續性野生動物貿易之觀念

- 持續擴充 TRAFFIC 網站，目前有 144 項主要新聞和 762 件野生動物貿易相關報導。並新設每週電子通訊(weekly e-newsletter)，供讀者下載。
- 持續擴充 TRAFFIC 網站內容，提升資訊交換速度，於 2010 年間，有來自 216 國共 145,000 人至 TRAFFIC 網站查閱 507,000 餘頁的資料，並下載 100,000 件 TRAFFIC 報告。
- 2010 年 1 月增設 CITES 第 15 屆締約國大會專頁，3 月間吸引創紀錄 31,800 人閱覽 91,000 網頁資料。讀者下載報告在大會召開期間也高達每週 3,600 個檔案，IUCN 和 TRAFFIC 合作出版的附錄提案分析和建議尤其受歡迎。
- TRAFFIC 網站 SBSTTA 14 會議 update 也獲得許多迴響。
- 林務局贊助經費文字列在網站蒐尋出版品那一頁，以及每週通訊中。

二、運用國際媒體宣導，提升民眾對野生動物貿易問題及解決方法之瞭解

- 以發佈新聞稿、召開記者會、與記者聯繫或投稿至其他刊物等方式，提升民眾對野生動物貿易議題之瞭解。
- TRAFFIC 網站或 TRAFFIC 所發佈之新聞稿，經常被國際媒體引用。例如 2010 年 8 月間，曼谷機場發現由泰國前往伊朗旅客行李中有被麻醉幼虎之 TRAFFIC 報導，之後數天 850 個網站轉述此新聞。

三、增進政府機構、學術單位及利益相關人士對野生動物貿易之瞭解

- 1979 年開始出版 TRAFFIC Bulletin，原來僅有 200 人訂閱。目前寄贈約 4,500 人(150 餘國)，包括 100 餘個圖書館，讀者群眾多。2008 年 2 月起，除 pdf 檔外，TRAFFIC Bulletin 也可下載 html 格式。農委會林務局贊助經費的文字列在 TRAFFIC Bulletin 全球查緝相關資訊 (Seizures and Prosecutions)最上端。本項主題原有 6 頁，因廣受讀者歡迎，已增至 8 頁。
- 2010 年的主題包括 CITES 第 15 屆締約國大會、南非鮑魚、鱘魚貿易管理、盜獵馬來熊和非法貿易等。

TRAFFIC: CHANGING WILDLIFE TRADE FOR GOOD – PHASE 6

WILDLIFE TRADE LAW ENFORCEMENT SUPPORT, POLICY ADVOCACY, MEDIA AND COMMUNICATIONS

2010 Annual Project Activities Report

With support from the

Forestry Bureau of the Council of Agriculture

Executive Yuan
Republic of China

TRAFFIC®

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INTRODUCTION

Wild species, both animals and plants, make a critical contribution to human wellbeing around the world. They provide a source of food, medicine, household materials, pets and other items, and enrich human life with their beauty. Wild species also make an important contribution to the incomes and livelihoods of people who are reliant on the legal harvest and trade of natural resources. Unfortunately, illegal trade of wild fauna and flora threatens both the survival of wild species, and the availability of wildlife resources to those who depend on them. TRAFFIC therefore monitors the wildlife trade, both legal and illegal, brings attention to regulatory and enforcement problems, and provides recommendations, training and other assistance to governments to help them bring the trade under better control. TRAFFIC also provides information to businesses and the wider public to increase understanding of the need to act to keep the wildlife trade within sustainable levels. Once again during 2010, this work was made possible through a generous grant from the Forestry Bureau of the Council of Agriculture. This report summarises highlights of TRAFFIC's work to "Change Wildlife Trade for Good" with support from the Forestry Bureau of the Council of Agriculture in 2010.

AIM

Continue to contribute to efforts to 'Change Wildlife Trade for Good' through the activities of the TRAFFIC network. These include preparations for CITES CoP 15 in March 2010 and supporting further development of regional wildlife trade enforcement efforts, including the ASEAN Wildlife Enforcement Network (ASEAN-WEN), and the South Asian Wildlife Trade Initiative (SAWTI); strengthening TRAFFIC's ability to provide wildlife trade analysis and capacity building services to wildlife trade enforcement agencies, and wider communications efforts to increase access to wildlife trade information to a broad range of stakeholders.

Objectives

- To assist governments and intergovernmental organizations in the development of measures to enforce the provisions of CITES and other wildlife trade regulations in order to improve the effectiveness of CITES and regulatory approaches to managing wildlife trade.
- To identify areas of illegal wildlife trade, and encourage and assist remedial action by government authorities through provision of intelligence, facilitation, tools and training.
- To research and promote effective policy approaches and campaign for change toward ensuring that the wildlife trade is legal, sustainable and generates income for communities in developing countries in particular.
- To promote, communicate and raise awareness of the current challenges and solutions to ensuring that the wildlife trade is sustainable and legal.

Executants

Work to achieve these objectives is led by TRAFFIC International, the headquarters of the world-wide TRAFFIC network, working with TRAFFIC staff in over 25 countries around the world. TRAFFIC International directs and manages the network's activities, and provides particular expertise with regard to enforcement, wildlife trade policy and advocacy, communications and media relations. TRAFFIC International also produces the *TRAFFIC Bulletin* and the global website.

To strengthen its ability to support enforcement efforts, TRAFFIC maintains a proactive team of representatives from within its network to act as regional enforcement co-ordinators. This team oversees the intelligence handling and analysis and many of TRAFFIC's enforcement-related activities. TRAFFIC International's Global Enforcement Co-ordinator manages this work.

TRAFFIC undertakes many of the activities described in this report in concert with government agencies and intergovernmental organizations worldwide, including the CITES Secretariat, with whom TRAFFIC has a Memorandum of Understanding (MOU) that formalises this working arrangement. TRAFFIC also has a number of national level MOUs with governments and their enforcement agencies in particular.

1. Global Enforcement Support

Investigation of illegal international trade in wildlife

- Collection of intelligence information, seizures data, information on trade routes and smuggling methods
- Identify significant cases of illegal international trade in wildlife
- Investigate cases on a priority basis through TRAFFIC's network of regional enforcement support co-ordinators
- Report findings of investigations to government enforcement agencies and assist them in taking action to address the problems identified

Intelligence information related to reducing illegal wildlife trade is gathered in all the regions where TRAFFIC works. A variety of methods are used, including collection of information provided by key contacts in the field, traders, and members of the public and from the work that TRAFFIC staff carry out themselves. TRAFFIC's use of this information is discussed below in the section on Global Enforcement Support.

TRAFFIC continued to develop a network of monitoring and information sources in priority places for action on wildlife trade in order to expand the collection of wildlife trade information for analysis and action. TRAFFIC also systematically collated seizures data in all the regions in which it works, with the largest volume of data coming from Southeast Asia, East Asia, South Asia and Africa. A process was also initiated to amalgamate these data, which currently reside in a number of discrete databases, to ensure maximum intelligence and analytical value. Standard protocols were developed and used with regard to tracking location and temporal information, which will enable TRAFFIC to more accurately map and help predict hotspots of wildlife crime in future. This is described in more detail below.

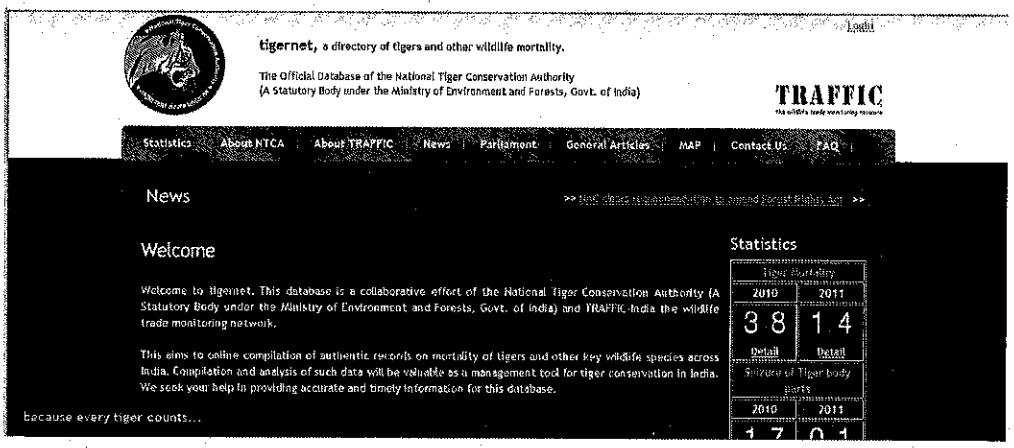
Information collected in this way is being used to help enforcement authorities understand and act to stop illegal trade. For example, TRAFFIC has documented a dramatic increase in trade in four Critically Endangered tortoise species from Madagascar to Southeast Asia over the past few years. TRAFFIC is working closely with governments in the region, conservation bodies in Madagascar, and the IUCN/SSC Freshwater Turtle and Tortoise Specialist Group to address this issue, with efforts leading to seizures in China, Indonesia, Malaysia, Thailand, and associated arrests. Several European governments have requested information on the trade from TRAFFIC to assist their investigations and enforcement efforts.



Gathering, analysis and dissemination of information about illegal trade

- Input into formalised intelligence analysis systems
- Support to the EU TWIX – the EU wide seizures database and secure listserver
- Dissemination of intelligence information to assist national enforcement agencies in targeting, profiling and prioritising actions and investigations
- Timely delivery of intelligence to assist with shipment and smuggler interceptions
- Development of intelligence analysis/dissemination techniques for TRAFFIC

TRAFFIC continued to provide support to a number of analytical systems to document illegal wildlife trade, including the Elephant Trade Information System (ETIS), which TRAFFIC manages on behalf of the CITES Parties, and EU TWIX (see below). Recently, TRAFFIC, on behalf of the National Tiger Conservation Authority in India, has developed TigerNet. TigerNet provides a mechanism for government personnel working throughout the country to provide and access data on Tiger poaching and trade in India. It also serves as a vehicle for delivering information on the scale of Tiger poaching and trade to enforcers, parliament and the wider public both within and outside the country.



TRAFFIC continued to support the further evolution of EU-TWIX, a database of information on wildlife seizures in the European Union and an associated mailing list that allows quick and efficient information sharing between designated enforcement officers from all 27 EU Member States, plus Croatia, Montenegro, Norway, Serbia, Switzerland and the Ukraine. The database currently holds information on over 31,000 wildlife seizures plus information on forensics institutes, rescue centres and wildlife experts, and prices of wildlife specimens in trade. The mailing list has proved an invaluable mechanism for rapid sharing of information on illicit wildlife trade, triggering a number of seizures and subsequent prosecutions. During CITES CoP 15, CITES Parties raised the possibility of creating a global wildlife trade seizures database modeled on EU-TWIX. The wider interest of CITES Parties is a testament to the growing value of the system, which is helping curb wildlife trafficking within the European Union and at its external borders.

A total of seven EU-TWIX Enforcement Alerts regarding tortoise species of conservation concern known to be in illegal trade were prepared and circulated on EU-TWIX, providing information on smuggling methods, illegal trade routes, likelihood of captive-breeding success, and identification sheets. Among the results reported to date are:

- The World Customs Organization (WCO) requested permission to share the alerts via ENVIRONET and has been paying special attention to the issue, particularly the illegal trade of species from Madagascar; two subsequent WCO alerts have been sent via ENVIRONET and EU-TWIX, including a Regional Intelligence Liaison Office (RILO) Alert entitled "Save the Tortoises!" The WCO Secretariat also contacted enforcement authorities in relevant countries to encourage information exchange to facilitate investigation of the cases;
- French Customs in Toulouse put up a special "EU-TWIX board" to display EU-TWIX alerts, along with other training materials shared via the EU-TWIX mailing list. According to David Danede (French CITES Management Authority): "EU-TWIX has changed the way we work, for the best";
- The alerts were shared with TRAFFIC East Japan and provided a basis for training Japanese Customs officials with regard to the illegal trade in tortoises;
- The EU-TWIX mailing list has helped identify the area of operation of some illegal traders.

Information gathered by TRAFFIC on species including Tigers, rhinos, elephants and marine turtles was prepared as intelligence reports and supplied to government enforcement agencies in a timely and confidential manner to aid enforcement efforts. In India, for example, TRAFFIC collected field-level actionable intelligence in India, which was provided to law enforcement agencies for direct action. TRAFFIC worked closely with State forest departments, police departments, the Indian Army, and border security forces, with this collaboration leading to the arrest of wildlife criminals including poachers in the States of Assam, Uttar Pradesh, and Haryana. Similarly in China the delivery of accurate and timely information, cross-checked by TRAFFIC, to government law enforcement has opened doors to further increase law enforcement action, and resulted in the seizure of ivory items identified during market surveys.

Work continued to strengthen TRAFFIC's ability to supply such information to government enforcers. The first phase in the development of TRAFFIC's information management system for illegal trade

data was completed during 2010. In the first half of this year, TRAFFIC worked with i2 in designing a database specific to TRAFFIC's needs, with training provided to TRAFFIC staff in Southeast Asia and India. Use of this software will greatly enhance TRAFFIC's ability to assess illegal trade patterns and to provide information that will support government enforcement efforts.

Identification of priority enforcement problems, development of recommendations for remedial action, and capacity building support

- Research and documentation of problems of ineffective enforcement as necessary
- Promotion of remedial measures in collaboration with governments, the CITES Secretariat, Interpol, UNODC and the World Customs Organization
- Increasing awareness of illegal trade issues among governments, enforcement agencies, and stakeholders such as trade associations and NGOs, as well as the CITES Standing Committee, as necessary
- Further development of TRAFFIC's capacity building programmes targeting government wildlife enforcement agencies and "wildlife enforcement networks" in key wildlife trade hotspots

Research and documentation of ineffective enforcement

TRAFFIC's research is just the first step along a path to supporting governments, industry and consumers to respond to illegal and unsustainable trade. As noted above, TRAFFIC has done considerable work to document and draw attention to the laundering of wild-caught reptiles falsely declared as captive-bred. TRAFFIC is increasingly called upon as an expert in this field and has produced a number of reports and papers on the subject. Based on TRAFFIC's input, a number of shipments have been denied entry into respective countries, or seized.

Action has also been facilitated to address illegal trade in rhino horn from southern Africa. South Africa has lost nearly 320 rhinos to poaching in 2010, the worst loss of rhinos to poaching in several decades. Markets in Viet Nam have been increasingly implicated as a main driver of the illegal rhino horn trade in Asia; a major trade route has emerged connecting horn from illegally killed rhinos in South Africa with markets in Viet Nam. To help address the escalating poaching and trade, TRAFFIC took the lead in facilitating linkages between South African and Vietnamese law enforcement agencies to establish effective channels of communication and improve law enforcement on rhino horn trade issues. This included helping arrange a series of bilateral meetings, first in Viet Nam and then in South Africa, to scale up collaboration and cooperation between the government enforcement agencies in these two important countries. In October, TRAFFIC supported a mission of South African law enforcement officers to Viet Nam to enhance bi-lateral engagement on the shared problem of illegal rhino horn trade. The two governments agreed a number of measures to detect and reduce illegal trade, with a visit by officials from Viet Nam to South Africa to further this cooperation planned for 2011.

Promoting remedial measures

In Malaysia, TRAFFIC initiated the establishment of a Multi-agency Task Force in Belum-Temengor, that is tasked with addressing the increasing threats to poaching and encroachment into the Belum-Temengor forest complex (at the Thai-Malaysia border). TRAFFIC is an advisor to this task Force. This Task Force is the only one of its kind in an important source-site in the country, and is expected to pave the way for other such task-forces to be set up in the country. Trade surveys continue to be conducted at key hotspots along Thailand-Myanmar-China borders to identify trends and emerging issues for Tigers and other Asian big cats.

TRAFFIC staff in Africa began compiling information and data on the ivory trade situations in Mozambique and Tanzania and lining up government support for a major law enforcement initiative to halt illegal trafficking. Preparations for trialling the use of sniffer dogs at key seaports and along major roadways and bridges commenced with the identification of a South African company that has perfected a new technique whereby their dogs are able to detect odours from filter samples rather than from actual objects. In this way, a dog can potentially sample a 100 times more items than it could if it was, for example, on a bridge moving from vehicle to vehicle. TRAFFIC has pioneered the training and use of sniffer dogs for detecting high value wildlife products.

Five dogs specially trained to sniff out illegal wildlife products were trained during the second phase of a training programme supported by TRAFFIC. These dogs joined the Forest Departments of Madhya Pradesh, Maharashtra and Jharkhand. The dogs have been trained to detect hidden wildlife articles such as Tiger bone and skin, Leopard bone and skin and bear bile. The dogs and their 10 handlers completed a rigorous nine month training programme at the Dog Training Centre, 23rd Battalion of Special Armed Forces, Bhopal. Sniffer dog squads have now been deployed by the forest departments of Maharashtra, Madhya Pradesh and Jharkhand in India and have already started to show positive results, with criminals apprehended in Madhya Pradesh and Maharashtra.

TRAFFIC also continued to provide and propagate the use of Deep Search Metal Detectors for anti-poaching surveillance and detection of traps/snares planted by the poachers in the protected areas. These detectors were sent to various Tiger Reserves and Forest Divisions, and have helped in the detection of traps in Rajaji National Park, Uttarakhand, where about 20 leg hold traps were detected from the forest trails during the partrolling. Smilarly a patrolling team detected 10 traps in Dudhwa Tiger Reserve, Uttar Pradesh. The traps had been set on a forest path for trapping Leopard/Tiger.



Increasing awareness of illegal trade issues among governments

Of special significance was the increased involvement of TRAFFIC in the efforts made by the Thai government to combat the illegal ivory trade, though capacity building workshops, Elephant Trade Information System (ETIS) linked training, awareness raising among ivory traders and through a media campaign. Thai authorities have also planned for ETIS and ivory workshops for their officers, in which TRAFFIC was invited for technical support and expert advice. Several high profile seizures of ivory have taken place in Suvarnabhumi International Airport in the second half of 2010 as a result of continued pressure and attention.



The Thai Royal Customs made three huge seizures in 2010, netting two tonnes of ivory in February consisting of 239 African Elephant tusks, reported to be the country's biggest ever ivory seizure. A further 1.4 tonnes was seized in April, when Customs officers discovered 296 African Elephant tusks inside three crates on board a flight and in July a further 800 kg was seized at the same airport.

TRAFFIC continued its engagement with Russian enforcement agencies through the provision of short focused training courses for front-line staff, organized by the Training Centre of the Central Customs Directorate. Two one-day training seminars were organized with the support from UNDP in Norilsk: the first seminar was for staff of the regional Transport Police Directorate; another was for staff of the regional Hunting Inspectorate. TRAFFIC in Russia's strong reputation and skills have resulted in Moscow-based enforcement and conservation agencies engaging with TRAFFIC staff as experts in enforcement actions and raids. For example, TRAFFIC staff in Russia staff have accompanied enforcement personnel in raids and expert evaluations to assist in prosecution cases regarding illegal trade in furs, birds (parrots, raptors, etc), and hunting trophies.

Capacity building programme

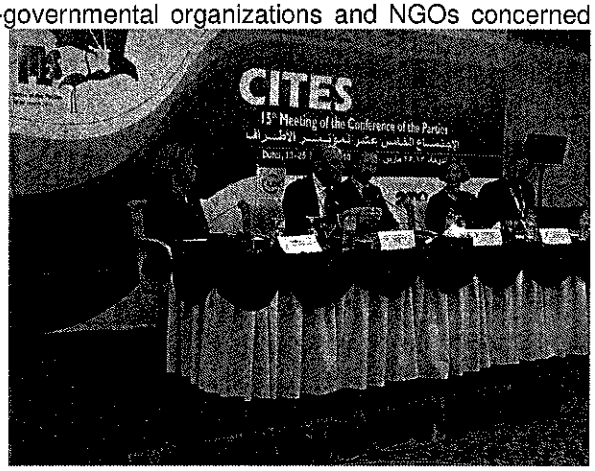
As is clear from capacity building workshops mentioned above, much of TRAFFIC's work is focused on strengthening the knowledge, skills and tools available to government enforcement agencies working to combat illegal trade in wildlife. In 2010, TRAFFIC trained nearly 1200 law enforcement

personnel. In India, over 350 officers from enforcement agencies including Forest Department, Police, Customs, and Paramilitary Forces were trained via workshops on wildlife law enforcement and handling of wildlife prosecutions. These workshops increased individual skills, helped provide a common understanding of wildlife trade enforcement issues, and helped build better inter-departmental coordination. The training workshops also supported programmes being carried out by other agencies such as the Wildlife Institute of India, Central Bureau of Investigation Training Academy, Indira Gandhi National Forest Academy and the National Institute of Criminology and Forensic Sciences.

In Southeast Asia, more than 650 personnel were trained via ASEAN-WEN and other enforcement training workshops, with more than 60 national agencies across the region engaged. After several discussions with Malaysian Customs officials, the Malaysian authorities have requested TRAFFIC to conduct a workshop on ivory trade and other wildlife trade issues for their Officers, with a particular focus on illegal trade. This is seen to be particularly important as Customs officials are increasingly involved in detecting and seizing illegal wildlife passing through the country. In addition, Peninsular Malaysia's new Wildlife Conservation Act 2010 empowers the Customs Department to enforce aspects of wildlife trade legislation that had not previously been within its remit. As Malaysian ports are increasingly being identified as being used for illegal trade in ivory, this training will strengthen the government's capacity to respond.

2. Working for Positive Changes to Wildlife Trade Policies

During 2010, TRAFFIC continued its more than 30-year tradition of providing high quality information and policy advice to government agencies, inter-governmental organizations and NGOs concerned with wildlife trade issues.



Providing support for CITES decision making

The 15th meeting of the Conference of the Parties to CITES (CITES CoP 15) took place from 13–25 March 2010, in Doha (Qatar). TRAFFIC once again was one of the most visible and influential NGOs and played a critical role with regard to providing the information needed by CITES Parties to agree the most appropriate actions necessary to maintain international trade in wild species within sustainable levels, reduce trade threats to endangered species, and tackle illegal trade. The IUCN/TRAFFIC Analyses of Proposals to Amend the CITES Appendices, completed in mid-January, were well-received by donors and Parties and served as a basis for the TRAFFIC Recommendations on the proposals. These products were disseminated to all the Parties to CITES, with the Analyses provided in English, French and Spanish, and the recommendations in these three languages as well as Chinese and Japanese, and were cited extensively during the Conference of the Parties. A limited survey of Parties showed that The Analyses continues to be appreciated and considered when making decisions at the CoP.

TRAFFIC also produced a briefing paper on a range of CITES CoP 15 agenda items, and specific briefing papers on Tigers and enforcement matters, and was engaged by the European Parliament to produce a briefing on key CITES agenda issues for their information. Many of the CoP15 agenda items that TRAFFIC had identified as priorities produced positive conservation decisions and policy progress. Among the issues of particular note for the TRAFFIC programme are the decisions related to Tigers and other Asian Big Cats, the illegal ivory trade, and the CITES listing criteria. However, there was disappointment following the decisions not to include marine species such as red corals in the CITES Appendices. Further advocacy by TRAFFIC and partners may have accounted for subsequent, and more positive, positions taken by the Parties on some of the related agenda documen ts. These include, for example, the adoption by the Parties of Decision 15.85 related to sharks and stingrays. Positive conservation decisions and policy progress was also seen in terms of: CITES engagement with FAO on timber and non-timber forest products; trade in sea cucumbers; trade in agarwood and medicinal plants; illegal trade databases; elephant ivory trade; rhino trade; Saiga

Antelope; wild species used for meat ("bushmeat"); and the criteria for inclusion of species in Appendices I and II.

Supporting multi-lateral processes to encourage legal and sustainable wildlife trade

The year 2012 was a particularly important one for the Convention on Biological Diversity (CBD), marking two decades since the Convention was opened for signature at the 1992 Rio "Earth Summit". The 10th meeting of the Conference of the Parties (CoP) to the CBD was held in Nagoya, Japan in October. TRAFFIC's and others preparations for this meeting started much earlier in the year, however.

In May, TRAFFIC participated as an observer to SBSTTA 14 (the 14th meeting of the Subsidiary Body on Scientific, Technical and Technological Advice), a key preparatory meeting ahead of the full CBD meeting. TRAFFIC provided a number of technical inputs to working documents, with a particular focus on sustainable use issues, including the use of wild species for meat, and the use and trade of medicinal plants. TRAFFIC also supported efforts to encourage the CBD to respond to the findings of the third Global Biodiversity Outlook (GBO3), which included an analysis by TRAFFIC and IUCN of the status of wild species used for meat and medicine. TRAFFIC joined a coalition of civil society and conservation organizations in calling on the CBD to halt biodiversity loss by 2020; to address the world's biodiversity crisis at the highest political levels; to integrate biodiversity processes into economic policy; and to prevent further habitat loss as a matter of urgency.

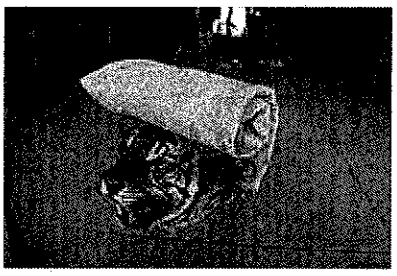


During CBD CoP 10, which took place in October, TRAFFIC focused on promoting positive solutions to addressing illegal and/or unsustainable trade in wild species, including through highlighting model projects. TRAFFIC organized and ran two side events during the first week of the CoP, one on medicinal plants and the other on wildlife trade and protected areas. The medicinal plant trade meeting, *Saving Plants that Save Lives* was run three times during the week. Local traditional medicine practitioners from three continents joined TRAFFIC to showcase the benefits of the sustainable use of wild medicinal and aromatic plants for to local, including indigenous, communities, and to traditional medicine use more generally. Conservation issues and linkages to the CBD agenda and the role of the FairWild Standard for sustainable and ethical sourcing were also highlighted. Later the same day, TRAFFIC staff led the event *Securing Wildlife Resources to Secure Protected Areas*, and attracted a good audience and some lively discussion. Despite the very busy CoP10 agenda, these events attracted good audiences, with the medicinal plant event in particular gaining a lot of local media attention. In the main meeting, TRAFFIC voiced support for the Global Strategy for Plant Conservation, drawing attention to the FairWild Standard and the guidance on timber sourcing from the Global Forest Trade Network (GFTN). Both FairWild and GFTN contain sets of principles and criteria for governments, companies and other stakeholders to verify sustainable and ethical sourcing of plants from the wild. Positive outcomes supported by TRAFFIC advocacy include the continuation of the Global Plant Conservation Strategy and the acceptance of the recommendations at national and international level of the CBD's Liaison Group on Bushmeat. Further, TRAFFIC is now explicitly named along with other expert organisations within the inter-sessional follow-up on the item of Sustainable Use (with FAO, IUCN and others).

TRAFFIC continued to contribute to discussions regarding the potential use of trade measures to support international efforts to sustainably manage fisheries stocks. This included participation in two workshops convened as part of the "Kobe" process, meetings of the five regional fisheries management organizations (RFMOs) for tunas. As well as considering measures for tuna management, these workshops also considered how to monitor bycatch of other species commonly caught with tuna, e.g. sharks. TRAFFIC also continued to liaise with FAO and others to facilitate exchange of information and the development of mutually supporting approaches to management of species subject to multiple international and national management regimes, e.g. RFMOs and CITES. TRAFFIC was the only NGO invited by the FAO to participate in a workshop on CITES and Shark Fisheries, which took place in July 2010, with TRAFFIC information on the trade in shark products cited by a number of meeting participants.

As co-chair of the International Tropical Timber Organization (ITTO) Civil Society Advisory Group (CSAG), TRAFFIC was invited to represent CSAG during an ITTO experts meeting to review the ITTO guidelines on sustainable forest management. The guidelines provide the basis for much of the world's standard for forestry operations and sustainability verifiers for tropical forests. To help timber exporting countries and exporters to comply with strengthened US and European Union import controls for timber, TRAFFIC worked with WWF's Global Forest & Trade Network (GFTN) to produce *Exporting in a Shifting Legal Landscape.* This guide provides practical advice on documenting legality, and builds on TRAFFIC's and WWF's work on timber trade legality frameworks previously funded by the European Union.

The Year of the Tiger provided a critical opportunity for focusing attention on the need to strengthen Tiger conservation efforts in both Tiger range States and in consumer markets. TRAFFIC joined governments, international agencies and NGOs in drawing attention to the plight of the world's Tigers, and designing strategies to reverse the decline in Tiger numbers in the wild. The International Tiger Forum, which took place in St Petersburg from 21-24 November, provided a particular focus for TRAFFIC's policy efforts. Although only two staff TRAFFIC participated in the forum itself, they were standing on the shoulders of the wider TRAFFIC network. TRAFFIC staff in Asia, Europe and North America made sure that the problems of Tiger poaching and trade received a high media profile and were given high priority by government policy makers.



This included publication of the reports *The Big Cat Trade in Myanmar and Thailand* and *Reduced to Skin and Bones: An Analysis of Tiger Seizures from 11 Tiger Range Countries* and production of the the short video "Closing a Deadly Gateway", about trade across the Myanmar border. As well as documenting the continued problem of illegal trade, the reports highlighted a series of national and international actions that can be taken to clamp down on illegal Tiger trade. TRAFFIC received positive feedback on the presentation and reports, with the seizure analysis in particular seen as a critical baseline for judging action in future. As well as speaking during the meeting, TRAFFIC and WWF also facilitated an Experts Roundtable on "Public awareness campaigns in support of Tiger conservation" on the third day of the Forum.

TRAFFIC provided also provided information and guidance to policy makers in the lead up to and during the Forum. Ultimately, government delegations from 13 countries with wild Tiger populations agreed to collaborate in a Global Tiger Recovery Programme (GTRP), with the goal of doubling wild Tigers by the next Year of the Tiger in 2022. The GTRP was also given high-level political endorsement and support in 'The St. Petersburg Declaration on Tiger Conservation' that was endorsed by all 13 Tiger range country government representatives at the Forum, including five Heads of Government. The need for regional law enforcement cooperation in particular was widely recognised in the presentations made by Tiger range countries, donors as well as by ASEAN-WEN and the South Asia Wildlife Enforcement Network (SAWEN), who also noted the contribution made by TRAFFIC and WWF in supporting these efforts.

Regional Cooperation

To support strengthened enforcement of wildlife trade controls in South Asia, TRAFFIC, with WWF and IUCN, successfully facilitated the first SAWEN meeting, which took place in Kathmandu in May. Participating experts from Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka agreed the structure, functions and operational parameters for SAWEN, including ideas for developing multi-lateral activities based on strong inter-agency co-operation at the national level. Participants also agreed to a roadmap for SAWEN that will lead to establishment of a SAWEN Secretariat in 2011. Agreement was also reached on elements needed for the SAWEN work programme as well as a draft operational structure for the regional initiative.

TRAFFIC also worked to strengthen regional wildlife trade enforcement cooperation in Central Africa., with a particular focus on the Central African Forest Commission's (COMIFAC). Two documents, the "*Proposed COMIFAC Head of State Statement on adopting the COMIFAC Wildlife Trade Enforcement Action Plan 2011-2016 and launching the COMIFAC Wildlife Trade Enforcement Task Force*" and the

"*Proposed strategic framework for a COMIFAC Wildlife Trade Enforcement Action Plan 2011-2016*" were provided to the COMIFAC Secretariat for inclusion on the agenda of the 6th Session of the COMIFAC Ministerial Council, which took place in November, 2010 (Kinshasa, Democratic Republic of Congo). During the Ministerial Council, Ministers gave a mandate to the COMIFAC Secretariat to finalize the Regional Wildlife Trade Enforcement Action Plan and to prepare it for adoption at the upcoming Kinshasa summit. This is a major milestone in the strengthening of regional political will to mitigate illegal trade within a framework of action amongst national stakeholders in the Congo Basin.

3. Communicating Results and Influencing Choices

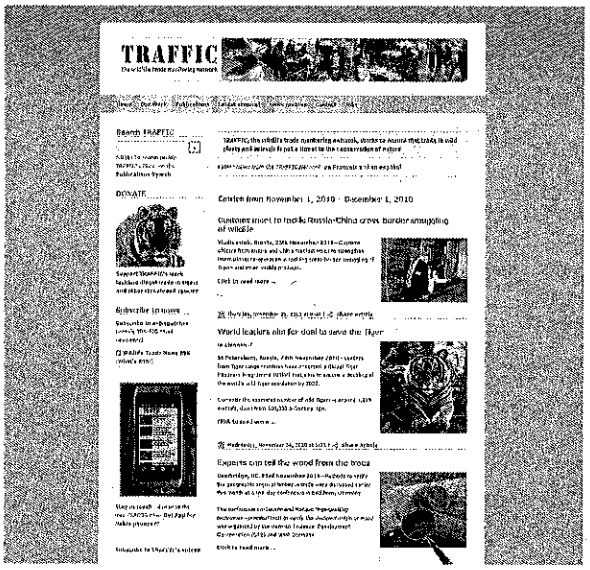
Funding provided by the Forestry Bureau of the Council of Agriculture continued to be instrumental in supporting TRAFFIC's communications efforts, particularly through the website and the *TRAFFIC Bulletin*, the world's only journal dedicated to peer-reviewed scientific papers on the wildlife trade.

TRAFFIC's development of online communications tools and resources continued to progress in 2010 with an increasing number of website visitors and greater use of the rapidly developing website technology.

- **Getting the word out – Using the internet to communicate on wildlife trade issues**

- Further development and enhancement of the TRAFFIC website www.traffic.org and associated online communications tools and resources

The success of TRAFFIC's work depends directly on our ability to communicate our research findings clearly and rapidly, to those who have the greatest ability to influence decisions at the local, national, regional and/or global levels. TRAFFIC uses a variety of communication vehicles to achieve this, largely through the written word, delivered via a combination of electronic formats as well as in printed form when required (for example to decision makers without reliable access to high speed internet connections). TRAFFIC's communication tools take a variety of forms, from news stories to briefings, brochures, printed and on-line reports, and TRAFFIC's signature wildlife trade journal, the *TRAFFIC Bulletin*. Through these and other tools, TRAFFIC remains the premier source for reliable information on wildlife trade and trade controls, and an objective source of advice on actions that governments, the private sector and consumers can take to support sustainable and reduce unsustainable and illegal trade.

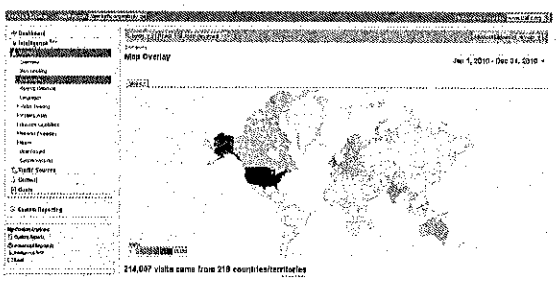


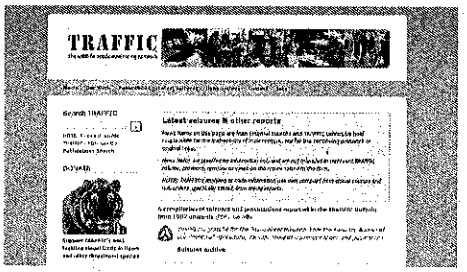
Launched in November 1997, the TRAFFIC website is now the network's most important communications tool; critical to TRAFFIC's delivery of information to the wide variety of stakeholders that can make a difference to the nature and implementation of wildlife trade policies and practices. It provides TRAFFIC with the most up-to-date means to communicate rapidly and cost-effectively to a wide readership, including staff within governments, intergovernmental organizations such as CITES, the CBD and the Food and Agriculture Organization of the United Nations (FAO), scientific institutions, trade associations, businesses, researchers, the mass media and NGOs. It also makes wildlife trade-related information available to interested individuals, including teachers and students around the world.

Development of the TRAFFIC website continued apace during 2010, for which support from the Forestry Bureau was critical. More main news items and media reports of wildlife trade interest posted

than ever before, totals of 144 and 762 respectively and a weekly electronic newsletter was introduced for online subscribers.

These reports all helped to enhance the TRAFFIC network's ability to deliver a rapid, high quality and effective flow of information to those concerned with wildlife trade and conservation, particularly government decision makers.





During the year, there were more than 145 000 unique visitors to the website from a total of 216 countries/territories worldwide; more than 507 000 pages were viewed, and there were approximately 100 000 downloads of TRAFFIC reports.

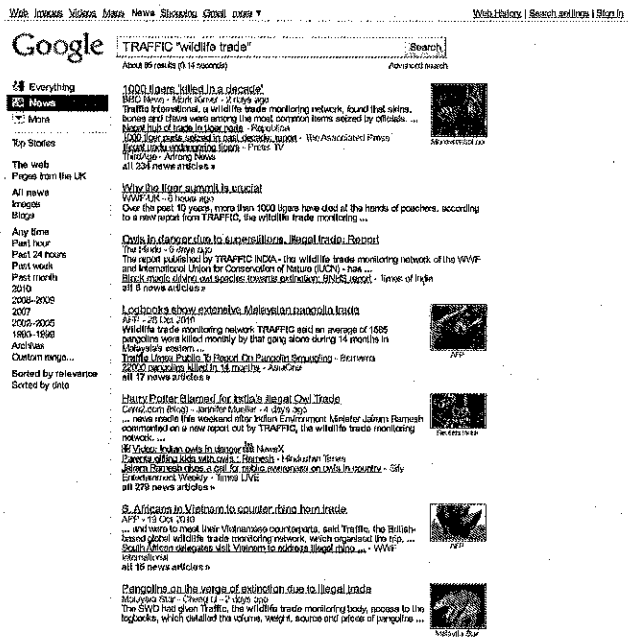
A special "Conference of the Parties to CITES" area was developed on the website for CITES CoP 15, which went on line in January, several months before the meeting itself. TRAFFIC received record numbers of visitors to the TRAFFIC website in the time around the meeting, peaking at 31 800 unique visitors during March, with more than 91 000 page views in that month. Downloads of TRAFFIC reports also showed a peak in activity around the CITES CoP, particularly the IUCN-TRAFFIC *Analyses of Proposals to Amend the CITES Appendices*, as well as TRAFFIC's Recommendations on the proposals. Just ahead of the meeting, downloads of PDF documents from the site were running at more than 3600 files per week.

CBD SBSTTA-14 also provided an important communications opportunity. TRAFFIC received positive feedback from Parties and NGO/IGO partners with regard to web updates produced during the meeting, which covered topics including the Global Strategy for Plant Conservation (jointly with IUCN and Plantlife); the failure to reach the 2010 target and the forthcoming new biodiversity targets for 2020 (a coalition of more than 20 NGOs/civil society organizations); and Global Biodiversity Outlook 3 (GBO3). The launch of GBO3, which contains data and input from TRAFFIC's work on biodiversity indicators linked to use of wild species for food and medicine, and an associated paper in *Science*, also received considerable media attention.

The Council of Agriculture's support of TRAFFIC's website was acknowledged on the Publications search page, on the newly created seizures page and also in TRAFFIC's weekly e-newsletter.

The back-digitization of earlier TRAFFIC reports is still underway, and will continue during 2011. These are currently being digitized as they are requested by government agencies and others. Over time, all of TRAFFIC's early publications will be made available electronically for download from the website. Around 50 such reports were made available this way during 2010. Rapid delivery of wildlife trade-related news stories is ongoing, aimed at alerting decision makers to news of major seizures, changes in legislation and other events, and making them aware of the latest TRAFFIC publications, as well as providing an incentive for people to check the TRAFFIC website regularly for breaking news.

- **Increasing awareness of wildlife trade problems and solutions through the international media**



- More regular and rapid delivery of wildlife trade related news items and messages to media outlets

The international media, both print, e.g. newspapers and magazines, and non-print, particularly television and radio, provides a powerful vehicle for delivering information and influencing thinking in relation to the trade in wild species. The media can be used to discourage certain behaviours, for example the illegal consumption of endangered species in traditional medicine, and to encourage others, for example greater investment in CITES implementation in response to increased public interest. TRAFFIC both generates news items for distribution to media outlets, and responds to a large number of requests for information and interviews.

The TRAFFIC website and TRAFFIC's media releases were regularly picked up by media outlets around the world. The uptake of information from TRAFFIC was often very considerable. For example, in August 2010 TRAFFIC raised concern in the media after a sedated Tiger cub was discovered by enforcement officers at Bangkok international airport concealed inside the luggage of a passenger *en route* from Thailand to Iran. The story was covered by at least 850 news websites over the next few days.

- **Leading the way in promoting understanding of emerging wildlife trade issues among governments, researchers, the private sector and the wider public**

  - Publication and distribution of the *TRAFFIC Bulletin*

The journal of the TRAFFIC network—*TRAFFIC Bulletin*—is the only international publication devoted exclusively to global wildlife trade issues. It contains original reports and news on trade in wild animals and plants and their derivatives, much of which arises from investigations carried out by TRAFFIC staff. Issues covered range from local trade concerns to analyses of the enormous and valuable international trade, encompassing the wide variety of uses and trade covering thousands of animal and plant species.

The *TRAFFIC Bulletin* is currently provided free of charge to approximately 4500 individuals and institutions in over 150 countries. These recipients include some 100 libraries, resulting in a far wider readership, with the *Bulletin* available to many who would be unable to pay for the unique information that this publication provides. Many subscribers are those who make or inform decisions related to

wildlife trade, including policy-makers, enforcement officials, lawmakers, conservationists, scientists, academics and the media. Among those subscribed to the journal are the CITES Management and Scientific Authorities of the 175 member States of CITES, government agencies of the many countries that are not party to the Convention, and numerous environmental NGOs. Free access to current and past issues via TRAFFIC's website also ensures that the wealth of information contained in the *TRAFFIC Bulletin* is readily available throughout the world.

Examples of issues covered in the Bulletin over the past year include:

- a report on the South African marine mollusc Abalone *Haliotis midae*, which was listed in CITES Appendix III by South Africa in 2007 in an attempt to enlist the co-operation of other countries in tracking specimens in international trade, as well as to strengthen control of the trade in illegally harvested specimens, which is currently having a devastating impact on this resource. The meat is traded in live, frozen, canned and dried form and is in great demand, in particular in Hong Kong; the flesh is also sold as an aphrodisiac and the shells used as ashtrays, soap holders and food platters. In 2010, the South African authorities decided to withdraw the listing citing administrative difficulties in its administration and following concern expressed by the cultured abalone industry. TRAFFIC East/Southern Africa undertook an evaluation to determine the impact of the CITES listing on the illegal and legal harvest and on the export sector. This report assesses the feedback from stakeholders on the CITES listing and evaluates the reasons for the delisting.

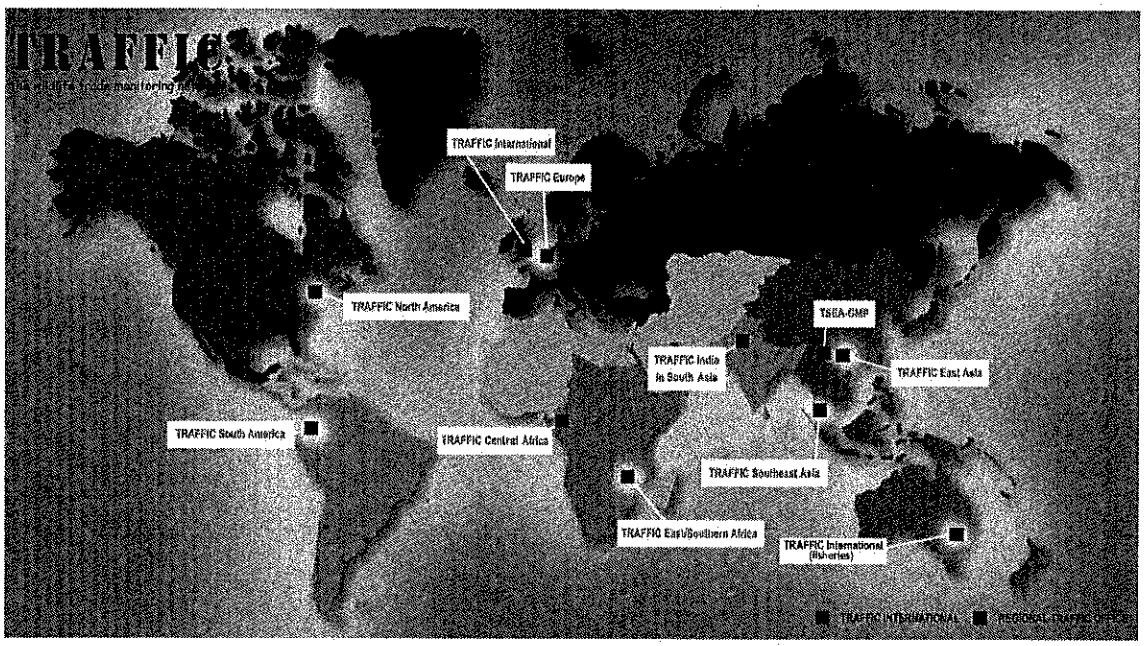
- a comprehensive account of the 15th meeting of the Conference of the Parties to CITES, including the proposals and decisions taken.

- An assessment of the impact of poaching and trade of Malayan Sun Bears—the smallest of the eight bear species—in Peninsular Malaysia, where the species is threatened by hunting for the illegal domestic and international trade in live animals, body parts and derivatives. The Malayan Sun Bear is completely protected in the region and yet specimens continue to be poached to supply the demand for parts used in traditional medicines—in particular the gall bladder from which bile is extracted—and as food, particularly the animal's paws, which are offered as a delicacy in some restaurants. The claws and canine teeth are sold as talismans and souvenirs. New legislation will allow for significantly stricter penalties and better protection for the Malayan Sun Bear. The authors call for surveys to be carried out as a matter of urgency in order to measure the true scale of the hunting and trade in this species, which will help support future enforcement of the law.

EXPENDITURE OF FUNDS

TRAFFIC is grateful to the Forestry Bureau, Council of Agriculture, Taiwan for the USD60 000 allocated to the work of TRAFFIC under its 2010 Conservation Grant. Funds were received in October 2010.

Expenditure of COA Conservation Grant to 31 January 2011	
Personnel expenses	43 134
Establishment costs	8 536
Travel	291
Consultants	9 184
Meeting running costs	550
Translation	161
Telephone	616
TOTAL	62 472



ANNEX 1 - Background to the TRAFFIC network

The trade in wild plants and animals and their derivatives is big business, estimated to be worth billions of dollars and involve hundreds of millions of plants and animals every year. Most of the trade is legal but a significant portion of it is not. The trade is diverse, ranging from live animals for the food and pet markets to ornamental plants and timber. An array of wildlife products and derivatives, such as food, exotic leather goods, musical instruments and even medicines, can be found in markets around the globe.

TRAFFIC works to help ensure that wildlife trade is sustainable and in accordance with domestic and international laws and agreements through the investigation, monitoring and reporting of such trade, particularly that which is detrimental to the survival of flora and fauna and that which is illegal. TRAFFIC's reports and advice provide a technical basis for the establishment of effective conservation policies and programmes for wildlife in trade.

TRAFFIC is a joint programme of WWF, the world's largest conservation NGO and IUCN, an inter-governmental organization and the world's largest conservation network. TRAFFIC International, the headquarters of the TRAFFIC network, is based in Cambridge, UK. TRAFFIC's work, reputation and network has grown enormously since the mid-1970s when TRAFFIC was founded largely to assist in the implementation of CITES. Over a quarter of a century, TRAFFIC has developed from a single office into a global network of staff in over 25 countries in eight regional programmes around the world. CITES now covers some 30 000 plant and animal species and has 169 member countries. These member countries face ever-more complex issues in determining how best to ensure that trade does not threaten the survival of species. A critical role for TRAFFIC is therefore to assist governments, CITES committees and the CITES Secretariat in their efforts to ensure the effectiveness of CITES and associated wildlife trade laws. This role is carried out through research on the trade in CITES-listed species, identification of problems with regard to the implementation and enforcement of existing CITES trade controls and the provision of assistance in the development of appropriate solutions. TRAFFIC has developed its role in addressing wildlife trade issues in a wider context, including major commercial sectors such as fisheries and timber trade and trade at the sub-national and regional levels.

TRAFFIC's Global Programme 2009-2012

TRAFFIC's work is focused through TRAFFIC's four-year Global Conservation Programme (2009-2012), which focuses around four major programme themes:

1. Flagship Species in Trade

Aim:	Driving urgent action for emblematic threatened species that act as flagships of wider trade and conservation challenges
Target themes:	Elephants, Great Apes, Marine Turtles, Tiger and other Asian Big Cats, Rhinoceroses, Vicuna

2. Resource Security and Wildlife Trade

Aim:	**Supporting trade measures that help encourage sustainable practice within some major wildlife resource sectors**
Target themes:	Fisheries, Medicinal Plants, Timber, Wildlife used for meat and medicine

3. Wildlife Trade Routes

Aim:	Taking focused action along priority trade routes to reduce wildlife trade threats to priority centres of biodiversity, species and resources

4. Early Warning

Aim:	Catalysing responses to new and emerging knowledge about wildlife hunting, harvest and trade levels, patterns and trends

國際植物園保育協會計畫執行摘要

國際植物園保育協會計畫內容及成果摘要如附：

國際植物園保育協會致力於全球受威脅物種保育工作，因維持植物的多樣性和人類生活、減輕貧窮、以及全球氣候變遷息息相關。BGCI 組織網內的植物園和保育組織遍佈全球，會員包括來自 120 多國、600 餘個機構(多數為植物園)。並透過提供支援協助和授權，同時建立並強化對保育的知識，以達成保育目標。BGCI 促進科學與技術方面的知識交換，並樂於分享最佳的保育方式、環境教育及永續性資訊。透過倫敦秘書處、及設立於芝加哥、廣州、新加坡植物園之地區辦公室，BGCI 以經濟又有效的方式運作，有利於全球植物園工作，並使官僚繁瑣制度和所需行政費用減至最少。

BGCI 很感激並重視台灣林務局所給予的大力協助，使我們得以朝著更有抱負的保育理想目標邁進；同時亦讓我們能夠特別針對氣候變遷此一議題著手製作教育專題，使兒童能在家庭中就從小培養正確觀念，知道自己的任何一個行為都有可能對全球氣候造成影響，進而教導兒童做出對環境和氣候有益的判斷，使其能更減緩及適應氣候變遷所帶來的轉變。

2009-2010 年 BGCI 計畫進度報告如下：

2009 年 8 月，全球植物園保育協會建立「氣候變遷全球教育入口網站」，內容包含開創性的新教材，以及各式各樣的活動素材提供給講師、學者免費下載使用。此一創舉的目的是要讓學生都能充分了解植物和氣候變遷議題密切相關。

此入口網站包含許多創新且立即可用的活動，讓各年齡層的學生都能參與，如【Voice Your Choice 表達你的選擇】即是讓 7-15 歲的學童積極參與終極辯論，回答：『滅絕之前，你會選擇救哪一物種？』學童必須藉由生物間的相互關係、可能導致的氣候變化來判斷如何抉擇，並在過程中學到批判性思考，邏輯能力及判斷力，同時瞭解植物、人類、氣候變化和地球各生物之間的聯繫。

網站中還有八個新教案，是根據 BGCI【Plants and climate change: which future?】報告中的案例所編寫而成，內容說明氣候變遷的幾個重要特點以及植物如何在其中扮演了極為重要的角色。

經由林務局協助，BGCI 將上述網站內容翻譯成中文及西班牙語版本，使「氣候變遷全球教育入口網站」得以有全球五大語系的其中三種版本。
中文版本網址：www.bgci.org/education/chinese/

西班牙語版本網址：www.bgci.org/education/cambio/
網站中所提供的資源內容獲得極正面的評價，特別是內容的關連性和即時性方面更是備受各方肯定。網站特色是以創新教材教導兒童氣候變遷的重要性。泰晤士報教育專刊(Times Education Supplement, TES) Heated debate 短文中，有提及此入口網站。BGCI 教育部門負責人 Julia Willison 在上開文章中提及「兒童就是未來的決策者，我們必須重新檢視我們的價值觀與行為，如此方能扭轉生物多樣性物種的繼續流失，並得以應付氣候變化所帶來之影響」。。

藉由林務局的協助，BGCI 得以將「氣候變遷之教育入口網站」的網站說明及翻譯版本於南非和英國發表。未來透過各地的植物園聯絡網，這些網站資訊亦能持續被報導。BGCI 並得以印製三種不同語言版本的宣傳用明信片，並於南非舉行之第七屆 BGCI 植物園教育大會(The 7th BGCI Education in Botanic Gardens Congress)廣發給前來參加的 24 國代表團。

「氣候變遷全球教育入口網站」已於 2009 年 11 月 18 日份假屏東縣高樹鄉「辜嚴倬雲保種中心」舉辦之東南亞植物園聯絡網(SEABGN)會議中正式發表，該會議旨在提供給會員們(東南亞各國之專家學者及保育人員)一個溝通與協調的交流論壇，對當前的國際保育議題提出討論與建議，以及協調其中的共同關注議題與跨國機構間的合作。與會代表共來自 13 國、分屬 20 個組織，參與國家有汶萊、柬埔寨、印尼、日本、寮國、馬來西亞、緬甸、菲律賓、新加坡、台灣、泰國、越南和中國(雲南)，以及來自澳洲和英國的觀察員。與會代表團對此一全球化「氣候變遷全球教育入口網站」的啟用展現了高度興趣，也極有意願使用。

BGCI 2009 年工作成果列於其出版品「Plants for the Planet: The work of Botanic Gardens Conservation International in 2009」中。

依據 2008 年至 2010 年計畫資料，國際植物園保育協會設立於 1987 年，設立宗旨為鼓勵植物園建立夥伴關係，參與植物多樣性保育工作，以增進人類福祉和地球健康。BGCI 專家來自 118 國的 800 餘個植物園，並與當地社區民間團體和政府單位合作執行保育受威脅物種計畫，協助民眾瞭解植物是地球的重要資源。

BGCI 的重要工作成果包括：

- 協助擬定生物多樣性公約全球植物保育策略(Global Strategy for Plant Conservation, GSPC)，BGCI 為 2 項目標之負責單位，包括域外(*ex situ*)保育與復育(Target 8)和環境教育(Target 14)。
- 進行植物保育評估工作，出版木蘭科紅皮書(Red list of Magnoliaceae)和橡樹紅皮書(Red List of Oaks)。
- 2007 年發表「維生植物：藥用植物保育和植物園(Plant for life: Medicinal plant

conservation and botanic gardens)」報告。

- 與國際自然保育聯盟(International Union for Conservation of Nature, IUCN)合作，確認哪些植物為受威脅物種，並於 6 個國家執行保護重要植物區計畫。
- BGCI 與植物園教育聯絡網(Botanic Gardens Education Network, BGEN)合作設計一套英語版網路教育宣導計畫，供全球植物園運用。宣導對象為 7-14 歲學童，宣導重點為植物和氣候變遷議題。2007 年間，有 26,000 人閱覽 BGCI 網站中 1,850 頁的教育宣導資料網頁。
- 2008 年出版「Plants and climate change: which future?」，該書依據最新研究報告，由多國專家撰寫，為全球首次詳述氣候變遷對植物生理、生物氣候學和生態系等不同層級之衝擊，以及此類衝擊如何影響全球人民生計和生存。

國際植物園保育協會在全球拯救植物多樣性危機中扮演領導角色。經由動員各國植物園和保育夥伴，BGCI 推動瀕危植物保育和提升民眾對植物資源重要性之瞭解。全世界的植物園每年有 2 億人前往參觀，提供絕佳的教育宣導契機。

全世界有 10 萬餘種植物面臨決滅之危機，若全球氣溫持續上升，植物絕種速率也會加快。科學家推估本世紀末增加 3-6℃，對水循環將有巨大影響，屆時連最普遍的植物都會面臨威脅。BGCI 於 2007 年在 6 個國家進行調查，發現大多國家沒有特別針對植物和氣候變遷的課程，也缺乏植物多樣性和保育相關資訊和教材。研究顯示民眾對生物多樣性和保育的興趣，通常衍生自親身的自然環境體驗。BGCI 因而研擬一套全球戶外教學教育宣導教材資料。

全球植物保育策略(GSPC)係世界各國政府於生物多樣性公約會議中認可之保護植物多樣性計畫。2008 年檢討目標執行進度時，與會者建議將氣候變遷對植物多樣性的影響納入修訂目標，並研擬第二階段(2011-2020) GSPC，修訂版 GSPC 有已於 2010 年在日本召開之生物多樣性公約第 10 屆締約方大會(CBD COP10)中通過。第二階段 GSPC 有必要擴大參與，尤應加強教育宣導，讓教育和保育界人士，以及決策者更瞭解 GSPC。

2010 年計畫之目標包括：

一、製作一份簡單明瞭且引人入勝的「全球植物保育策略」指南資料供溝通、教育和宣導之用。

二、在網路上提供 GSPC 教材資源之英文、中文和西班牙文版本。

三、製作 PowerPoint 簡報資料，供世界各地植物園和其他機構使用，廣為宣導 GSPC 理念。

四、經由 BGCI 全球保育和教育聯絡網，宣導 GSPC 教材。

BGCI 希望我國能贊助經費，將資料翻譯為西班牙文和中文，以推廣至更多角落

及更多讀者。下表顯示 3 種語言可能宣導的人數。

語言	人數
中文	1,075,000,000
英文	514,000,000
西班牙文	425,000

本計畫之主要工作項目包括：

一、草擬 GSPC 一般指南文字稿。

二、遴選 GSPC 宣導用圖像資料。

三、完成 GSPC 宣導資料初稿，將於 CBD COP10 期間展示，並徵詢各界意見。

四、設計 GSPC 宣導教材。

五、製作 PowerPoint GSPC 資料，置於 BGCI 網站。

六、將 GSPC 宣導教材翻譯成中文和西班牙文。

七、經由 BGCI 聯絡網、出版品和會議等管道，推廣 GSPC 宣導教材。

2010 年計畫工作進度如下：

- GSPC 一般指南文字稿部分，修訂版 GSPC 已於 2010 年 10 月在日本召開之生物多樣性公約第 10 屆締約方大會(CBD COP10)中通過。BGCI 彙整每項目標之資料，包括目標之背景、重要性、目前進展和執行所面臨之挑戰。
- 遴選 GSPC 宣導用圖像資料部分，辦理年度環境教育活動時，遴選學童繪製之圖畫資料。辦理包含 GSPC 意涵之 T-Shirt 圖案徵圖活動，針對青年宣導植物保育之重要。也遴選其他圖像、事實說明、引言、詩句等，供製作 GSPC 指南運用。
- 設計部分，已選定 16 個目標之設計格式。
- 製作 PowerPoint GSPC 資料部分，將於 GSPC 指南內容定稿後製作。
- 翻譯成中文部分，將於英文稿定稿後進行。西班牙文部分，將繼續募款辦理。

Taiwanese Forestry Bureau 2010 Conservation Grant

A popular guide to the Global Strategy for Plant Conservation

Progress report February 2011

1. Project aims, objectives and activities

Aims

The aim of the project is develop an easily-accessible, popular guide to the Global Strategy for Plant Conservation (GSPC) that allows botanic garden and other educators worldwide to increase awareness amongst the public of the urgent need to conserve plant diversity through the implementation of the GSPC.

Objectives

The main objectives of the project are:

- To produce a clear, attractive and comprehensible guide to the GSPC for use by specialists in communication, education and public awareness.
- To make the GSPC guide available on-line in two of the world's major languages – English and Chinese;
- To produce an effective PowerPoint™ presentation that can be used by botanic gardens and other institutions worldwide to communicate the value of the GSPC to their audiences
- To promote the Popular Guide through BGCI's global conservation and education networks.

Progress to date

- **Develop text of a Popular Guide to the GSPC:**

  Revised targets for the GSPC for the period 2011-2020 were agreed and adopted by the Parties to the Convention on Biological Diversity at their 10th Conference in Nagoya, Japan in October 2010. We are presently compiling relevant information about each of these targets for use in the Popular Guide. This information includes background to the target, why the target is important, progress to date and challenges in implementation.

- **Identify images to illustrate the Popular Guide**

  We are assessing images produced by school children in response to the 'Global Option' offered by BGCI as part of the *Fairchild Challenge* - an annual environmental education outreach programme designed and initiated by Fairchild Tropical Botanic Garden in the USA. This year's Global Option was to create a T-Shirt design embodying the Global Strategy for Plant Conservation (GSPC) that will resonate with young people worldwide and will express what they think is important about plant conservation. Other images, facts, quotes and poems are also being identified for use in the Popular Guide.

- **Design and layout**

  We have agreed a 'format' for the presentation of each of the 16 targets in the popular guide and will be working with our designer to produce this once the contents are complete.

- **Development of a GSPC PowerPoint™ presentation**

  This will be developed once the contents of the Popular Guide are complete

- **Translation into traditional Chinese**

  This will be done once the English version is completed

Links to other activities

BGCI has been commissioned by the Secretariat of the Convention on Biological Diversity (CBD) to develop a tool kit for the GSPC to support the national, sub-regional and regional implementation of the GSPC. The Popular Guide being developed with the support of the Taiwanese Forestry Bureau will provide an ideal entry point to the toolkit and will therefore be incorporated into this, as well as being available as a stand-alone product.

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Descanso House, 199 Kew Road, Richmond, Surrey, TW9 3BW, UK
Telephone: 020 8332 5953 Fax: 020 8332 5956 Website: www.bgci.org
Contact: Sara Oldfield, Secretary General, sara.oldfield@bgci.org



Plants for the Planet

The work of Botanic Gardens Conservation International in 2009

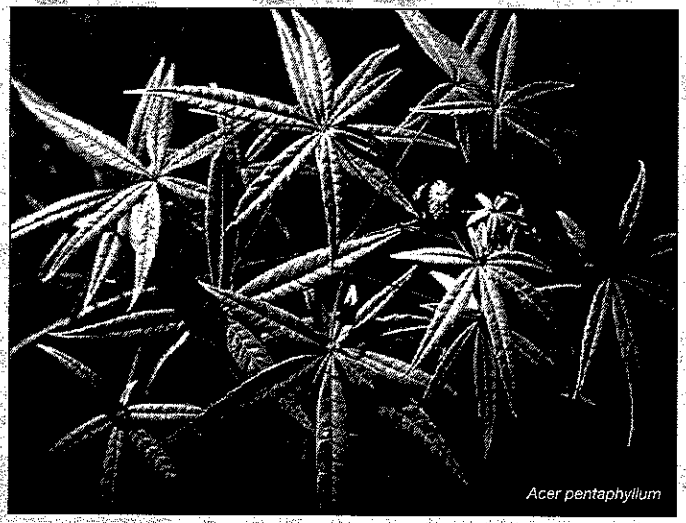
BGCI

Plants for the Planet

Message from the Chair

2010 is the International Year of Biodiversity. So this is a good year to think about the diversity of flora and fauna on the planet that we largely take for granted. Botanic gardens are great places to celebrate the diversity of plants – collectively the botanic gardens of the world grow around one-third of all flowering plant species. The conservation and restoration work of botanic gardens is helping to ensure that our increasingly threatened biodiversity is maintained in safe hands.

Looking back over BGCI's achievements in 2009 I am again struck by how much we achieve for such a small budget! We are able to do this because of the fantastic global network of botanic gardens and the friendships and collaborations between them. If BGCI can effectively help to facilitate this network, linking gardens in Africa with those of Australasia and gardens in Russia with those of Latin America, then we are doing a great job. The Fourth Global Botanic Gardens Congress held in the National Botanic Gardens of Ireland at Glasnevin in Dublin this year gave me an opportunity to see the friendships between botanic gardens worldwide at work. A big thank you to the Irish Government and staff at Glasnevin for their hard work and support for this truly magnificent event.



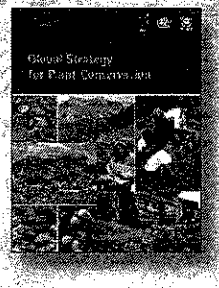
Acer pentaphyllum



During 2009, BGCI helped to update an important international agreement, the Global Strategy for Plant Conservation, using our convening power worldwide. The successes of this Strategy, in good measure due to the ongoing work of botanic gardens, are something to celebrate! But our work is far from over. We need to ensure that botanic gardens with strong conservation and education programmes continue to flourish and that everyone truly understands that all life depends on plants.

Baroness Joan Walmsley,
Chair, BGCI Board of Directors

BGCI in 2009

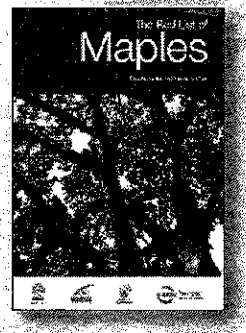


Conserving the world's wild plant diversity is a momentous task! In 2009, BGCI continued to work at all levels to maximize its support for plant conservation and the crucial work being undertaken by botanic gardens. The global policy framework provided by the *Global Strategy for Plant Conservation* (GSPC) continues to guide our work and in 2009 we helped to update this important strategy of the Convention on Biological Diversity. Publicising the Strategy to a wider audience remains a challenge, but the Janet Meakin Poor Research Symposium entitled Global Plant Conservation and Outreach held at Chicago Botanic Garden in association with BGCI provided an excellent opportunity to do this.

Sound information remains essential for prioritizing and planning plant conservation action. BGCI was delighted to join the 4D4Life project in 2009, a three year project funded by the European Commission, to develop the comprehensive Catalogue of Life. The value of BGCI's own databases (GardenSearch and PlantSearch) was highlighted at an international workshop on the role of botanic gardens in the restoration of ecosystems organised by RBG Kew. We remain committed to the continued development of these databases as a unique source of information on the skills and resources available throughout the global network.







BGCI retains its specific focus on assessing the conservation status and *ex situ* collections of tree species. In July, we organized the first meeting of the IUCN/SSC Global Tree Specialist Group, generously hosted by the Morton Arboretum. At this meeting we reported on our progress in Red Listing the world's rhododendrons and collectively prioritized the genera and regions of trees for conservation assessment over the next ten years. Later in the year we published the *Red List of Maples* detailing the threatened status of all the species in this horticulturally popular and economically important tree genus. Earlier in 2009 we helped to organize an international symposium on the magnolia family held at South China Botanic Garden – which holds the world's largest *ex situ* collection of endangered magnolia species.

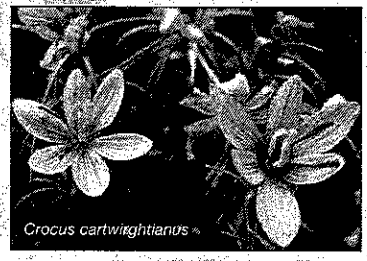
Ex situ collections of threatened plant species will become increasingly important in biodiversity conservation as the impacts of global climate change are felt. They will also be valuable in adaption to climate change whether through ecological restoration or trialling the growth of crop species under different climatic conditions.



Sharing experiences through networking and building capacity are key elements in global plant conservation. In June, BGCI participated actively in the EuroGard meeting in Helsinki which brought together over 200 botanic garden delegates. We also co-organized a workshop hosted by the magnificent Tblisi Botanic Garden in Georgia. The purpose of the workshop was to identify challenges and opportunities for Georgia's botanic gardens. These are of major historical and cultural importance and immensely important in conserving plants of the Caucasus Global Biodiversity Hotspot.

In the long term involving many more people in the conservation of local plants will be the key to success. BGCI worked with partners in Madagascar and Uganda to consider ways of increasing engagement with local communities in plant conservation and livelihood development. This topic is complex and likely to be a recurring theme for BGCI's work in the years to come.

Engaging with broader audiences is a challenge for many botanic gardens. In the UK, BGCI launched two new projects addressing botanic gardens and social inclusion and also the role of Islamic gardens in the UK. It is hoped that the findings of these studies will ultimately have practical implications for botanic gardens in many parts of the world.



Crocus cartwrightianus »



Overall 2009 was an exciting year for BGCI. We strengthened our conservation work in China, consolidated partnerships in the US and developed an increasing focus of work in Africa. BGCI's 7th International Education Congress brought over 200 delegates from around the world to Durban, Africa's oldest botanic garden. Our work linking over 600 member botanic gardens and a wide range of partners is truly global. The challenges for botanic gardens are major but collectively we form the greatest force for plant conservation!

Sara Oldfield

Sara Oldfield
BGCI Secretary General

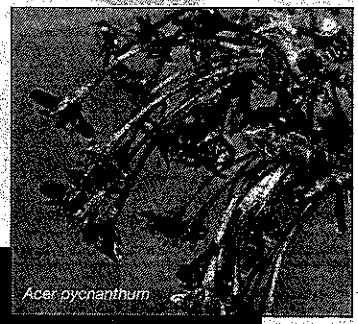


Securing plant diversity

With up to one-third of all known plant species facing an uncertain future, which would you chose to save first? Recognising that people in rural communities in developing countries are largely reliant on wild plant resources and are likely to suffer most if these are no longer available, BGCI has been working with such communities to help protect their plant resources. Pilot projects in Uganda and Madagascar have allowed us to explore the issues and develop models for community-based conservation for the most valued species. Working in partnership with local botanic gardens and other partners, similar approaches have also been developed in Cambodia, Indonesia and Vietnam, with a focus on medicinal plants. Fostering dialogue among local communities as the ultimate natural resource custodians is essential to define locally appropriate conservation and management approaches.



In China, our work to save critically endangered trees continues. With a close link to BGCI's Red Listing work, the focus is on conserving threatened species of magnolia, oak, maple and rhododendron. An integrated approach to conservation secures these species for the future, while at the same time ensuring the continued provision of services from the ecosystems they are part of. Field surveys undertaken in 2009 have provided detailed information on the distribution of target species and allowed seeds and vegetative material to be collected for the establishment of *ex situ* collections. Particular success has been achieved in producing a stock of seedlings of the highly threatened maple – *Acer yangbiense*. Very few individuals of this species remain in the wild, but it is hoped that the seedlings produced by our partners, Beijing and Kunming Botanical Gardens will provide a source of plants to reinforce wild populations.



Acer pycnanthum



Acer cappadocicum

Enabling people and botanic gardens

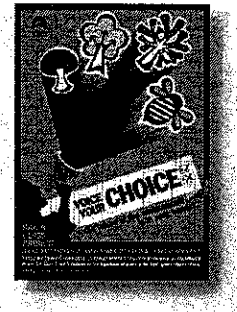
With over 200 million visitors every year, botanic gardens are ideally placed to educate and inform the public. However, the skills, expertise and resources required to deliver effective education and public awareness programmes are often limited. BGCI's education programme is helping to address this gap.



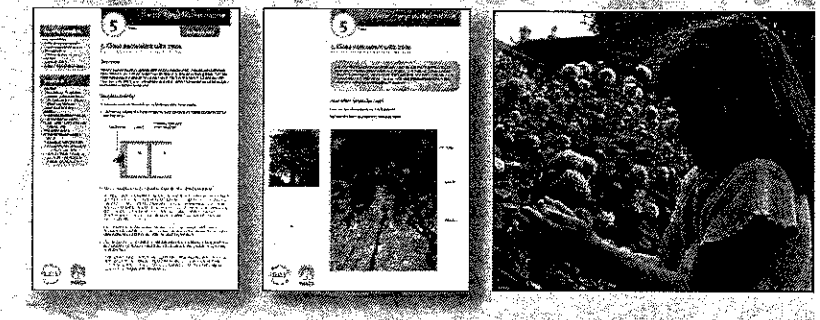
In 2009, BGCI's 7th International Congress on Education in Botanic Gardens was held in Durban, South Africa, the first time an education congress had been held in Africa. Attracting 110 delegates from 23 countries, the congress highlighted the breadth and depth of botanic garden education work around the world. The benefits of organising events such as this are encapsulated by these quotes from Congress delegates:

"The education congresses are useful on so many levels – introducing concepts to newcomers, creating partnerships and facilitating group discussions to identify solutions to the professional challenges we face."

"Often we work alone or in small numbers at our gardens, thus this is a chance to get ideas from a wider pool. It also gives a chance to assess whether the issues we are prioritising in our programmes are those that are seen by others to be important."



In February 2007, the Intergovernmental Panel on Climate Change noted *"The amount of global warming will depend on the choices human beings make"*. Since then, our education department has been busy developing a set of innovative resources that will help botanic gardens educate their visitors about climate change. With a focus on educating the young, we have developed a comprehensive set of interactive teaching materials on plants and climate change. These are easily-downloadable from a special education portal on our website.



"Children are tomorrow's decision-makers and we need to encourage a re-evaluation of our values and behaviours, so that we can reverse biodiversity loss and deal with climate change"
Julia Willison, BGCI's Director of Education Programmes

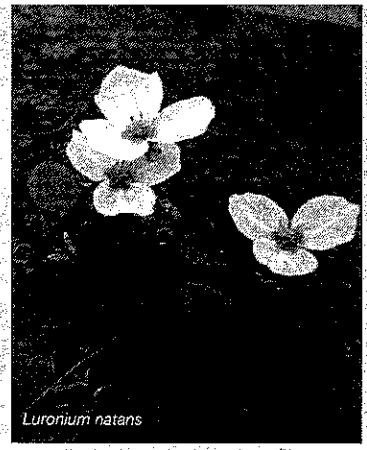
Influencing decision-making and policy

The GSPC is the key instrument guiding plant conservation work nationally and globally. Following an in-depth review of the GSPC in 2008, Parties to the Convention on Biological Diversity requested that the strategy, with its 16 targets, should be updated for the period 2011-2020. The focus in 2009 was therefore on developing revised targets and building consensus around these. BGCI, with the support of the Boeing Company organised a series of regional workshops to gather input from stakeholders in Africa and the Americas. The workshops provided excellent opportunities to share experiences on implementation of the Strategy and to exchange views on how the targets should be taken forward. The reports from the workshops were provided to the CBD Secretariat and were considered a key part of the GSPC consultation process.



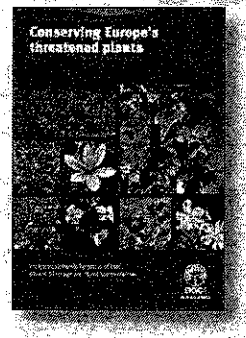
BGCI worked with partners in Japan on the development of the Japanese response to the GSPC. A draft status report was developed during the year and presented at a national workshop in December. The key role of Japanese botanic gardens in conserving plant diversity was recognised during this process, with the Japanese Association of Botanic Gardens playing a lead role in the review process.

In the US, BGCI worked with Chicago Botanic Garden and partners in government, academic and private sectors across the country to assess botanical capacity to implement policy and deliver practical conservation outcomes.



Luronium natans

One of the key GSPC targets for BGCI and the botanic garden community is Target 8: "*60% of threatened plant species in accessible ex situ collections....*". Monitoring progress towards this target has however been constrained by the lack of comprehensive global and regional lists of threatened plants. BGCI took steps in 2009 to address this constraint in Europe by developing a consolidated list of regionally threatened plants. Based on national Red Lists and species distribution data, 1,917 threatened species were identified. Comparing this list with BGCI's PlantSearch database (a database of the living plant collections of botanic gardens worldwide) and a database of European seed bank holdings developed by the European Native Seed Conservation Network (ENSCONET) allowed 808 threatened taxa (42% of the total) to be identified in *ex situ* collections.



Summary of accounts

The full Financial Statements are available on written request from BGCI Headquarters

Extracts from Financial Stements Year ended 31 December 2009	Extracted from BGCI Limited accounts		For illustrative purposes converted at a rate of 2009 $1.56:£1 2008 $1.46:£1	
	2009	**2008**	**2009**	**2008**
Income and Expenditure	**£000**	**£000**	**$000**	**$000**
Income				
Grants	837	441	1,306	645
Subscriptions	105	98	164	143
Other incomes	30	60	47	88
	972	**599**	**1,517**	**876**
Expenditure				
Staff costs	579	636	903	928
Direct project and other project implmentation costs	587	587	916	857
Management and administration costs	28	47	44	69
	1,194	**1,270**	**1,863**	**1,854**
Surplus/(Deficit) for the year	**(222)**	**(671)**	**(346)**	**(978)**
Balance Sheet				
Fixed assets	**11**	**15**	**17**	**22**
Current assets/(liabilities)				
Debtors	43	101	67	147
Cash at bank and in hand	586	717	914	1,047
Creditors due within one year	(94)	(65)	(147)	(95)
	535	**753**	**834**	**1,099**
Total assests less current liabilities	**546**	**768**	**851**	**1,121**
Funds				
Restricted funds	324	338	505	493
Unrestricted funds	222	430	346	628
	546	**768**	**851**	**1,121**

The BGCI community

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Dr Christopher Willis

New Institutional Members in 2009

Malabrigo - Area Natural Protegida	Argentina
The Gardens of Fanshawe College	Canada
Hunan Forest Botanical Garden	China
Kunming Botanic Garden	China
Botanical Garden Faculty of Science	Croatia
Shehab Mazhar Barageel Garden	Egypt
Gambia National Botanic Garden	Gambia
Ioannis Patlis	Greece
Alcsúti Arboretum	Hungary
Hortus Botanicus Universitatis	Hungary
Myanmar Floriculturist Association	Myanmar
Jardín Botánico Ambiental	Nicaragua
Oman Botanic Garden	Oman
Parques de Sintra - Monte da Lua S.A.	Portugal
Gardens by the Bay	Singapore
Htoo Foundation	Singapore
Hantam National Botanical Garden	South Africa
Islamic Culture Foundation	Spain
Eastern Botanic Garden (Khao Hin Son)	Thailand
Jurij Fedkovich National University Botanical Garden	Ukraine
Auchgourish Botanic Gardens	United Kingdom
Durham University Botanic Garden	United Kingdom
Palomar College Arboretum	United States
Aarru	United States
New Orleans Botanical Garden	United States
University of Maryland College Park	United States

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Cover, Sandrine Godefroid; Nikos Krigas; Westonbirt Arboretum.
Page 1, (*Acer pentaphyllum*) Quarryhill Botanic Garden; page 3, (*Crocus cartwirghtianus*) Nikos Krigas; page 4, (*Acer cappadocicum*) Westonbirt Arboretum; (*Acer pycnanthum*) Westonbirt Arboretum; page 6, (*Luronium natans*) Jo Packet.
Back cover, (*Erysimum naxense*) Nikos Krigas.

Acknowledgements

BGCI gratefully acknowledges the support of all its members and the following individuals and organisations for its programme in 2009

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Prof. Hongwen Huang
Prof. Junhua Yan

Georgia
Tiblisi Botanic Garden

Japan
Japanese Association of Botanical Gardens
Biodiversity Network of Japan
The Ministry of Environment

Korea
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Springbok Atlas

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Brooklyn Botanic Garden
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Chicago Botanic Garden
Fairchild Tropical Botanic Garden
Missouri Botanical Garden
Plant Conservation Alliance
The Morton Arboretum
United States Botanic Garden
US Forest Service
US Fish and Wildlife Service

United Kingdom
Richmond upon Thames College
Society of Botanical Artists

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Francis Heller (US)

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Veronica Franco
Orlik Gómez García
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Allison Marshall
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Arron Storey
Liam Storey
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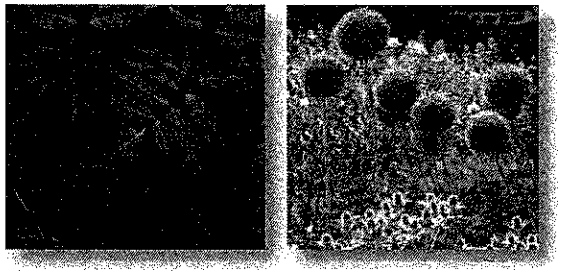

BGCI

Plants for the Planet

Botanic Gardens Conservation International

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Our vision: A world in which plant diversity is valued, secure and supporting all life.

Our mission: To mobilise botanic gardens and engage partners in securing plant diversity for the well-being of people and the planet.

BGCI's patron is HRH the Prince of Wales

BGCI is an independent organization registered in the United Kingdom as a charity (Charity Reg No 1098834) and a company limited by guarantee No 4673175. BGCI is a a tax-exempt 501(c)(3) non-profit organization in the USA and is a registered non-profit organization in Russia.

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國際鳥盟所提巴西計畫成果摘要

國際鳥盟所提巴西計畫執行情形摘要如附：

我國於2007年贊助「保育亞馬遜雨林重要生物多樣性地區計畫(第一階段)」，國際鳥盟各國合作單位(巴西、秘魯、哥倫比亞、厄瓜多、玻利維亞)均有參與，但第1年之重點地區為巴西。成果摘要如下：

亞馬遜計畫為國際鳥盟積極推動重要野鳥棲地(Important Bird Areas, IBAs)計畫之一環。主要針對亞馬遜雨林，實際探查、選址、決定保育優先順序等事宜。由國際鳥盟美洲分部負責統籌，各國合作單位共同參與。

亞馬遜雨林以生物多樣性高聞名於世，亞馬遜雨林為全球最大熱帶雨林，佔全球之53%，約佔全球陸域初級淨生產量之10%。亞馬遜雨林面積600萬 km^2，跨越南美洲9個國家，雨林中有全世界最大的河流系統。調查顯示亞馬遜雨林至少有40,000種植物(30,000種特有種)、1,300種鳥類(263種特有種)、427種哺乳類(173種特有種)、387種爬蟲類(216種特有種)、427種兩棲類(364種特有種)。亞馬遜雨林資源調查不時發現新種，過去8年來，巴西境內的亞馬遜雨林就發現18個鳥類新種。1990年以來也記錄了10種靈長類動物新種。亞馬遜雨林原住民文化豐富，巴西境內有260群、170族。有些原住民的未來面臨危機，1/3族人口少於200人。

亞馬遜計畫原訂工作項目及2007年執行進度，說明如下：

一、調查、紀錄、製圖列出巴西境內亞馬遜雨林重要野鳥棲地。

- 於2007年4月16至20日辦理研討會，討論於巴西境內亞馬遜雨林選擇IBA地點的標準，並研擬工作指南。參加成員包括SAVE Brazil、國際鳥盟美洲秘書處、Conservation International巴西分部及G. A. Bencke(大西洋岸森林IBA指南之作者)。決議選定巴西境內亞馬遜IBA工作將以法定的亞馬遜地區(Amazonia Legal)為範圍。主要討論重點為如何將IBA標準運用於荒野地區(wilderness area)。
- 於2007年5月11至13日辦理研討會，繼續討論IBA標準運用於荒野地區相關議題，亞馬遜雨林9個國家中，有8國派員，其他有wilderness area的國家如阿根廷、加拿大、巴拉圭、烏拉圭和美國也與會討論。
- 初步選定51個有可能公佈為IBA的地區。

二、全面性分析9國現況，確保應保育物種，均有納入亞馬遜雨林IBA系統。

- 目前有5個國家完成IBA評選工作。

三、亞馬遜雨林IBA相關資料納入網站供大眾查閱，另提供宣導用紙本出版品。

- 規劃出版巴西亞馬遜IBA、圭亞那IBA和包括9國IBA的海報等。
- 資料已納入國際鳥盟World Bird Database。

四、排定保護優先順序，進行保育行動需求評估和可行性研究。

- 已討論排定優先順序的方法。
- 國際鳥盟美洲秘書處已聘請專家進行此項工作。

五、與各國政府和贊助單位合作，整合保育策略。

- 一旦優先順序排定後，就會進行此項工作。

國際鳥盟於2008年9月22至27日召開BirdLife World Conference時，發表本計畫相關出版品"The Important Bird Areas of Brazil: Amazonia, Cerrado and Pantanal"，該書有印出林務局logo。

2009 年之巴西保育瀕危鳥類和棲地計畫，計畫及報告摘要如附：

全球鳥類 10,000 餘種中有 1,200 種面臨危機，有 190 多種極度瀕危(極危，Critically endangered)，360 種為瀕臨絕種(Endangered)鳥類。國際鳥盟在 100 多個國家有當地合作團體，總會員人數超過 250 萬，為此國際鳥盟推動「防止絕種計畫(Preventing Extinctions Program)」，採取保育行動，加強培育人才和教育宣導，爭取經費以拯救瀕危鳥類。巴西有 123 種鳥類瀕臨滅絕，其中 25 種為極危物種，是全世界最多瀕臨滅絕物種的國家，亟需採取補救行動。

防止絕種計畫的主軸為負責領導該國瀕臨絕種鳥類保育計畫之物種守護者(Species Guardians)。物種守護者負責協調全國、當地社區和相關團體，採取保育措施，監測物種現況，評估保育計畫成效，並將結果通報國際鳥盟。

國際鳥盟 2009 年所提「巴西保育瀕危鳥類和棲地計畫」之目標為：
一、支援鳥類守護者執行相關計畫。
二、研擬「物種行動計畫」，協助政府部門和相關團體執行重要保育計畫。
三、執行上述行動計畫。
四、爭取經費，確保守護者能持續執行上述行動計畫。

本計畫之預期成果包括：
一、於巴西指定至少 5 種鳥類之守護者。
二、研擬至少 5 份「物種行動計畫」。
三、針對 2 種極危鳥類，執行緊急拯救行動。
四、爭取經費支援 2 種極危鳥類保育計畫 2 年。

Araripe Manakin (*Antilophia bokermanni*)是保育團體 Aquasis 於 1996 年發現的新種，Aquasis 集中精力研究此種鳥類之生物特性(覓食特性、繁殖生物學、遺傳變異等)和保育現況(族群數量、活動範圍、威脅因子等)。Aquasis 也在當地社區辦理活動，提倡將 Araripe Manakin 選為該區保育自然資源之象徵。國際鳥盟和巴西環境部共同支持上述計畫。研究資料顯示，Araripe Manakin 活動範圍侷限於 28 平方公里的區域內，且棲地消失為最主要的危機。棲地破壞的原因包括農業活動(最嚴重的包括香蕉、玉米、豆類和蕃茄)、牧牛、度假屋之建造、娛樂設施和火災。泉水和河流被轉向、分流或開挖也減少棲地面積。

原認為已絕種的 Stressemann's Bristlefront (*Merulaxis stresemanni*)，只在博物館有兩個標本。1995 年再度被發現，目前位於巴西美納斯傑瑞斯州(Minas Gerais)的熱基坦永雅山谷(Jequitinhonha Valley)為此物種全球唯一棲地。

Restinga Antwren (*Formicivora littoralis*)面臨棲地日益縮小及高度破碎化的危機。目前分佈範圍為發展觀光業重點地區，興建度假村或旅社對棲地造成壓力，附近的製鹽工業和人類佔用棲地也是問題。

本計畫執行進度如下：

一、國際鳥盟已選定 3 個巴西民間團體擔任 3 種瀕危鳥類的物種守護者

- Aquasis 負責守護 Araripe Manakin。
- Biodiversitas 負責守護 Stressemann's Bristlefront。
- Pingo d'Agua 負責守護 Restinga Antwren。

二、國際鳥盟巴西合作夥伴拯救巴西協會(Save Brasil)與上開守護者共同研擬 3 份「物種行動計畫」。

三、「物種行動計畫」之執行

- 經由 Save Brasil 和 Pingo d'Agua 之努力，巴西政府同意劃設 4,000 公頃之 Costa do sol State Park，以保護 Restinga 棲地。
- 執行 Restinga Antwren 活動範圍、覓食行為和族群評估之研究計畫，巴西政府設立保護區和研擬行動計畫均納入此研究之建議。
- The Chico Mendes Institute for Conservation of Biodivrsity(主管巴西動植物保育之政府單位)同意採用 Restinga Antwren 和 Araripe Manakin「物種行動計畫」。
- 負責守護 Araripe Manakin 的 Aquasis 已逐步參與及影響當地議會，提倡永續性土地利用，保護湧泉和溪流之重要性，以保護 Araripe Manakin 棲息環境。
- Aquasis 已將 Araripe Manakin 評估和研究結果，以及族群分佈圖提供給統籌保護區設立的單位，巴西環境部將擇期召開會議，邀請各界相關人士，共同討論於阿勒萊皮高原(Araripe Plateau)設立保護區事宜。
- Aquasis 與 Araripe 當地 NGO Associacao Crista de Base 合作推動教育宣導和復育湧泉和溪流本土植物。Aquasis 也與當地天主教教會合作，提倡以 Araripe Manakin 為自然資源保育的象徵。
- Biodiversitas 積極推動設立佔地 600 公頃之 Stressemann's Bristlefront 私立保留區，已爭取到美國鳥類保育協會(American Bird Conservancy)贊助經費，並將雇用一位保護區看守員。

四、教育宣導

- Pingo d'Agua 出版保護 Restinga Antwren 摺頁 1,000 份，T 恤 100 件。並

辦理保育 Restinga Antwren 照片展覽，發放保育資料給參觀人士。2009 年 8 月爭取到一家重要電視台播放保育 Restinga Antwren 紀錄片。

- 巴西環境部出版 Araripe Plateau: Biodiversity and Conservation 一書中，包括由 Aquasis 撰寫之 Araripe Manakin 專章。2009 年 2 月 10 日爭取到 State of Ceara 一家重要報紙，整幅報導 Araripe Plateau 議題。

五、爭取經費部分，已爭取到三個物種擁護者(Species Champions)，應允提供三年保育經費。

2010 年，國際鳥盟所提「巴西保育瀕危鳥類和棲地計畫 Phase II」為上開計畫之延續計畫，摘要如附

Phase II 計畫目標和活動如下：

一、針對巴西極危物種設立保護區，並由物種守護者、各界相關人士和相關地方和中央政府機構共同合作促成。

1. 劃設 4,000 公頃之 Costa do sol State Park，以保護 Restinga Antwren 棲地，物種守護者 Pingo d' Agua 已於 Phase I 時提出建議範圍和分區。
2. Phase I 時物種守護者 Biodiversitas 購買土地於 Minas Gerais 的 Jequitinhonha Valley 設立 Stressemann's Bristlefront 保護區，Phase II 工作為改善保護和經營管理措施，並建立保護區基礎設施。
3. 保護及永續經營管理 Araripe Manakin 重要棲地，包括於湧泉和溪流附近進行森林復育計畫。物種守護者 Aquasis 已於 Phase I 時標示出重要棲地。

二、進行 Restinga Antwren、Stressemann's Bristlefront 和 Araripe Manakin 生物研究，以供巴西政府規劃保育措施和排定優先行動之參考，以及監測物種行動計畫之進度。

三、利用電視或其他媒體宣導 Restinga Antwren、Stressemann's Bristlefront 和 Araripe Manakin 之保育，並針對上開物種與當地相關團體(例如教會)合辦教育宣導活動，如展覽、博覽會等。

四、爭取政府單位支持物種守護者所擬「物種行動計畫」。爭取政府單位承諾採用「物種行動計畫」之建議事項，包括保護區之設立等。

本計畫執行進度摘要如下：

Restinga Antwren 部分：

- 巴西環境部 INEA 於 2011 年初公告劃設 4,000 公頃之 Costa do sol State Park，以保護 Restinga Antwren 之主要棲地。3 次保護區設立民眾意見徵詢會議都很成功。
- 2011 年初啟動 Restinga Antwren 物種行動計畫，製作分發 100 份資料夾，內容包括 Restinga Antwren 基本資料和行動計畫摘要。

- 外來種狨猴(marmoset)對 Restinga Antwren 造成威脅，已將 2 個研究地區之狨猴移走，並於 Restinga Antwren 棲地建立狨猴管理系統。
- 於保護區設立前之徵詢民眾意見期間，辦理 Restinga da Costa do sol – a view beyond the dunes 展覽，描述 Restinga Antwren 為旗艦物種及其生物地位之重要性。此展覽巡迴 5 個都會區，吸引 1,400 人參觀。民眾對展覽予以肯定，對保護區諮詢程序有正面貢獻。
- 宣導 Restinga 生物多樣性布條掛在交通繁忙地區 2 個月，每天都有數千人車由該處經過。另有一所學校將 Restinga 生物多樣性布條長期在校內展示。
- 2010 年 7 月於當地期刊 O Saqua 發表文章，說明 Restinga Antwren 所面臨之威脅，O Saqua 每期印製 3,000 本，文章也列在期刊網站中。另外 Planeta Terra 雜誌刊登一篇外來種文章，以 Restinga Antwren 和狨猴為案例研究。
- 巴西很受歡迎的節目 Globo Ecologia，全力投入 Restinga Antwren 保育活動，2 段摘要短片可於 Youtube 中觀賞。
- 其他教育宣導包括發放貼紙給當地居民和觀光客，於教育宣導活動中贈送印有 Restinga Antwren 保育訊息的 T-shirt。

Araripe Manakin 部分：

- 負責守護 Araripe Manakin 的 Aquasis 已成為 6 個當地社區論壇和委員會之成員。一個論壇採用 Araripe Manakin 為保育水資源重要性之象徵，另一個論壇以 Araripe Manakin 為保育生物多樣性之象徵。3 個社區委員會有建設性的參與物種行動計畫之討論。
- Aquasis 發現大片地區之公有未使用土地可設立為 Araripe Manakin 保護區。2010 年 1 月 Aquasis 與保護區政府相關單位(Protected Areas Creation Department, PACD)討論此案，PACD 9 月指派 2 位專家負責此案，10 月至現場會勘。這些都是設立保護區之必要程序。
- Aquasis 與其他團體合辦活動，提升民眾對保育 Araripe Manakin 之認知，例如 2010 年 4-7 月間，辦理多場賞鳥活動。
- 湧泉和溪流區域為 Araripe Manakin 重要棲地，Aquasis 校訂由 Ceara 洲水資源部取得之資料庫，至 2010 年 9 月已訂正 10 處溫泉之位址標示，2009 年 12 月至 2010 年 7 月間發現 9 處未標示湧泉。新資料庫可更正確的規劃保育和族群監測計畫。
- 2010 年 10 月，進行系統性之族群調查。
- 參與各類團體或機構所辦活動，並宣導 Araripe Manakin 保育議題，如 2011 年 5 月和 6 月環境教育週活動，11 月之計畫宣導活動等。
- 保育計畫相關宣導包括於 4 和 7 月接受全國性電視台 Rede Globo 採訪；4 和 6 月接受地區性電視台 Verdes Mares Cariri 採訪；2 和 4 月全洲性報紙 Diario do Nordeste 刊登文章，8 月另刊 1 次計畫簡介；地區報紙 Jornal do Cariri 和全洲性報紙 O Povo 各刊登 1 次計畫相關文章；8 月全洲性商業期刊 Jornal do

Commercio 刊載採訪報導。

Stressemann's Bristlefront 部分：

- 擴大調查 Stressemann's Bristlefront，由 2009 年 120 個樣點增至 2010 年之 298 樣點。但僅發現 1 隻雄鳥，加上 2009 記錄到的 5 隻雌鳥，本計畫開始調查至今，僅發現 6 隻，證實 Stressemann's Bristlefront 極危的現況。
- 2010 年研究調查發現，Stressemann's Bristlefront 之領域大約為 2.36ha。
- 經由美國鳥類保育協會(American Bird Conservancy)贊助經費，Biodiversitas 已購置 600 公頃有發現 Stressemann's Bristlefront 的林地，並將規劃設立私立保留區。
- 通往保護區之路況不佳，5-7 月間進行道路改善工程，7-9 月修復巡護人員宿舍後，雇用保護區 1 名看守員。

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03 March 2011

Subject: Reports for the projects supported by the 2010 conservation grants of the Forestry Bureau, CoA

Dear Dr. Yen,

It is my pleasure to attach the three project reports for which you have granted support in 2010. As you can see from the reports, the projects have been implemented successfully by BirdLife in Cambodia, Brazil and Sao Tome.

Brazil

Preventing extinctions in Brazil: *conserving the endemic and most critically endangered birds on the brink of the extinction" – Phase 2.*

Brazil is the country with the highest number of threatened species, many of them critically endangered. BirdLife has launched the Preventing Extinctions Program and central to this is the appointment of "Species Guardians" who take the lead in conserving a species in their country or region. With the Forestry Bureau's support in 2009 and 2010, BirdLife has recruited local NGOs in Brazil as Species Guardians and prepared conservation plans for three species that have been the focus of project activities: Stressemann's Bristlefront, Araripe Manakin and Restinga Antwren. This report provide details on the exciting conservation work that has been carried out for these species in Brazil during phase 2 of the project, during 2010, including progress with the designation of protected areas, habitat management, and public awareness activities.

Preventing extinctions in Sao Tome and Príncipe': *conserving the endemic and most critically endangered birds on the brink of the extinction - Phase 2.*

Threats to the rich biodiversity of São Tomé and Príncipe are increasing, especially as a result of the gradual encroachment into secondary forests for agriculture and collection of wood for charcoal. Building on the activities supported by the Forestry Bureau in 2009, during 2010 the project has continued to provide support to the local NGO *Associação dos biólogos Santomenses* (ABS), as the BirdLife Species Guardian in São Tomé. Three species have been prioritized for action: Dwarf Olive Ibis, Sao Tomé Fiscal Shrike and Sao Tomé Grosbeak. During 2010, the project has made good progress in understanding the status and distribution of the species, developing conservation plans, building local community support, and addressing threats to the forest (especially from oil palm development).

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A list of director of the company can be obtained from the registered office

Cambodia

BirdLife Forests of Hope Programme
Conservation of a large forest block in North Western Cambodia through carbon financing and local community involvement – Phase 1

This project has built on BirdLife's success in Indonesia, supported by the Forestry Bureau in previous years, where BirdLife is now managing a lowland forest concession covering over 101,000 hectares. This successful experience is now to be replicated in other tropical forests around the world under the BirdLife "Forests of Hope" programme, including at Western Siem Pang in Cambodia where a first a year of .

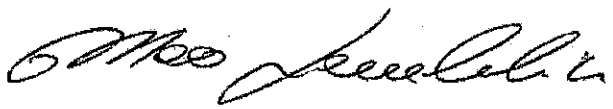
During phase 1 of the project, the concession licence for one of the two corporations seeking to log and convert the forest was cancelled, and the Minister of Agriculture, Forestry and Fisheries has established a new law enforcement team for the area. Important surveys and biodiversity studies were also undertaken.

These are all exciting top priority conservation projects whose success has been made possible by the critical contribution of several donors including the Forestry Bureau of CoA of Taiwan.

I leave you to the details of the reports and should you have any questions, please don't hesitate to contact me.

We are very grateful for your support to these projects as a sign of your commitment to international conservation and also a proof of the productive and continued collaboration between your institution and BirdLife International.

Thank you and best regards.



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BirdLife
INTERNATIONAL
BRASIL PROGRAMME

BirdLife International's Preventing Extinctions Program

Conserving the world's most threatened birds and their habitats

Preventing Extinctions in Brazil

Phase II



Report from BirdLife International to the Forestry Bureau of the Council of Agriculture of Taiwan

Cambridge, United Kingdom, February 2011

SUMMARY

In 2008, at its World Conservation Conference, BirdLife launched the *BirdLife Preventing Extinctions Program* in order to galvanise the entire BirdLife Partnership and engage with the wider conservation community to help prevent the extinction of the 192 Critically Endangered species. The core of the BirdLife Preventing Extinctions Program is the establishment of two new communities: *BirdLife Species Guardians* and *BirdLife Species Champions*

Species Guardians take the lead in conserving a globally threatened species in their country or region. Their primary role is to take and encourage greater conservation action for their species, working with national and local governments, other concerned individuals, organisations and local communities. BirdLife Species Champions are individuals, organisations and companies who raise awareness for threatened species and provide the vital funding that supports the work that the BirdLife Partnership and the *BirdLife Species Guardians* undertake to prevent extinctions.

This report provides a summary of activities undertaken by the project '*Preventing Extinctions in Brazil*', which has been supported by the Forestry Bureau of the Council of Agriculture, Taiwan. This project forms an integral part of BirdLife International's Preventing Extinctions Program and BirdLife is extremely grateful to the Forest Bureau for its support to the Program.

1. Locally-based organisations appointed in Brazil as Species Guardians.

Three locally-based organisations in Brazil were appointed as Species Guardians in 2009. These are: Aquasis, Biodiversitas and Pingo d' Água. Agreements were reached with these Guardians who made a commitment to advance the most urgent conservation actions for the species and to report back on the results of actions taken. They were appointed by the BirdLife Partner in Brazil, Save Brasil, in consultation with the BirdLife Secretariat in the Americas (Quito, Ecuador).

2. Species Action Plans Prepared

BirdLife and Save Brasil worked with the Species Guardians in Brazil to prepare simple conservation plans for three species, which have then formed the basis for project funding and implementation.

3. Implementation of Species Action Plans

The core of the project in 2009 and 2010 has been the implementation of the three species action plans. They have been implemented with technical support from Save Brasil. The three species that have been the focus of project activities are Stressemann's Bristlefront *Merulaxis stresemanni* (Species Guardian is Biodiversitas), Araripe Manakin *Antilophia bokermanni* (Species Guardian is Aquasis) and Restinga Antwren *Formicivora littoralis* (Species Guardian is Pingo d' Água).

The most significant achievements in the implementation of these action plans have been as follows:

Restinga Antwren

3.1 Important progress was made in the creation of the Costa do Sol State Park. The designation of the park by the Environment Agency of Brazil (INEA) is expected in early 2011. All three public consultations, an essential part of the Park designation process, were successful. The Park will encompass about 4,000 hectares and will include all the main habitats of the Restinga Antwren.

3.2 The launch of the Restinga Antwren Species Action Plan is expected in early 2011. A folder will be launched with the Action Plan which will comprise technical information about the species and a short Action Plan summary.

3.3 Marmosets (*Callithrix* spp.), an alien species and a significant threat to the Restinga Antwren were removed from two study areas. A strategy for marmoset management in the Restinga Antwren habitat has been established.

3.4 The Pingo D' Água launched an exhibition "Restinga da Costa do Sol – a view beyond the dunes" on the creation of the Costa do Sol Park during the period of public consultations. The exhibition highlighted the biological importance of the Restinga de Maçambaba using the Restinga Antwren as a flagship species. The exhibition was displayed in five of the seven municipalities where the Restinga Antwren occurs. About 1,400 people visited the exhibition; it was very well received by the public and contributed significantly to the public consultation process.

3.5 An exhibition of thematic banners about restinga biodiversity was an important dissemination campaign. The banners were exhibited for two months in places where thousands of vehicles and people circulated every day.

3.6 In July 2010 an article was published describing threats to the restingas of the Saquarema region in a local journal *O Saquá*. 3,000 copies were printed and the article can be found at the journal's website. *Planeta Terra* Magazine published an article about alien species which used the Restinga Antwren and marmosets as a case study.

3.7 A showing of the most popular TV show in Brazil *Globo Ecologia*, was totally dedicated to the Restinga Antwren. Two excerpts can be seen on Youtube.

3.8 Other awareness-raising activities included the distribution of folders (with some suggestions of local actions that could help in the conservation of the Massambaba Restinga), and the distribution of Project stickers and T-shirts.

Araripe Manakin

3.9 Aquasis is now a member of six local forums and councils. Project presentations by Aquasis and their participation in the forums' discussions have ensured greater recognition of the need to conserve the Araripe Manakin and its habitat. The species has been adopted by one forum as a symbol for the importance of conserving water resources in the region, and by another as a symbol of biodiversity conservation. Three councils were productive participants in the Species Action Plan discussions.

3.10 Progress has been made in establishing a protected area in the Araripe Plateau. Aquasis discovered that the proposed location includes a large unoccupied public area

and this is likely to facilitate the protected area's creation. Aquasis members discussed the protected area's establishment with the Head of the Protected Areas Creation Department. Following the meeting Aquasis was informed that two technical specialists had been assigned to work on the protected area and would visit the site in December, as part of the protected area's establishment process.

3.11 Aquasis has taken part in many events and activities with local stakeholders designed to encourage their involvement, support and understanding of the Project.

3.12 A database obtained from the Department of Water Resources, State of Ceará was used to provide baseline estimates of the location of for natural springs that occur within the known range of the Araripe Manakin. Errors and omissions in the database were rectified and the new database will enable more accurate conservation planning and population monitoring.

3.13 Vocal activity of the species was monitored to identify the beginning of breeding activity in order to efficiently utilize limited resources when carrying out fieldwork. A systematic population census was undertaken in October.

3.14 Aquasis selected Associação Cristã de Base, one of the most active and influential NGOs in the region, as a partner in their Project awareness campaign, which got underway in November. In addition Aquasis promoted the Project by taking part in Environmental Awareness Week activities and environmental education initiatives carried out by other organizations in May and June. The Project was also promoted in articles in one regional and two state newspapers in August and featured on the main national television network *Rede Globo* in April and July.

Stresemann's Bristlefront

3.15 In 2010, significant additional forest areas were surveyed, as well as areas previously covered in 2009, and the number of sampling points was greatly increased. However, only one additional bird was found, a male and in the same forest tract as the five females that were recorded in 2009, making a total of six individuals located since the start of the project.

3.16 A rough measure of the species territory size was obtained (2.36 ha). Results obtained so far confirm the conservation status of Stresemann's Bristlefront as Critically Endangered.

3.16 Using funds from the American Bird Conservancy, Fundação Biodiversitas continues to make progress with the establishment of a 600 ha private nature reserve. This reserve will comprise part of the only forest tract where the species has been found so far.

3.17 Hiring a local park guard had to be postponed as structural repairs were needed to the guard's house. The road to the reserve which was previously in a terrible condition and the guard's house have both been improved. An excellent candidate guard has been contacted and is expected to be hired soon.

4. Securing additional funding for the Guardians

Based on the actions set out in the action plans, and the funding that is required to implement these, BirdLife has recruited Species Champions for two of the three species. These Champions have each made a commitment to support the conservation work over three years.

INTRODUCTION

NB An abbreviated account is included below of BirdLife's Preventing Extinctions Program and the *Preventing Extinctions in Brazil* project. Please see BirdLife's report to COA (Feb 2010) for further details. The key focus of this 2011 report is on the results of last year's work by the three Species Guardians in Brazil.

1. BirdLife's Preventing Extinctions Program

In 2008, at its World Conservation Conference, BirdLife launched the *BirdLife Preventing Extinctions Program* in order to galvanise the entire BirdLife Partnership and engage with the wider conservation community to help prevent the extinction of the 192 Critically Endangered species.

The core of the BirdLife Preventing Extinctions Program is the establishment of two new communities: *BirdLife Species Guardians* and *BirdLife Species Champions*

Species Guardians take the lead in conserving a globally threatened species in their country or region. Their primary role is to take and encourage greater conservation action for their species, working with national and local governments, other concerned individuals, organisations and local communities. BirdLife Species Champions are individuals, organisations and companies who raise awareness for threatened species and provide the vital funding that supports the work that the BirdLife Partnership and the *BirdLife Species Guardians* undertake to prevent extinctions.

2. Summary of the project

The project '*Preventing Extinctions in Brazil'*, has been launched because of the great importance of Brazil for Critically Endangered birds, and the need to support action by the Species Guardians. The project is supported by the Forestry Bureau of the Council of Agriculture, Taiwan and has the following objectives:

1. To recruit and provide support to Species Guardians in Brazil
2. To develop Species Action Plans with the Species Guardians and to promote the implementation of key actions by government departments and other key stakeholders
3. To directly implement actions in the Species Action Plans through work undertaken by the Species Guardians
4. To secure additional funding support for the work of the Species Guardians to ensure that the actions can be sustained for the long-term.

This report provides a summary of activities undertaken by the project.

PROJECT RESULTS

1. Appointment of and support to BirdLife Species Guardians

As described in the last report BirdLife appointed three locally-based individuals and organisations in Brazil as Species Guardians. Agreements have been reached with these Guardians who have made a commitment to advance the most urgent conservation actions for the species and to report back on the results of actions taken.

2. Preparation of Species Action Plans

BirdLife and Save Brasil have worked with the Species Guardians in Brazil to prepare simple Species Action Plans as a basis for providing funding and as appropriate technical support.

3. Implementation of Species Action Plans

The core of the project in 2009 and 2010 has been the implementation of three species action plans. The three species that have been the focus of project activities are Stressemann's Bristlefront *Merulaxis stresemanni* (Species Guardian is Biodiversitas), Araripe Manakin *Antilophia bokermanni* (Species Guardian is Aquasis) and Restinga Antwren *Formicivora littoralis* (Species Guardian is Pingo d' Água).

Further details on the work for these three species is provided below.

4. Securing additional funding for the Guardians

Based on the actions set out in the action plans, and the funding that is required to implement these, BirdLife has recruited Species Champions for two of the species. These Champions have each made a commitment to support the conservation work over three years.

Financial report

Item	Expenditure (see note 1)
Office equipment	900
Office running costs	2,700
Field equipment	1,080
Vehicle running costs	1,140
Vehicle	0
Infrastructure	2,650
Education materials	1,920
Field activities	2,820
Printing	900
Awareness materials	1,920
Field coordinators	2,520
Awareness officer	0
Reserve wardens	0
Support to Guardians	4,800
Species conservation planning	4,700
Promotion and fundraising	9,500
Subtotal	**37,550**
Project management @15%	5,630
Total	**43,180**
Contribution by COA	15,000
Funding contributed by BirdLife	**28,180**

Note 1. Financial reports for year 2 are still awaited from the Species Guardians prior to finalizing the financial report

BirdLife Species Guardians' Project: Restinga Antwren



Restinga Antwren

Restinga Antwren has an extremely small and highly fragmented range around Cabo Frio in Rio de Janeiro state, Brazil. The species inhabits coastal scrub vegetation, notably restinga – a beach-scrub habitat.

Its range occurs within an area of major tourism development, and suitable habitat is under considerable pressure from clearance for beachfront housing and holiday resorts. The species is also threatened by the salt industry and the increasing presence of squatters.

Background

The Restinga de Maçambaba, located in the northeastern coast of the Rio de Janeiro state, is important for the Critically Endangered Restinga Antwren *Formicivora littoralis* and the Vulnerable Black-backed Tanager *Tangara peruviana*. This area consists of a narrow strip of coastal restingas about 40 km long. The restinga ecosystem is characterized by a beach-scrub habitat, rich in cacti and bromeliads, growing on sand dunes. The Restinga de Maçambaba separates the Araruama lagoon from the ocean and it is one of the last well preserved beach lagoon systems in Rio de Janeiro state. The Restinga de Maçambaba is considered an Important Bird Area, and also an AZE (Alliance for Zero Extinction) site. The IBA is under enormous pressure from clearance for real-state projects (beachfront housing), the salt industry and the increasing presence of squatters.

Most occupation in the area is illegal, and occurred once the paved road between Araruama (beside the Araruama lagoon) and Arraial do Cabo (on the coast) was constructed. The Restinga Antwren is one of the most abundant birds in this avifaunally depauperate ecosystem. Pairs clearly occupy relatively small areas and occur at high densities. However, being totally reliant on the restinga habitat the population will decline rapidly with further habitat loss.

The Species Guardian for the Restinga Antwren is Pingo d' Água

Planned activities

1. Promotion of the creation of a public protected area in the region

2. Development of biological research on the Restinga Antwren to determine home range, foraging behaviour and population estimates.

3. Implementation of an awareness raising and environmental education program.

Results

1. Promotion of the creation of a public protected area in the region

Important progress was made in the creation of the Costa do Sol State Park. The designation of the park by the Environment Agency of Brazil (INEA) is expected in early 2011. Three public consultations were held as part of the protected area establishment process. Local communities, stakeholders, local and regional media, interested business people, and representatives from the INEA, city halls, NGOs and research institutions had the opportunity to discuss the pros and cons of the Park's creation.



The third public consultation to discuss the National Park creation

The third public consultation was allied to the exhibition "*Restinga da Costa do Sol –a view beyond the dunes*" promoted by Pingo D' Água. This event was particularly successful. Around 250 persons took part and showed great receptivity to the Park's creation. The public consultation process was finalized with the third consultation.

In November 2010 INEA worked on final adjustments to the Park delineation and sent their proposal to the Governor of Rio de Janeiro State who will decide whether to approve the Park's creation. Letters of support will be prepared and signed by environmental institutions to be sent to the Governor, highlighting the importance of the region's unique biodiversity. The Park will encompass about 4,000 hectares and will include the main habitats of the Restinga Antwren.

The launch of the Restinga Antwren Species Action Plan is expected to take place in early 2011. The printed version will be in Portugese and the English version will be available in PDF format. In addition, ICMBio and SAVE Brasil are preparing a folder to

be launched with the Action Plan; the folder has technical information about the species and a short summary of the Action Plan.

2. Development of biological research on the Restinga Antwren to determine home range, foraging behaviour and population estimates.

The presence of marmosets (*Callithrix spp*) in the Restinga de Massambaba was an important threat to the Restinga Antwren. The removal of marmosets took place at two study areas, Área de Relevante Interesse Ecológico (ARIE Formigueiro-do-litoral) (Area of Relevant Ecological Interest Restinga Antwren) located at Saquarema municipality and in Massambaba, Praia Seca district, Araruama city.

The last marmoset capture was followed by representatives from INEA (the Environmental Agency of Rio Janeiro State) and the Association of Neighbours from Jaconé (a local organization). The Universidade Estadual do Rio de Janeiro (State University), one of SAVE Brasil's local partners, is now in charge of the marmoset removal project. Representatives of both state and municipal environmental bodies were contacted to establish a strategy for marmoset management in the Restinga Antwren distribution area. The marmoset's removal had good media coverage.

In 2010 a Master's student from Universidade Estadual do Rio de Janeiro, (State University) presented a dissertation on the diet and foraging tactics used by the Restinga Antwren. This Master project's was supported by Conservation International and SAVE Brasil through the Preventing Extinctions Programme. During the preparation of the species' Action Plan and the proposal to create the Park the knowledge acquired through biological research on the Restinga Antwren was crucial in determining the best strategic actions to protect the species.

3. Implementation of an awareness-raising and environmental education program.

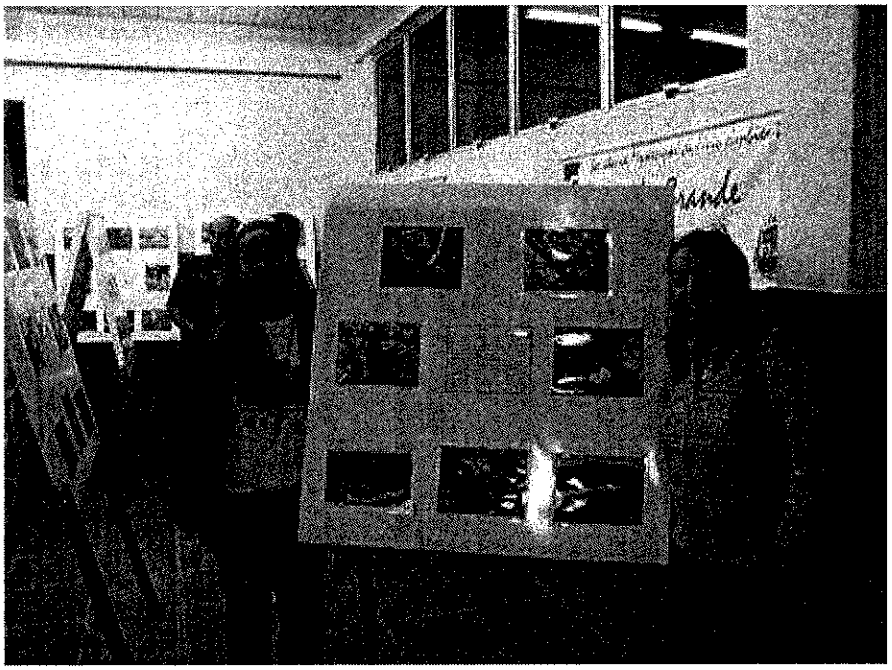
The Pingo D' Água launched the exhibition "Restinga da Costa do Sol – Um olhar além das dunas" (Restinga da Costa do Sol – a view beyond the dunes) during the period of public consultations on the creation of Costa do Sol Park. The exhibition highlighted the biological importance of the Restinga de Maçambaba using the Restinga Antwren as a flagship species. The exhibition was very well received by the public at large and many people learned more about the Restinga Antwren Project.

The exhibition contributed significantly to the public consultation process. Many times the employers from INEA cited the exhibition during discussions about the necessity to create the Park.

The exhibition was displayed in five of the seven municipalities where the Restinga Antwren occurs. About 1,400 people from the general community visited the exhibition. A brief description of the activities at each municipality follows.

Saquarema Around 110 people attended the exhibition, which was supported by local stakeholders (local institutions, media and traders). In the same neighbourhood, a very effective environmental awareness program took place at the Municipal School Ismênia de Barros, involving teachers and about 600 students from all grades at the school.

During the program, issues on the perception and knowledge of the community about the restinga and the Restinga Antwren were discussed.



Restinga da Costa do Sol – a view beyond the dunes Exhibition during the third consultation

Cabo Frio The exhibition was shown here during the period of the third public consultation. About 150 people visited the exhibition.

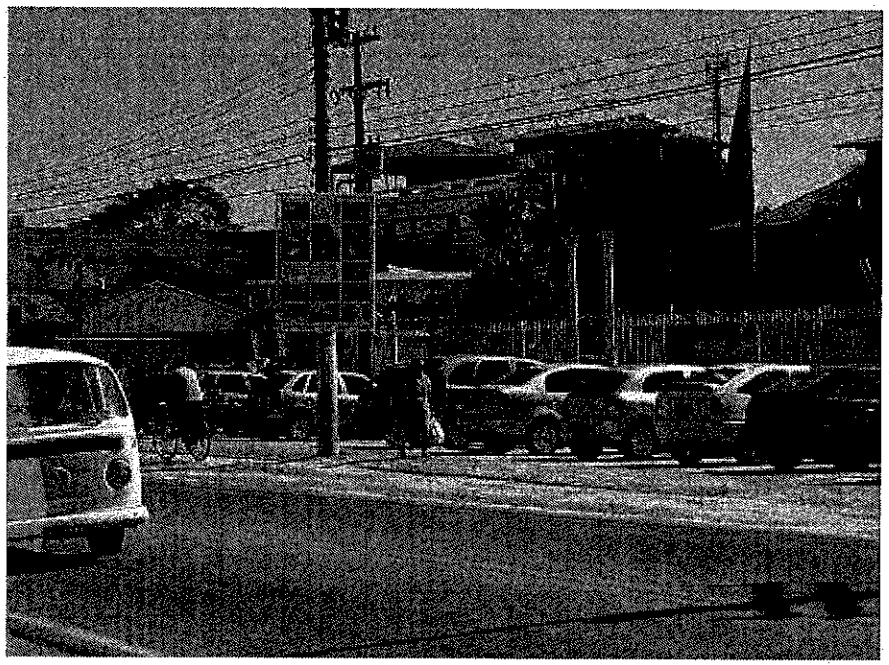
São Pedro da Aldeia The exhibition received an exclusive place at an event organized at the School Horto São Pedro da Aldeia. The event's purpose was to raise funds to construct an ecological trail at the school where environmental education classes would take place. About 60 visitors passed through the exhibition, including the mayor, the secretary of the Environment Agency and other managers and decision makers from the municipality.

Araruama The exhibition was displayed during a science fair at the Educational Center Jardim Neto and was visited by about 120 students and their parents.

Iguaba Grande The exhibition was shown during a meeting to present the project Bichos da Mata ("Animals of the Forest") promoted by INEA (Environmental State Agency). The project's aim was avoid the capture and keeping of wild animals in captivity. The exhibition was also displayed during the fair of Science and Biodiversity of the Integrated Center of Public Education, a State School, where 400 people attended.

The pictures were also exhibited at a small event with 30 visitors during the Encontro da Família (Family's Meeting), for parents of students from the Municipal School Antônio Rodrigues Teixeira. The students of this school belong to a local fisher group, so they have a strong link with environmental preservation.

An exhibition of thematic banners with pictures and messages about the restinga biodiversity was an important dissemination campaign. The banners were exhibited for two months in places where thousands of vehicles and people circulated every day. This exhibition was part of the anniversary celebration of Environment Week in Iguaba Grande municipality.



Banner about restinga biodiversity

In July 2010 an article was published describing restinga threats in the Saquarema region in a commemorative 10 year edition of a local journal *O Saquá.* A total of 3,000 copies was printed; the article can be found at the journal's website http://www.osaqua.com.br/2010/07/01/ameaca-a-um-patrimonio-ambiental

A showing of the most popular TV show in Brazil *Globo Ecologia* from Globo Network, was totally dedicated to the Restinga Antwren. Following the links:
http://www.youtube.com/watch?v=AevcLETaOpg (Part 1)
http://www.youtube.com/watch?v=fY9kaFDMz8k (Part 2)

A researcher from UERJ (State University of Rio de Janeiro) gave a presentation to students on the Restinga Antwren and the Restinga de Maçambaba ecosystem. Publicity materials produced as part of the Project (folders, stickers and T-shirts) were distributed during the talk. These materials were also used to support environmental education activities including capacity-building workshops for teachers of public schools and in presentations for students.


Sagui invasor coloca em risco ave nativa do Rio

Article in the Planeta Terra magazine about invasive species, using the Restinga Antwren and marmosets as example

Planeta Terra Magazine published an article about alien species and used the Restinga Antwren and marmosets as a case-study of invasive species problems.

About 100 folders (with some suggestions of local actions that could help in the conservation of the Massambaba Restinga) were distributed during the third public consultation and are being used during Project activities.

A banner about the Project was produced for a permanent display at a school at the school's request.

Project stickers have been distributed among local people and tourists; the 350 remaining stickers will be distributed in the coming months.

There are 150 remaining Project T-shirts which will be distributed in future environmental education activities.

BirdLife 'Species Guardians' Project: Araripe Manakin



Araripe Manakin *Antilophia bokermanni* is the most endangered manakin in the world. Restricted to the slopes of the Araripe Plateau in the State of Ceará, NE Brazil. It is very distinctive, and remarkably it was only discovered in 1996.

Background

Since the discovery of the species by Aquasis (who have been identified as the appropriate BirdLife Species Guardian) in 1996 they have concentrated their efforts on determining its biology (e.g., feeding habits, reproductive biology, and genetic variability) and its conservation status (e.g., population size, present range, major threats). They have also conducted an extensive outreach campaign among the local community to promote the Araripe Manakin as a symbol for the conservation of natural resources in the region. These initial efforts were supported by the BirdLife Conservation Leadership Program and the Brazilian Ministry of Environment and the results have been summarized in a formal Species Action Plan (SAP).

The study has shown that the species is confined to just a 28km² range, and habitat loss is the major issue for its survival in the wild. This has been driven by clearance for agriculture (especially banana, maize, beans and tomatoes), cattle-raising, construction of holiday homes and other recreational facilities and fires. Diversion, channeling and piping of springs and streams are also reducing the available gallery forest habitat.

Planned activities

1. Participation in key local forums and councils to include the Araripe Manakin in the discussions of natural resource use and planning

2. Follow up closely the Protected Area creation process with the local and national environmental authorities, providing them with the technical information required.

3. Promote the involvement of local stakeholders.

4. Refine the mapping of spring and watercourses and conduct a new population census to evaluate trends (5 years after first census).

5. Conduct an awareness campaign with selected communities living in the lower slopes of Chapada do Araripe, along the Araripe Manakin´s range.

Results

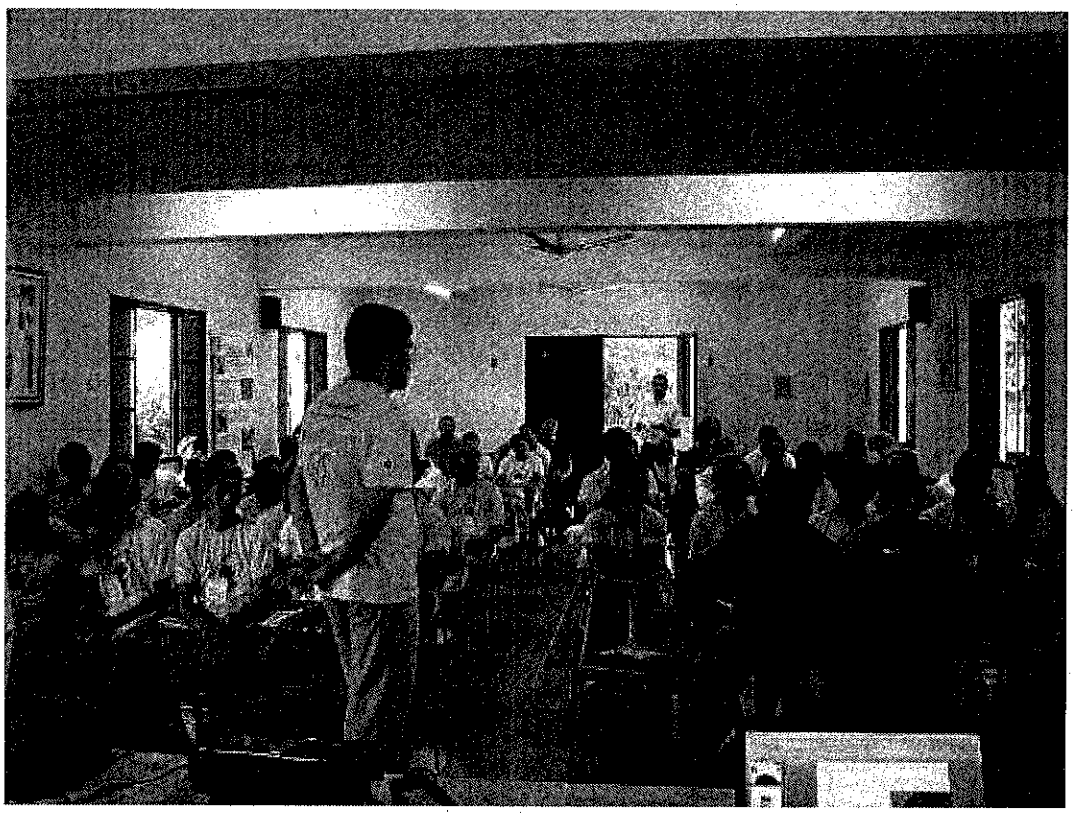
1. Participation in key local forums and councils to include the Araripe Manakin in the discussions of natural resource use and planning

As previously described in Birdlife's 2010 *Preventing Extinctions in Brazil* report, four local forums are key to the Araripe Manakin's conservation: the Salgado River Watershed Committee (coordinated by the State´s Water Management Agency), Araripe Protected Area Council, Araripe National Forest Council, and Araripe Desertification Prevention Forum. Aquasis has also been invited to participate in meetings with two other councils with a broader focus that were not noted in the original project proposal: the Crato Municipal Environmental Council and the Araripe GeoPark Management Council.

Presentations on the Araripe Manakin Conservation Project were given to the Salgado River Watershed Committee, the Araripe National Forest Council, Araripe Desertification Forum, Crato Municipality Environmental Council and the Araripe GeoPark Management Council.



Lecture on the Araripe Manakin Conservation Project to the Salgado River Watershed Committee.



Presentation about the Araripe Manakin Conservation Project to the Desertification Prevention Forum

In addition Aquasis participated in:

* a seminar on water resource management held by the Salgado River Watershed Committee,

* discussions regarding the involvement of women in desertification prevention activities and regarding specific actions to combat desertification in the region held by the Araripe Desertification Prevention Forum, and

* a planning meeting held by the Crato Municipality Environmental Council for Environmental Awareness Week.

Acceptance and participation in the key local forums

Participation by the Project in meetings of all the above forums and councils ensured that the protection of Araripe Manakin habitat (forested springs along the slopes of the Araripe Plateau) was discussed by all forums.

The Salgado River Watershed Committee has readily adopted the Araripe Manakin as a symbol for the importance of conserving water resources that are already severely limited in the Araripe region. The regional representative of the water company, which organizes the Committee has declared his intention to integrate more direct attention to Araripe Manakin conservation into the company's long term strategic planning.

The Crato Municipal Environmental Council was eager to accept the Araripe Manakin as a symbol for biodiversity conservation and used the bird's image in their commemoration of Environmental Awareness Week.

The Araripe GeoPark Management Council was a productive participant in the Species Action Plan discussions and has formally included protection of the species as one of its primary objectives.

Following the lecture about the Project to the Araripe National Forest Council, Project information booths have been established in Crato's main public square. Various educational activities including birdwatching have also been carried out. As a result of such efforts, there is now a very good possibility that the existing boundaries of Araripe National Forest will be redefined to include some of the most critical areas needed for the species. Participation of forest council representatives in the revision of the Species Conservation Plan was productive.

Members of the Desertification Prevention Forum were also enthusiastic about the Project and Aquasis has been formally invited to take part in future forums and conservation-awareness events.

2. Follow up closely the Protected Area creation process with the local and national environmental authorities, providing them with the technical information required.

Aquasis discovered that the proposed location for creating a protected area in the Chapada do Araripe includes a large public area that is considered a strategic belt between private and federally owned areas. The most recent property survey in 1983 indicated that the strategic belt on the slopes of the Araripe plateau, which borders the national forest and includes much of the known distribution of the Araripe Manakin, is an unoccupied public zone.

This information could help facilitate the creation of a protected area, considering that the greatest obstacle to establishing such an area here would be the costs of private property purchase and expropriation, in some cases.

In January 2010 two Aquasis Bird Conservation Program team members met the Head of the Protected Areas Creation Department. The Head informed them that there was a lack of sufficient personnel to follow up immediately on all the proposed protected areas that are currently under consideration. In September 2010 two technicians had been assigned to the protected area, a required step in the protected area creation process.

Although no formal meetings with the Araripe Protected Area Council have been held, the participation of Council members in revising the species Action Plan was productive.

A review of the species Action Plan in collaboration with ICMBio, the Environment Agency of the Federal Government of Brazil took place in April 2010.

3. Promote the involvement of local stakeholders.

Collaboration has been developed with one of the most active and influential NGOs in the region, the Associação Cristã de Base. This NGO will join Aquasis in a partnership to conduct outreach activities in the region.



Bird watching field trip with local kids during the Araripe National Forest Anniversary Celebration

Aquasis took part in many events and activities with local stakeholders designed to encourage their involvement, support and understanding of the Project, birdwatching activities were organized between April and July 2010, for example. A Project information booth was used to participate in the Araripe National Forest Anniversary Celebration in Crato in April and in the Crato Agricultural Exposition in July.

4. Refine spring mapping and conduct a new population census to evaluate trends (5 years after first census).

A database obtained from the Department of Water Resources, State of Ceará was used to provide baseline estimates of geographical coordinates for the natural springs that occur within the known range of the Araripe Manakin. By the end of September 2010, Aquasis had corrected the geographical coordinates of ten springs and also discovered nine additional springs between December 2009 and July 2010.

The presence of the Araripe Manakin was confirmed in three places, two of which were new locality records along artificial water canals several kilometres from the naturally occurring source water supplying them. This discovery is very encouraging and it is now suspected that previous population census efforts, conducted primarily in the vicinity of the source of known springs, may have underestimated the actual population size.

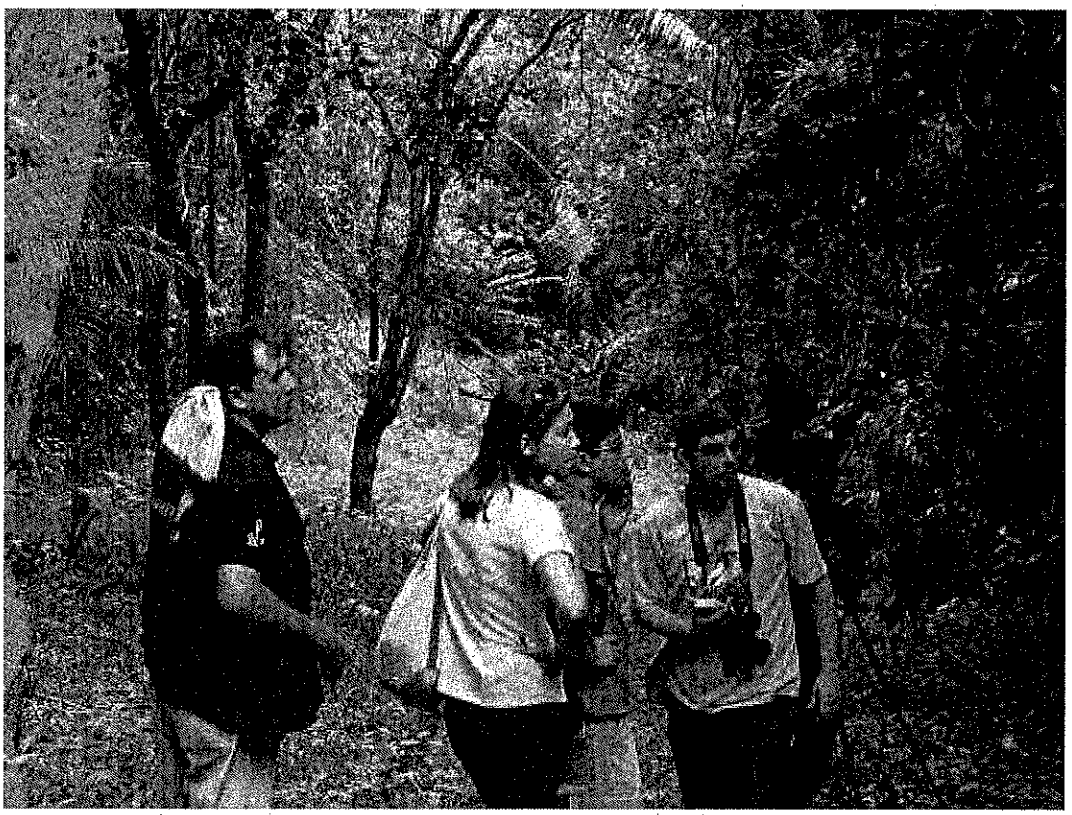
Araripe Manakin's degree of vocalization is usually highest during September and October, although vocal activity, which is closely tied to rainfall patterns, may be delayed by up to two months in years when the dry season is more prolonged.

In order to most efficiently utilize limited resources, Aquasis periodically monitored vocal activity to identify the beginning of breeding activity in 2010, and only then initiate the search for new springs. A systematic population census was undertaken in October.

Five areas were checked for the species' presence, as well as to update and correct the GIS spring database. Springs that flow year-round are critical for a successful Araripe Manakin territory. The new database, which now includes accurate data on 130+ springs, will enable more accurate conservation planning and population monitoring.

5. Conduct an awareness campaign.

The Project featured on the main national television network, *Rede Globo* in April and July, and on the regional television program, *Verdes Mares Cariri* in April and June.



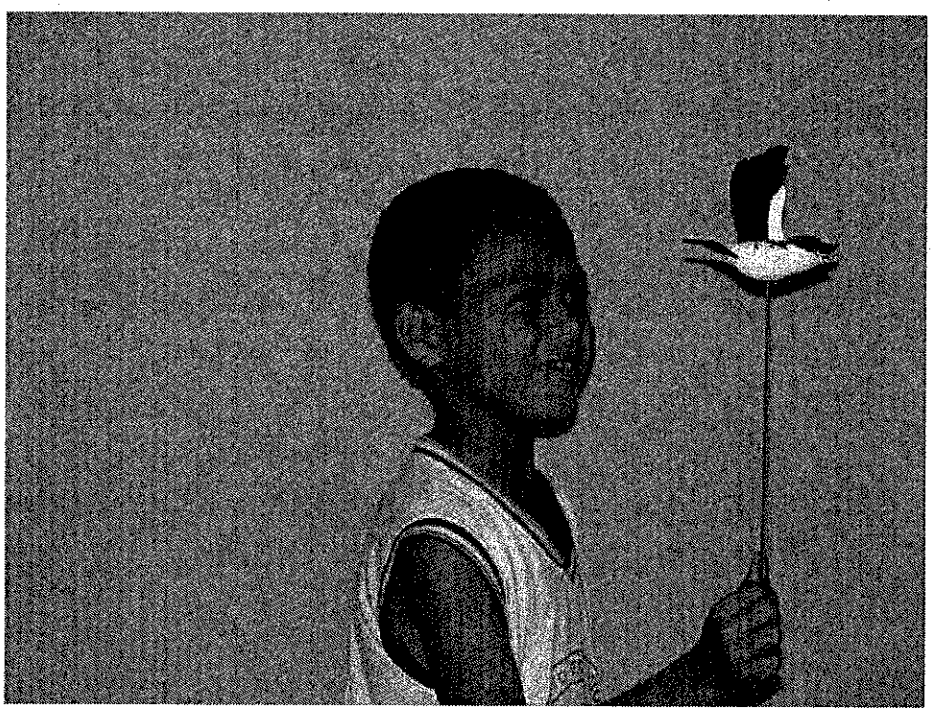
Recording footage of the Araripe Manakin Conservation Project with a television film crew

The Associação Cristã de Base was selected to partner Aquasis in their awareness campaign directed at community members living in closest proximity to the focal species. Awareness campaign activities commenced in November following the election period in Brazil.

Aquasis took part in Environmental Awareness Week activities organized by the Ceará Trade Federation Social Service in May, and by the municipal government of Crato in May and June. In August Aquasis also participated in environmental education initiatives of the apicultural enterprise Cearapi.

Articles about the Project were published in *Diário do Nordeste*, the state newspaper of Ceará in February and April; a note was also published there in August. Other Project articles were published in the regional newspaper, *Jornal do Cariri* and the state newspaper, *O Povo*, and an interview was published with the state commercial trade publication *Jornal do Commercio*, all in August.

Aquasis participated in field courses for biology students from the Federal University of Pernambuco and the University of Vale do Acaraú in May 2010. A film exhibition and lecture were given to the local community in May and a lecture was also presented at the Federal University of Ceará in partnership with another local NGO in June 2010.



Interacting with the local community at a lecture and film showing event.

BirdLife Species Guardians Project: Stresemann's Bristefront



Stresemann's Bristefront *Merulaxis stresemanni*
Until recently Stresemann's Bristlefront was known from just two museum specimens. It was rediscovered in 1995, and at present the only known site for the species is in the Jequitinhonha valley, Minas Gerais, near the border with Bahia which is where its conservation is now be focused.

Background
The Sossego do Arrebol Farm, in the Jequitinhonha valley, is home to a great number of threatened species including the Stresemann's Bristlefront. It is the perfect center for the dissemination of regional conservation action. In order to set a solid foothold in the region and initiate education and conservation actions, it is first necessary to create a proper infrastructure. This will provide the means for surveillance and maintenance of the area and the development of management projects.

Establishing an effective protected area demands long term planning and the participation of many stakeholders. However, this short term plan will set an operational background that will allow the development of immediate priority actions.

A local NGO, Biodiversitas, has been identified as the most appropriate organisation to be the BirdLife Species Guardian for the Stresemann's Bristlefront. Their emergency plan for the Sossego do Arrebol Farm comprises the following actions:

Planned Activities

1. Investigate the conservation status of Stresemann's Bristlefront to determine its population size, trend, distribution and habitat requirements, which, along with a refined definition of major threats to its environment will form the basis of conservation planning and action.

2. Hiring a Park guard who, in addition to security, will be responsible for operational activities. These will include setting up the reserve's infrastructure and establishing a preliminary relationship with local communities. The guard will also conduct a habitat preservation monitoring program in order to evaluate the effectiveness of the proposed conservation actions.

Results

1. Investigate the conservation status of Stresemann's Bristlefront

In 2010 significant additional areas were surveyed: the Veracel Reserve, RPPN, a private nature reserve in Porto Seguro, BA, the Biological Reserve Una-BA and Jueirana farm (both in Una municipality) and the Serra Bonita Reserve (Camacan municipality).

In addition the Bandeira / Macarani forest tract, part of the Mata Escura Biological Reserve (Jequitinhonha municipality), and the forest of Limoeiro/Bela Vista farms (Almenara municipality) which were all covered in 2009, were also surveyed.

The number of sampling points was greatly increased from 120 in 2009 to 298 in 2010.

Only one additional bird was found, a male also in the Macarani / Bandeira area (Balbina forest, or Sossego do Arrebol forest - SAF) where five females were recorded in 2009, making a total of six individual birds located since the start of the project.

Although more sampling will be carried out, current data indicate that the species is rare and local. There is the possibility of strong bias in the sexual ratio of the species' population at SAF where all the birds have been located to date.

All the birds were found in sloping parts of the forest with pendant vines and with dense litter on the forest floor comprising large dead leaves (especially of *Cecropia* sp.), many twigs and thick fallen logs. Birds have all been seen on the forest floor, feeding from insects in leaf litter or under fallen logs.

Until now it has not been possible to determine the home range or territory size of Stresemann's Bristlefront. In 2010 a rough measure of the territory was found to be 2.36 ha, which lies within the territorial range of 0.8 to 4 ha found for other understorey birds of the Atlantic forest.

The only forest tract where the species has been found in recent years remains under strong pressure. Results obtained so far, confirm the conservation status of Stresemann's Bristlefront as Critically Endangered.

2. Setting up the reserve's infrastructure and establishing a relationship with local communities.

Roughly 600 ha of the forest area where Stresemann'a Bristlefront occurs has been acquired by Fundação Biodiversitas with funds from the American Bird Conservancy. The area will be transformed into a private nature reserve.

Hiring the park guard had to be postponed because there was no suitable place available for him to live. The road to the reserve was in terrible condition previously making access difficult, but was repaired between May and July. This enabled improvements of a guard's house to take place between mid July and September. It is expected that the park guard would be hired after the house improvements have been completed. An excellent candidate had previously been personally contacted in Almenara municipality and had accepted the work.

國際鳥盟聖多美普林西比計畫成果摘要

國際鳥盟聖多美普林西比保育計畫成果摘要如附：

我國於 2008 年提供贊助國際鳥盟(BirdLife International)所提「賞鳥生態旅遊改善聖多美普林西比人民生計計畫」，報告摘要如附：

聖多美普林西比(Sao Tome and Principe)係位於非洲西部幾內亞灣之大西洋島國，為非洲第 2 小的國家，面積約 1,001 平方公里。該國有 95 種鳥類，其中 27 種為特有種，保育現況堪虞的特有種有 11 種。哺乳類爬蟲類和兩棲類的特有種比例也很高。植物有 685 種。威脅聖多美普林西比生物多樣性之原因主要是農業活動侵入次生林，以增加糧食生產或蒐集製木炭用之木材。破壞森林之根源為貧窮和高失業率。旅遊業為全球最大產業，生態旅遊的成長相當快速，而賞鳥正是生態旅遊中成長最快的類別之一。本計畫宗旨係發展生態旅遊，提倡永續發展和生物多樣性保育。聖多美普林西比自然資源和環境部有提供支持計畫信函。

本計畫之目標包括：

- 訓練民間團體和當地社區發展觀光和賞鳥活動。
- 強化各界相關人士間之合作，包括政府、民間團體、當地社區等，於地方、區域和全國 3 種不同階層之合作。
- 經由生態觀光，促使民眾瞭解生物多樣性保育和降低貧窮之關係及重要性。

國際鳥盟以聖多美普林西比為重心之非洲重要野鳥棲地(Important Bird Area, IBA)計畫成果包括：

一、選定聖多美普林西比生物學家協會(Association of Biologists of San Tome, ABS)為當地國際鳥盟執行計畫合作單位。完成檢視和分析觀光相關法令和活動，發展以賞鳥為重點之生態觀光。包括經濟可行性和永續研究、行銷計畫、社會環境影響評估等。

二、選定 3 種瀕危鳥類為重點保育及具吸引力物種，並指派 3 位守護人如下：

- Angnus Gascoigne; Dwarf Olive Ibis (*Bostrychia olivacea*)
- Virginia Carvalho d'Almeida Goudinho; Sao Tome Fiscal (*Lanius newtoni*)
- Maria Manuela Bandeira; Sao Tome Grosbeak (*Neospiza concolor*)

三、針對 ABS 辦理計畫執行訓練班。

四、辦理「發展聖多美賞鳥觀光作為永續發展途徑」研討會。

五、選定 2 個社區發展生態觀光計畫。成立社區團體，召開會議討論社區需求、面臨問題、發展賞鳥觀光活動和面臨之威脅等。

六、辦理宣導活動，製作宣導小冊。

七、設立景點支援小組(Site Support Groups, SSGs)負責社區永續發展計畫。

八、選定社區、民間團體、政府人員等，辦理野外鳥類鑑識訓練班和導遊訓練班。
九、發展生態觀光基礎建設。

全球鳥類10,000餘種中有1,200種面臨危機，有190多種極度瀕危(極危，Critically endangered)，360種為瀕臨絕種(Endangered)鳥類。國際鳥盟在100多個國家有當地合作團體，總會員人數超過250萬，為此國際鳥盟推動「防止絕種計畫(Preventing Extinctions Program)」，採取保育行動，加強培育人才和教育宣導，爭取經費以拯救瀕危鳥類。

聖多美普林西比(Sao Tome and Principe)有3種極危特有種鳥類，包括Dwarf Olive Ibis (*Bostrychia bocagei*)、Sao Tome Fiscal (*Lanius newtoni*)和 Sao Tome Grosbeak (*Neospiza concolor*)。ABS將擔任這3種鳥類的守護者(Species Gardians)，負責協調全國、當地社區和相關團體，採取保育措施，監測物種現況，評估保育計畫成效，並將結果通報國際鳥盟。

國際鳥盟2009年所提「聖多美普林西比保育瀕危鳥類和棲地計畫」之目標為：
一、支援鳥類守護者執行相關計畫。
二、研擬「聖多美普林西比極危物種行動計畫」，協助政府部門和相關團體執行重要保育計畫。
三、執行上述行動計畫。
四、爭取經費，確保守護者能持續執行上述行動計畫。

聖多美普林西比極危物種行動計畫中主要的工作計畫包括：
一、監測3種極危鳥類之族群現況和棲地分佈。
二、找出實際可行之方法保育鳥類多樣性，建立永續發展和環境監測之架構。
三、進行3種極危鳥類田野調查，包括生態、族群現況、威脅因子等，並劃定保護區範圍圖。
四、訓練當地社區執行保育計畫及發展生態旅遊活動。

本計畫受益者包括：
- 本計畫之鳥類守護者ABS。
- 當地社區執行保育計畫，環境將更穩定，森林資源(食物、薪材和建材)受到較佳保護，水資源和河川保護可降低河流氾濫和土壤侵蝕。
- 國際鳥盟將協助政府單位達成生物多樣性保育之目標。

2009年「聖多美普林西比保育瀕危鳥類和棲地計畫」執行情形如下：

一、BirdLife秘書處非洲地區辦公室協助物種守護者ABS草擬物種行動計畫，

及推動計畫活動之方法，例如野外技術、保育規劃、和教育宣導等。

二、「物種行動計畫」工作

- 製作保育宣導品(海報、筆記本、T 恤等)及辦理活動(3 種極危鳥繪圖比賽、有獎徵答活動、專題演講等)。重點地區為 Emolve，該地主要為 oil palm 人造林，社區緊鄰 Monte Carmo (Dwarf Olive Ibis 之重要棲地)。第一階段先針對該地 180 位學生，希望藉由學生影響成人。ABS 並拜會政府單位，說明保育鳥類和森林之迫切性。
- 已成功訓練五位保育人員和解說員，訓練班於 2009 年 7 月辦理，課程包括鳥類導覽、資源管理和觀光等，這 5 人目前與 ABS 研究人員一起執行保育或宣導計畫，也擔任觀光客解說員。
- 監測 3 種極危鳥種
  1. 觀察到 Dwarf Olive Ibis 47 次，聽到叫聲 6 次。第一次觀測到五隻 Dwarf Olive Ibis 成群飛行，這種鳥通常單獨或成對飛行，並已繪出 Dwarf Olive Ibis 分佈圖。
  2. 觀察到 Sao Tome Grosbeak 13 次，聽到叫聲 2 次。
  3. 觀察到 Sao Tome Fiscal 15 次，聽到叫聲 14 次。
- 執行 3 種極危鳥種之生態研究，包括族群現況、威脅因子、規劃保護區。重點研究地區為 Sao Miguel 和 Bombain，最重要的成果為發現兩處 Dwarf Olive Ibis 所築之巢。

三、針對 ABS 人員訓練調查及監測方法，目前包括：

- 穿越線(line transects)和利用 DISTANCE 軟體分析資料。
- 定點觀察(fixed point surveys)。
- 播放鳥鳴聲(play-back)。

四、爭取經費部分，已爭取到一位 Dwarf Olive Ibis 物種擁護者(Species Champions)，應允提供部分保育經費。

國際鳥盟 2010 年所提「聖多美普林西比保育瀕危鳥類和棲地計畫 Phase II」為去年計畫之延續計畫，摘要如下：

Phase II 計畫目標如下：

- 提倡和宣導原始林和物種保育，包括以法令保護 3 種極危鳥種。
- 訓練社區人士成為當地保育措施聯絡員，以及觀光活動之解說員。
- 監測 3 種極危鳥種及進行生態研究。
- 找出長程保育鳥類和生物多樣性最佳方法，建立永續發展和環境監測架構。

Phase II 計畫成果摘要如下：

一、長期拯救聖多美普林西比三種特有極危鳥類應採取之關鍵行動，以及永續發

展和鳥類監測所需架構均已建立。長期保育鳥類建議事項包括：

- 需特別留意 Parque Natural d'Obo de Sao Tome，尤其是東南方之保護區。因 Dwarf Olive Ibis 僅分佈在緊鄰棕櫚油人造林之保護區內。
- BirdLife、ABS、Directorate of Nature Conservation 及 Parque Natural d'Obo de Sao Tome 已開始與與棕櫚油公司 Agripalma Lda 初步會談，此類對話應持續進行並增加次數。
- 聖多美普林西比批准加入濕地公約(Ramsar Convention)，並公告第 1 個 Ramsar site。應將 Dwarf Olive Ibis 之重要棲息地公告為 Ramsar site。
- 應推動三種極危鳥類之生物和分佈研究。
- ABS 應擴充現有調查範圍以支援上述研究。
- 應加強教育宣導，重點包括極危鳥類、特有鳥類、Natural Park 之重要性及其保育原始林之角色等。

二、繼續監測三種特有極危鳥類，建立分佈、族群大小和保育需求資料。

- 進行多次鳥類調查。
- 2010 年 2-9 月調查，觀察到 Dwarf Olive Ibis 85 次。
- 調查期間常發現入侵種老鼠和猴子(*Ceropithecus mona*)，將持續觀察這兩種動物是否為獵食者。調查 Dwarf Olive Ibis 繁殖行為時發現其築巢於較其他種 ibis 高出許多之地點，將研究是否為躲避天敵之適應行為。
- 老鼠和 Mona monkey 廣泛分佈全島，除非有密集且全面性之移除計畫，否則不可能將這兩種動物驅逐至 Dwarf Olive Ibis 繁殖區外面。
- 觀察到 Sao Tome Fiscal 14 隻。

三、聖多美普林西比受威脅鳥類及其棲地納入法定保護系統。

- 繼續與相關主管單位聯繫，推動納入保護。原始林部分因在國家公園範圍內已受到保護，但個別物種沒有特定法令保護，2011 年 2 月 ABS 與環境和自然資源部討論此議題。

四、新開發的大片棕櫚油人造林已對棲地和生物多樣性構成威脅，已開始評估其可能衝擊和減緩影響的方式。

- 亟需留意的項目包括次生林之砍伐、獵捕受威脅物種案件增多 、侵佔國家公園土地、社會衝擊、環境影響評估等。

五、辦理訓練課程。

- ABS 於 2010 年月和 8 月辦理第 2 梯次生態觀光訓練課程。建立 7 個社區聯絡點(community focal point)。
- 訓練 2 位鳥類解說員，訓練 2 位生物系學生協助執行鳥類監測計畫。

六、持續社區溝通聯繫，ABS 與數個保育團體與當地政府討論保育議題。

- 2010 年辦理全國性和當地社區之教育宣導活動。
- 針對社區權益相關人士辦理 2 次保育鳥類展覽和演講活動。
- ABS 參與其他環保團體辦理之活動，廣為宣導計畫事宜。
- 2010 年 8 月 23 日出版「聖多美普林西比鳥類圖鑑」。

BirdLife INTERNATIONAL

PREVENTING EXTINCTIONS

The BirdLife International Preventing Extinctions Program

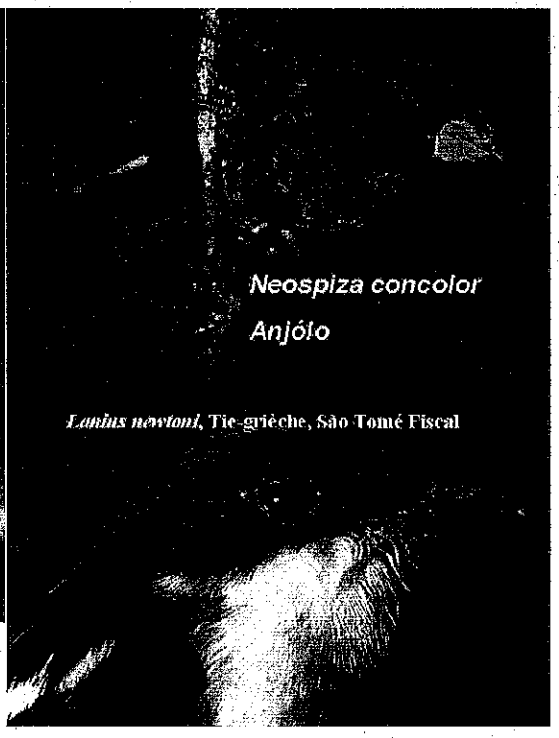
Conserving the world's most threatened birds and their habitats

Preventing Extinctions in São Tomé and Príncipe

Phase II



Bostrychia bocagei, IBIS de Bocagei, Íbis de S.Tomé (Galinhola)



A Report from BirdLife International to the Forestry Bureau of the Council of Agriculture of Taiwan

Cambridge, United Kingdom, February 2011

Background

This report provides a summary of activities undertaken by the project '*Preventing Extinctions in São Tomé and Príncipe', Phase II* - which has been supported by the Forestry Bureau of the Council of Agriculture, Taiwan. This project forms an integral part of BirdLife International's Preventing Extinctions Program and is the continuation of a project that commenced in 2009, which was also generously supported by the Council of Agriculture .

São Tomé and Príncipe is one of the most important countries in Africa for the implementation of BirdLife's program to prevent extinctions. The country supports three species of Critically Endangered bird, the São Tomé Fiscal (*Lanius newtoni*), São Tomé Grosbeak (*Neospiza concolor*) and Dwarf Olive Ibis (*Bostrychia bocagei*), which are found nowhere else on earth.

São Tomé and Príncipe is one of the Africa's major centres of wildlife endemism, and its lowland forest has been classified as the second most important for bird conservation in Africa. So the need for species and habitat protection based is urgent.

This report outlines achievements during Phase II of the project.

During 2010, the project has continued to provide support to the local NGO *Associação dos biólogos Santomenses* (ABS), as the BirdLife Species Guardian in São Tomé.

BirdLife staff (based at regional offices in Nairobi and Accra, and at the Cambridge Secretariat) have assisted ABS in supporting the implementation of key actions in the Species Action Plan previously developed in phase 1 of this project.

With this support ABS has been able to:

1. Identify key actions required for the long-term recovery of the three Critically Endangered São Tomé endemics and recommend a framework for sustainable development and bird monitoring.

2. Continue monitoring these species in order to establish a clearer picture of their distribution, population sizes and conservation requirements.

3. Advance action to insure proper legal protection is established for all São Tomé's threatened bird species and habitats.

4. Work alongside BirdLife International to respond to the development of a sizeable new oil palm plantation, which represents a significant new threat to the habitat and biodiversity of São Tomé, initiate the evaluation of its potential impact and propose preliminary mitigation actions.

5. Successfully implement a second eco-tourism training course.

6. Maintain outreach in the local community and engage several other local NGOs in discussions with local government.

Introduction

1. BirdLife's Preventing Extinctions Program

BirdLife International has launched the Preventing Extinctions Program, which is spearheading greater conservation action, human capacity and awareness, as well as funding support, for the world's most threatened birds. The focus of the program is the 190 species, which are listed as Critically Endangered on the IUCN Red List. Central to BirdLife's Preventing Extinctions Program is the appointment of 'Species Guardians' who are taking the lead in conserving a globally threatened species in their country or region.

2. São Tomé and its Critically Endangered Birds

One of the most important countries in Africa for the implementation of the BirdLife Preventing Extinctions Program is São Tomé and Príncipe. São Tomé supports three species of Critically Endangered bird, the São Tomé Fiscal (*Lanius newtoni*), São Tomé Grosbeak (*Neospiza concolor*) and Dwarf Olive Ibis (*Bostrychia bocagei*), which are found nowhere else on earth. São Tomé and Príncipe is one of the Africa's major centres of endemism, and its lowland forest has been classified as the second most important for bird conservation in Africa. So the need for conservation is urgent.

The Dwarf Olive Ibis is confined to the catchments of the São Miguel, Xufexufe and possibly the Quija rivers in the south-west, and along the Io Grande and Ana Chaves rivers in the centre of the island. It has a tiny population, estimated at <50 individuals and is confined to a small area of primary forest, mainly found within the São Tomé lowland forests Important Bird Area (c. 13,000 ha). It feeds on the forest floor in areas with sparse undergrowth, especially where the ground has been disturbed by wild pigs, and in swampy areas bordering watercourses. There is only limited information about the species, and not many people have been able to observe it due to the relative remoteness of its preferred habitat and its ability to conceal itself in the forest. However, despite this, there are reports of the ibis being killed by hunters.

The São Tomé Fiscal is known from the Xufexufe catchment, in the valley of the Rio Io Grande in the centre of the island, and in the Bombaím area. Its population is unknown, but is likely to be tiny given the limited area of suitable habitat. All records of the Fiscal are from primary lowland and mid-altitude (up to c.1,000 m) forest, predominantly under closed canopy, in sites with little or no undergrowth, but with bare ground and rocks. Many records are from ridgetops.

The São Tomé Grosbeak is known from close to the Rio Xufexufe in the south-west of the island and São Miguel areas. Given the limited area of suitable habitat and the paucity of records it probably has a tiny population. It occurs in lowland, closed-canopy primary forest. It is probably a canopy species and is reportedly quite silent, which could partly explain why it has so rarely been seen. Recently, however, some vocalisations have been recorded.

Historically, large areas of lowland and mid-altitude forest were cleared for cocoa and coffee plantations. Today, land privatisation is leading to an increase in the number of small farms and the clearance of trees. This does not currently affect primary forest but may be a threat in the future. Road developments along the east and west coasts are increasing access to previously remote areas. Introduced Black Rat *Rattus rattus*, Mona Monkey *Cercopithecus mona* and Weasel *Mustela nivalis* are potential predators.

3. The BirdLife Species Guardian in São Tomé

A BirdLife Species Guardian, *Associação dos biólogos Santomenses* (ABS), has been appointed for the three São Tomé species. ABS is a union of biologists created in March 2005. It is the only NGO in São Tomé that has a biodiversity conservation objective and whose members are not only dedicated but have demonstrated their commitment to the organisation through financial support for its constitution and launch.

The Species Guardian's primary role is to take and encourage greater conservation action for their species, working with national and local governments, other concerned individuals, organisations and local communities. In addition to undertaking conservation work themselves, the Species Guardians also monitor the status of the species, track the implementation and effect of actions taken by others, and report back to BirdLife on these each year.

4. Summary of the project

The project '*Preventing Extinctions in São Tomé and Príncipe Phase II*' was undertaken because of the continuing importance of Sao Tome as a high-risk area for extinction. It was also deemed important to continue to support conservation action by the Species Guardian there. The project is supported for a second year by the Forestry Bureau of the Council of Agriculture, Taiwan and has the following objectives:

1. To undertake advocacy and awareness activities for the species and primary forest protection in São Tomé, including the promotion of protection by law for the three Critically Endangered bird species;

2. The training of and support to community members as site-based focal points and guides to implement conservation measures and conduct tourism activities;

3. The surveillance of the three Critically Endangered bird species and the undertaking of ecological research;

4. The identification of best practice for the long-term conservation of birds and biodiversity, and the establishment of a framework for sustainable development and environmental monitoring.

Project Results

1. Key actions required for the long-term recovery of the three São Tomé endemic CR's and a framework for sustainable development and bird monitoring have been developed.

The following primary recommendations have been identified by the project as those required for the long-term conservation of the birds:

a) *Parque Natural d'Obo de São Tomé* - The integrity of the Parque Natural d'Obo de São Tomé in the southeast section of the protected area needs special attention given the interests of the multinational industrial oil palm company Agripalma Lda in the area and the fact that the distribution of at least one of the Critically Endangered species (the Dwarf Olive Ibis) is limited to a zone of the protected area adjacent to the Agripalm palm oil plantation.

b) BirdLife, ABS, the Directorate of Nature Conservation and the management authority of the Parque Natural d'Obo de São Tomé have entered into a preliminary dialogue with Agripalma Lda. This dialogue needs to be continued and intensified. Continued support from BirdLife International and other international parties (e.g. IUCN) are essential.

c) *Ramsar Convention* – São Tomé e Príncipe has ratified the Ramsar Convention and its first wetland area (the Ilhas Tinhosas, to the south of Príncipe, the most important seabird breeding site in the tropical east Atlantic). The national Director of Nature Conservation has recently been appointed as the national focal point for Ramsar after ABS' intervention. The watershed area of the Rio Martim Mendes, Rio Umbugu and Rio Io Grande, the habitat of the Dwarf Olive Ibis, is a prime candidate for further Ramsar Site designation.
Although the habitat area of the Dwarf Olive Ibis lies within the Parque Natural d'Obo de São Tomé, Ramsar classification of the zone would enhance both national and international conservation and legal measures to protect the Dwarf Olive Ibis and its habitat. ABS (with the Directorate of Nature Conservation) is now investigating the possibility of gazetting this area as a Ramsar Site.

d) *Further field research* into the biology and distribution of the three Critically Endangered species is required. Historical records, initial results of ABS research and the observations of recent visiting ornithologists suggest the distribution of the São Tomé Grosbeak and São Tomé Fiscal are wider than previously thought, although still restricted to primary forest. The Dwarf Olive Ibis appears to have a far more restricted geographical distribution. Further fieldwork is needed to confirm these initial findings.

e) ABS needs to now amplify its fieldwork in support of d) above, particularly in order to cover areas outside the current zone of intervention.

f) Campaigns to raise public awareness need to be continued about the Critically Endangered species and the endemic avifauna and the importance of the Natural Parks and their role in the conservation of primary forest need to be maintained.

2. Continued monitoring of the three Critically Endangered endemic birds is helping to establish a clearer picture of their distribution, population sizes and conservation requirements.

During 2010 ornithological surveys using direct observation and playback techniques were conducted along several established transects and concluded that a linear transect method is best for Dwarf Olive Ibis monitoring and fixed point surveys using play-back are better for São Tome Fiscal and São Tome Grosbeak.

Regular monthly counts were undertaken along six transects at the main study site at Monte Carmo from May through November 2010. The transect lengths varied, but totaled a length of 12.65 km.

Three students trained by ABS in 2009 are now acting as community focal points with each specialising in one of the three species. Hugulay Maia – Dwarf Olive Ibis, Lander Lima - São Tomé Grosbeak and Layriney Ramos – São Tomé Fiscal, are now working together on a regular basis, participating in monitoring activities using the techniques and data sheet designed and supplied by ABS.

Supervised by ABS, the three are responsible for all ongoing field surveys with the assistance of a core group of local community members. Hugulay Maia is also responsible for collating data and writing the field survey reports.

Eighty-five Dwarf Olive Ibis observations were made during the monitoring, which was conducted between February and September 2010. Sightings were most consistent on rainy days and birds were predominantly found where *Cleinthantus liberica* trees abound.

Researchers conducting these surveys consider it likely that introduced invasive rats and monkeys (*Ceropithecus mona*) are possible predators as they were frequently encountered during monitoring. Preliminary observations of Dwarf Olive Ibis breeding behaviour would suggest that it nests at greater heights than other ibis species, but does not occur in dense colonies which suggest a behavioural strategy evolved to avoid predation.

There is no evidence to suggest that adult Dwarf Olive Ibises predate their own species' neighbouring nests as occurs with other members of the ibis family but this is possibly due to their low breeding densities.

Rats and Mona monkeys are widespread thoughout the island. Rats are found in almost every location close to human habitation whether urban or rural. Monkeys are widespread in all rural locations, including primary and secondary forest and agricultural zones. ABS advises it would be impossible to exclude these species from the ibis breeding area, unless an intensive island-wide eradication campaign was conducted.

Fourteen São Tomé Fiscals were observed this year of which all bar one was found on transect C, in the steepest terrain. The same habitat seems to favour the São Tomé Grosbeak as all six of these were also found only on transect C.

During the transect counts conducted to primarily study the three Critically Endangered species, observations of all São Tomé endemic species were recorded. While a detailed analysis of data obtained has yet to be conducted, early findings suggest São Tomé's other endemic species either have a widespread distribution on the island or range beyond the ABS study area.

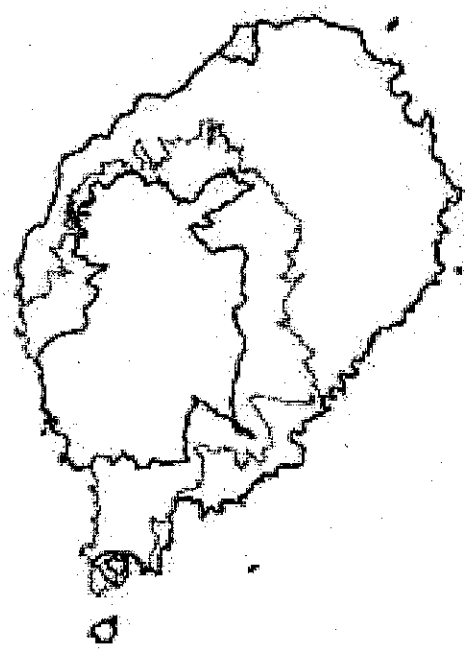
The data collected in the ABS study area will complement existing records and support other research underway by ABS in the country.

3. Action has been advanced to insure proper legal protection is established for all São Tomé's threatened bird species and habitats.

For several years ABS has been working closely with the Directorate of Nature Conservation and the Director of the Parque Natural d'Obo de São Tomé (both within the São Tomé Ministry of Environment and Natural Resources) in order to influence development of laws protecting primary forest and threatened species.

The primary forests in Sao Tome are already protected by existing legislation that established the Parque Natural d'Obo de São Tomé and the Parque Natural d'Obo de Príncipe. As yet there are no specific laws protecting individual species. This is not so much of a concern for the three Critically Endangered bird species whose habitat occurs exclusively within the Parque Natural d'Obo de São Tomé but is of concern for threatened endemic species outside the protected area.

ABS (The BirdLife Species Guardian) was active in lobbying elected parliamentarians in early 2010 with the intent of securing opportunities to formally advocate for improved legal protection. However, securing the required meetings became increasingly difficult, as government was busy preparing for and then conducting national elections. These were held in August 2010 and an ensuing change of administration led to further delay.



In Q4 ABS was able to meet with the secretary of the Ministry of Environment and Natural Resources and have now successfully scheduled a meeting, which is due to take place in February 2011.

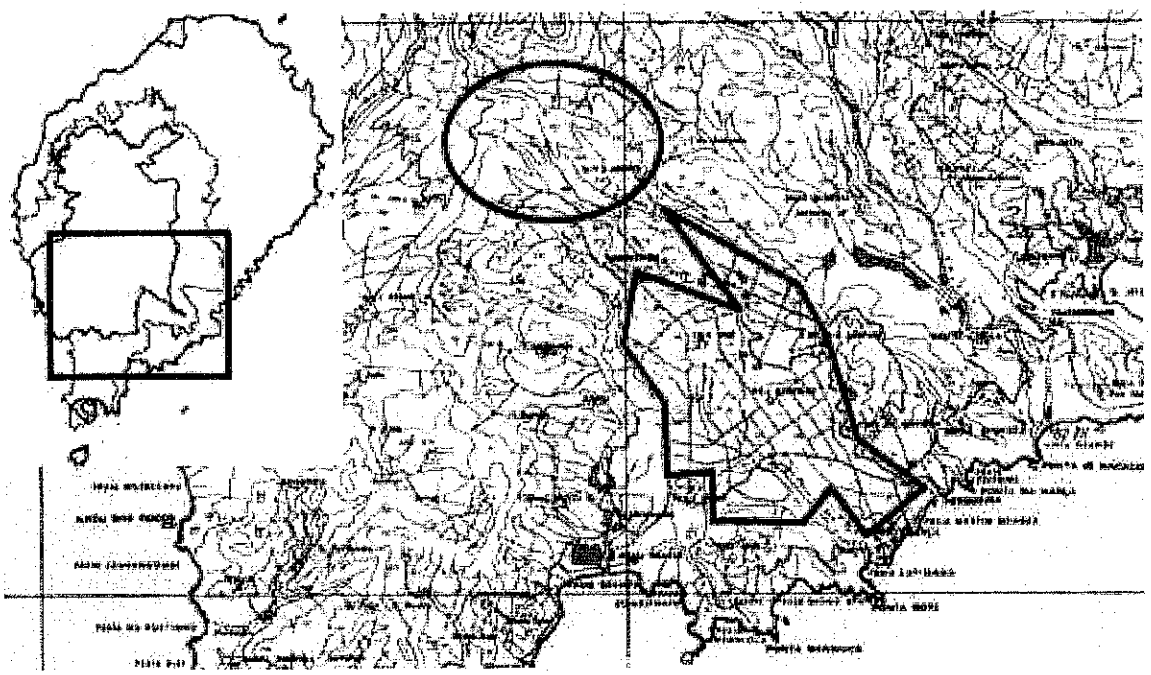
4. The development of a sizeable new oil palm plantation has been identified as a significant new threat to the habitat and biodiversity of São Tomé and an evaluation of its potential impact and preliminary mitigation actions are already underway.

In 2006, most of São Tomé's forests received legal protection when the Obô Natural Park was first established. The park covers almost one third of the island as can be seen from the dark green boundary in

this diagram. The natural park now also enjoys a buffer zone (boundaries in light green), which was proclaimed by ECOFAC - an EU-funded programme aiming to help preserve forests in Central Africa that has been working in the country for 15 years. The buffer zone is an important and sensitive area, essential to assure the long time survival of the unique habitats and biodiversity contained within the Natural Park.

In late 2009, BirdLife became aware of announcements in the Santomean press concerning a major SocFinco project in the country. It discovered that an investment of up to US €50 million was likely to be made by the Agripalma Company who intends to recover and expand oil palm plantations (covering an area of 5,000 ha) in the impoverished regions of southern São Tomé (Ribeira Peixe and Porto Alegre) and north of Príncipe (Sundy). By March 2010 the press reported that particularly rapid progress was already being made with the new venture in the area of Ribeira Peixe.

The Agripalma concession in Ribeira Peixe is very close to the Monte Carmo forests of the Obô Natural Park and actually overlaps the Natural Park's buffer zone. The Agripalma project aims to rehabilitate and develop an existing oil palm plantation previously run by a government-owned company EMOLVE.



Map showing the proximity between the Monte Carmo forests (circle in dark red) and the approximate boundaries of the old oil palm plantation EMOLVE (red irregular shape).

BirdLife is very concerned that the development of the oil palm plantation at Ribeira Peixe will have a significant adverse impact on the forests and biodiversity in the area, and there is evidence that this is already happening. The following issues are of particular concern:

Clearance of secondary forest; secondary forest inside the concession has already been cleared and it has been reported that further clearance is planned. The secondary forest is of high biodiversity importance and conservation of these forests is essential for the ecological integrity of the Natural Park. These forests also protect watersheds and watercourses, and it is best practice in oil plantation development that such areas are left unplanted.

Increase in hunting of threatened species; local people are being displaced from the concession and this is leading to increased pressure on forests and biodiversity in the Natural Park and buffer zone. In fact, the first-ever evidence of hunting of Dwarf Olive Ibis in the Monte Carmo region was found this year after the forest clearance had started.

Encroachment into the Natural Park; whilst we have no evidence of this at present, we understand that the plantation intends to expand beyond the boundaries of the previous EMOLVE concession and we are concerned this could, perhaps unknowingly, extend into the Natural Park.

Social Impacts; we are aware of a growing climate of anxiety and discontent amongst the inhabitants of the old EMOLVE workers' neighbourhood, including a concern about whether they will be able to continue to use land for subsistence agriculture. The presence of people in this area predates the establishment of the original EMOLVE concession. We are concerned about the local community's livelihoods, and affects community members that we have been working with to advance forest and bird conservation in this area. Further, any displacement of local people is likely to result in them moving closer to the Natural Park, putting even more pressure on this delicate ecosystem.

Environmental Impact Assessment (EIA): In October 2010 BirdLife confirmed that an EIA had been undertaken by a Belgian consultant on behalf of Agripalma Lda and produced in English. Given the global importance of this area, it is advisable that any EIA meets the highest of standards and is open to international review. This report is currently being translated into Portuguese by BirdLife. BirdLife now needs to review this with the local Species Guardian to establish whether the appropriate environmental and social impacts have been identified and measures agreed with regard to impact avoidance and mitigation.

BirdLife fully supports efforts that promote economic and social development in São Tomé, including investment in existing oil palm plantations. However, given the environmental and social issues highlighted above, we are now lobbying to insure that Agripalma Lda (Socfinco):

1. Halts further clearance of secondary forest inside their concession at Ribeira Peixe and any plans that might extend into the Natural Park;
2. Undertakes, and makes available for expert review, an environmental and social impact assessment of planned rehabilitation and development of this concession, and ensures that adequate safeguards and mitigation measures are in place to avoid adverse impacts in the area;
3. Provides information to BirdLife on the concession and plans for rehabilitation and development, including maps showing concession boundaries in relation to the Natural Park and buffer zone, such that we might provide better informed advice to Socfinco on the potential environmental impacts;
4. Considers whether there are any similar environmental and social issues in relation to other Socfinco concessions in São Tomé;
5. Considers working with an organisation such as BirdLife to ensure that best practice is employed in concession development and management at Ribeira Peixe and other sites to ensure the globally important biodiversity of in São Tomé is conserved.

BirdLife International is ready to assist Socfinco in ensuring that conservation and economic development can go hand-in-hand in the conservation of these globally important forests.

5. ABS has implemented a second eco-tourism training course.

After conducting a successful initial training course during phase1 of the project, ABS has implemented a second eco-tourism training course during July and August 2010.
This year the training recruited four more individuals to become bird guides in the main ornithological protection zone and carry out species protection measures. Two of the recruits have joined the five previous ones trained in 2009 within the community as 'focal points' and two biology students have also been trained to help conduct the required ongoing monitoring work.

6. Advocacy and Outreach in the local community has been maintained and ABS has engaged several other NGOs in discussions with local government.

During 2010 both national and local community awareness campaigns were conducted by ABS.

The Dwarf Olive Ibis is now fast entering the "national consciousness" as a flagship species representing the need to protect the environment in São Tomé, particularly through its use as the ABS logo. However, campaigns to raise public awareness need to be continued about the Critically Endangered species, the endemic avifauna and the importance of the Natural Parks and their role in the conservation of primary forest.

Outreach to engage with local communities and key community stakeholders was focused around two lectures held in secondary schools in important areas for the birds. One was held at the Liceau Nacional and the other at the Januario da Costa Secondary School. These lecture events were promoted by radio and on television and incorporated exhibitions at both schools, to which parents and members of the community were invited.

.During the year ABS also participated in several complimentary activities organized by other environmental NGOs - Marapa and RAPAC. In addition these parties were also involved by ABS in meetings organized by the São Tomé National Environment Cabinet

The book "The birds of São Tomé e Príncipe: A Photoguide" Authored by A. P. Leventis & Fábio Olmos, was launched on August 23, 2010

Financial report

Item	Phase II (see note 1)
Field equipment	1,609
Travel and subsistence	5,096
Office costs	1,609
Professional fees	4,023
Local personnel costs	1,609
Support to Guardians	6,200
Species conservation planning	4,699
Promotion and fundraising	9,487
Subtotal	34,331
Project management @15%	5,150
Total	39,481
Funding from COA	15,000
Funding contributed by BirdLife	24,481

Note 1. Financial reports for year 2 are still awaited from the Species Guardians prior to finalizing the financial report

國際鳥盟柬普寨計畫成果摘要

國際鳥盟(BirdLife International)所提「經由碳融資(carbon financing)和社區參與保育柬普寨西北部森林計畫」，內容及成果摘要如附：

國際鳥盟於印尼執行「拯救蘇門答臘最後低地雨林計畫」，經過數年努力，進行探勘合適地點、與印尼政府簽訂合作計畫、遊說印尼政府修訂森林相關法令、教育宣導、承租值得保護的地點等工作後，於2007年2月於蘇門答臘取得100,000ha伐木租借地之經營管理權。因印尼計畫之成功，國際鳥盟希望將此模式運用到柬普寨，保護 West Siem Pang 152,000ha 之森林，此地已被國際鳥盟列為重要鳥類棲地(Important Bird Area, IBA)。柬普寨計畫為國際鳥盟希望森林計畫(Forests of Hope Programme)之一環。

計畫目標為建立柬普寨示範計畫，提供全球長期支援下列工作財源之參考模式：

- 由政府和當地社區共同經營管理森林。
- 降低碳排放量。
- 改善當地人民生計和保育生物多樣性。

柬普寨東北部平原仍有大區域之落葉林、少數針葉林和季節性濕地。Siem Pang西部森林是僅存最重要的森林地區之一。柬普寨尚未完全從30年的內戰中恢復，因此自然資源經營管理和野生動物保育仍於起步階段。Siem Pang西部森林當地居民(尤其是原住民族)主要依賴自然資源生存，但多為非永續之利用。

West Siem Pang 仍有 90%未被破壞的森林，半數為乾龍腦香森林(Dry Dipterocarp forest)，40%為濃密的半常綠森林(semi-evergreen forest)。其餘為惡化的半常綠森林(5%)、包括農耕地的毀林區(3%)和水域(2%)。15,000 餘公頃 IBA 主要為乾森林生態系(dry forest ecosystem)，其中有 5 種極度瀕危(極危，Critically Endangered)鳥類，包括白肩黑鸛 White-shouldered Ibis (*Pseudibis davisoni*)、巨鸛 Giant Ibis (*Thaumatibis gigantea*)、白臀禿鷹 White-rumped Vulture (*Gyps bengalensis*)、細嘴兀鷲 Slender-billed Vulture (*Gyps tenuirostris*)和黑兀鷲 Red-headed Vulture (*Sarcogyps calvus*)。其他受威脅鳥類包括綠孔雀 Green Peafowl (*Pavo muticus*)、赤頸鶴 Sarus Crane (*Grus antigone*)、禿鸛 Lesser Adjutant (*Leptoptilos javanicus*)，以及受威脅哺乳類坡鹿 Eld's Deer (*Cervus eldi*)等。

此 IBA 生物多樣性所面臨最大威脅為人造林租借(plantation concession)，其他威脅因子包括過度放牧(overgrazing)、供當地或商業目的之小規模伐木，以及將林地變更為農耕地。另外，獵捕大型水鳥作為食物來源也是問題。

2006 年柬普寨森林覆蓋率為 59%，與 2002 年相較，少了 2.06%。另一項評估資料顯示 2000 年和 2005 年間，原始林喪失 29%。森林被破壞的主要原因包括：

- 人力和預算不足以執行永續森林經營管理。森林經營管理之改革、經營區之劃分、森林資源管理地方化等措施進展緩慢。
- 非法盜伐林木。
- 因土地炒作、農地擴張和居民移入所造成的森林濫伐。
- 柬普寨為亞洲地區最貧窮的國家之一，鄉村普遍貧窮，人民依賴森林生存，84%當地居民以薪材煮飯，6%使用煤碳。
- 人口成長(1.7%)和鄉村人口外移，85%的增加人口住在鄉村，將林地清除變更為農地的案例日多。
- 缺乏保育森林之經濟誘因。
- 其他國家改由柬普寨取得林木和其他森林產品。
- 森林火災。

Reducing Emissions from Deforestation and Forest Degradation (REDD)即是「減少來自森林砍伐與林地退化的溫室效應氣體排放」的簡稱，內容涉及富有國家付錢向開發中國家購買每公頃未砍伐林地消耗的二氧化碳量。

本計畫與 REDD 議題相關，預期能達成下列功效：

- 改善森林管理。
- 連結 REDD 之經濟誘因與貧窮村民之需求。
- 改善當地社區相關人士對 REDD 之瞭解。

針對本 IBA 預期推動之工作包括：

- 向政府單位爭取將 Western Siem Pang 公告為森林保護區和 REDD 試驗區。
- 與地區政府、省政府和民間團體商討，宣導 REDD 和當地社區各界相關人士共同參與之重要性。
- 於 Western Siem Pang 執行計畫，研究森林經營管理方法和惠益分享機制。
- 創設或強化社區民間團體(Community-Based Organizations, CBOs)，共同參與森林經營管理工作。
- 辦理 CBOs 森林學習之旅，尤其是 Oddar Meanchey 省 REDD 試驗區。
- 技術支援及訓練 Western Siem Pang 地區政府、省政府和 CBOs 人員，課程包括永續森林經營管理以減少碳排放量、生物多樣性和協助人民生計等。
- 執行示範計畫，為參與之社區和 CBOs，尋求新的謀生方式。培訓 CBOs 提供經濟和技術支援。

國際鳥盟柬普寨計畫與該國相關主管單位簽訂運作備忘錄(附於 2010 年計畫)，並與各級(全國性、省及地區)政府單位合作。合作單位包括隸屬農業、林業暨漁

業部(Ministry of Agriculture, Forestry and Fisheries, MAFF)之林業署(Forestry Administration, FA)和環境部(Ministry of Environment)。FA 為本計畫之重要夥伴，FA 主管 REDD 計畫和永久森林地產(Permanent Forest Estate)。國際鳥盟與 FA 中央和地方單位自 1990 年代起合作迄今，重點地區即為 Western Siem Pang 森林。

2010 年「經由碳融資和社區參與保育柬普寨西北部森林計畫」執行進度如下：

一、宣揚 Western Siem Pang 森林之重要性

2009 年 MAFF 決定將 152,825ha Western Siem Pang 森林規劃為保護區，但仍須經由部長委員會(Council of Ministers, CoM)同意。此地中央區和南區原有 2 個租地供人造林和生質燃料之用，此利用違反 REDD 原則。為此加強宣導保護之重要性，包括多次與政府單位會談，印製區內稀有野生動物圖片，與當地繼續溝通，與權益關係人建立夥伴關係等。

二、林地租借(Forest concessions)

- 上述努力於 2010 年 8 月獲得成效，MAFF 於 8 月 16 日正式函請首相 Hun Sen 取消一家公司租約，8 月 19 日獲准。CoM 於 8 月 27 日行文 MAFF 撤銷租約。2011 年初，上開公司團隊，包括重機具全部撤出 Western Siem Pang。
- 2011 年 MAFF 所屬林業署致函 MAFF 部長建議減少另一塊租地之面積，並提議將 Western Siem Pang 森林規劃為保護區。
- 除地區支援小組(Site Support Groups, SSGs)外，2010 年 12 月新設立查緝小組，2011 年 1 月沒收 6 組電鋸。

三、生物多樣性評估

- 進行數年生物調查，已進入監測階段，將於近期出版調查報告。
- Western Siem Pang 森林目前已記錄到 100 餘種植物、301 種鳥類、30 種不會飛的哺乳類、12 種爬蟲類、10 種兩棲類、47 種蝴蝶。其中有 5 種極危鳥類(請參考本摘要第 1 頁)。

四、威脅因子評估

- 對生物多樣性最大的威脅是綠海農業公司(Green Sea Agriculture Co. Ltd)的 100,852ha 租地，租約有效期至 2070 年。租地中有 85,036 與森林保護區預定地重疊。重疊地區為許多受威脅物種(含 5 種極危鳥類)重要棲地。砍伐森林改植人工林將對野生動物和社區造成負面影響，當地居民依賴此地區放牧，採集非林木森林副產品如魚、青蛙和松脂。目前政府單位正重新審查此公司租約。
- 其他威脅因子包括非法打獵、電魚、非法交易保護物種、不適當的小型農業和聚落、過度放牧、火災等。
- 最新的威脅為毒藥，2010 年發現 10 隻禿鷹被毒死。

五、生態旅遊倡議

- 因計畫地區知名度不高，很少觀光客到訪。國際鳥盟安排稀有鳥類俱樂部(Rare Bird Club, RBC)會員至 Western Siem Pang 森林賞鳥，引發當地居民極大興趣。若禿鷹和 ibis 族群受到保護，大型哺乳類數量增加，該地有潛力發展以自然為主之生態旅遊，改善當地經濟現況。
- 禿鷹數量減少主要原因是缺乏食物，肇因野生動物被非法獵捕。另外，以前自由放牧逐漸被集中管理取代。國際鳥盟引進禿鷹餐廳(vulture restaurant)計畫，將牛的屍體放置於特定地點提供食物給禿鷹，並吸引遊客，造福當地生意。柬普寨禿鷹族群降低情況也因而有所改善。2004 年全國禿鷹調查發現 140 隻，2009 年記錄到 286 隻。2010 年調查更顯示 Western Siem Pang 森林之重要性，此處有全國 1/3 的白臀禿鷹和 46% 的細嘴兀鷲。
- 2010 年調查計畫，白肩黑鸛數量打破紀錄，全國共有 429 隻，Western Siem Pang 森林約有 200 隻。

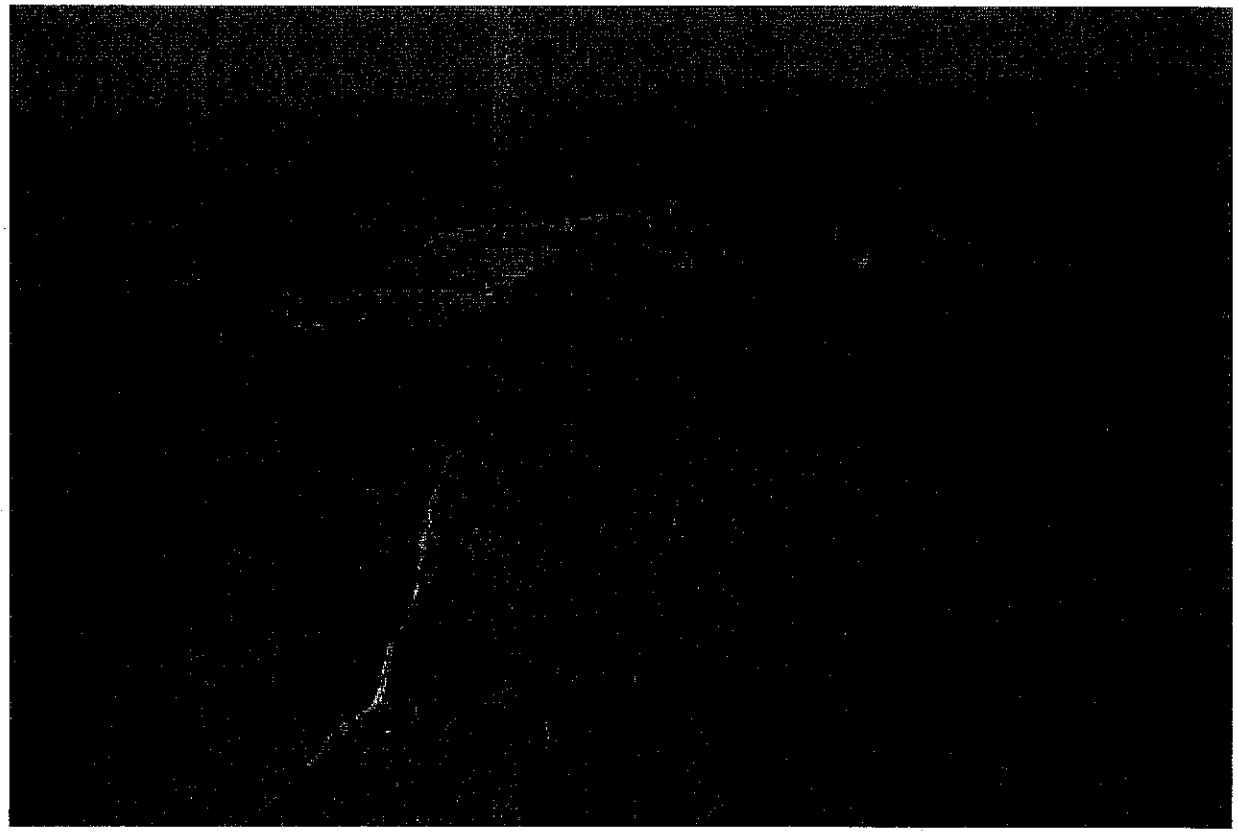
六、工作規劃、計畫提倡和國際宣傳

- 準備計畫提案，向歐洲和美國申請經費都獲贊助。
- RBC 生態之旅後，於其通訊中刊載希望森林計畫相關文章。
- 於國際鳥盟網站刊登 4 個故事，描述白肩黑鸛、巨鸛和 3 種極危禿鷹。
- 在新加坡辦理希望森林計畫相關活動，並邀請柬普寨政府人員參加。
- 於國際鳥盟網站募款，呼籲大眾支持柬普寨計畫。

BirdLife
INTERNATIONAL

Forests of Hope Programme

Conservation of a large forest block in north-eastern Cambodia through carbon financing and local community involvement



Aerial view of Western Siem Pang forest, showing localised deforestation

Report to the Forestry Bureau of the Council of Agriculture of Taiwan

Cambridge, February 2011

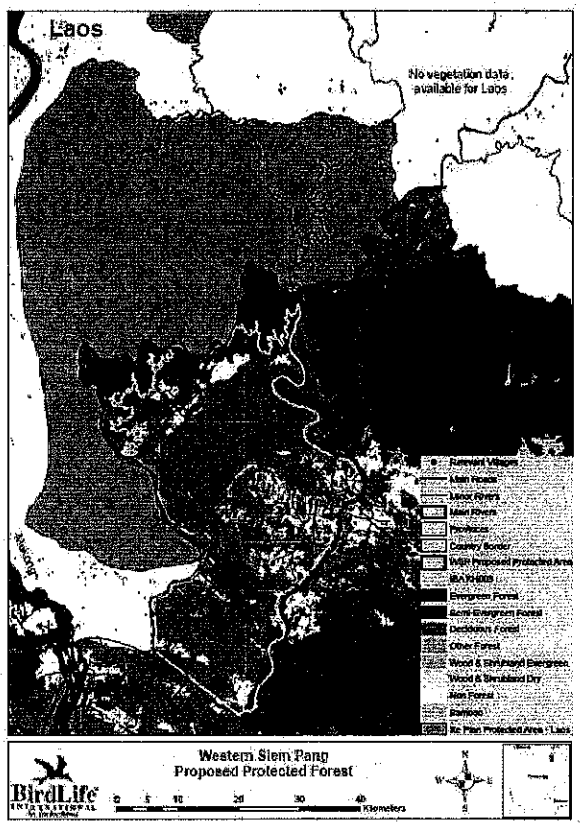
Background

Siem Pang District forms part of Stung Treng Province, in NE Cambodia, East of the Mekong River. BirdLife International is implementing a conservation project to protect the unique biodiversity of the western part of Siem Pang District, near the confluence of the San and the Mekong River. This is the area referred to as Western Siem Pang; see map.

The area was identified as a priority because of its exceptional biodiversity, in particular for threatened bird species. It is one of very few places in the world where as many as five Critically Endangered bird species can be found, and it is globally important for all five. However, the area is also important for other biodiversity and ecosystem services: included in the area are forests that are vital for the protection of the upper watershed of the Sekong River, a major tributary of the Mekong. These areas are probably very important in sustaining fisheries based in Stung Treng and other populous areas within the province.

BirdLife has been active in Western Siem Pang since 2006. Since than we have developed a collaborative relationship with the people, village leaders and district and provincial governments of Stung Treng which we have maintained to the present. Beginning in 2006 BirdLife undertook biodiversity surveys in Western Siem Pang. With a clearer understanding of its global biodiversity importance we began dialogues with the local communities in the area to understand more about their livelihoods and their reliance on the forest and its resources. We then began to pilot a community-based approach to sustainably managing the site via the Local Conservation Group approach. Jointly we trained and initiated local people to undertake regular monitoring of landscape features like *trapeangs*. We also began awareness raising activities to draw attention to their biodiversity and livelihood importance. Management protocols were discussed and agreed to limit and prohibit detrimental practices (such as logging and use of poison). Village development committees were also established and small funds provided for village development needs. This resulted in the construction of wells, bridges and school classrooms.

Activity Report



Boundaries of the proposed Western Siem Pang Protected Forest

1. Promotion of the site's importance in Cambodia

The project is being promoted as a potential REDD demonstration for the deciduous and semi-evergreen forests of central Indochina.

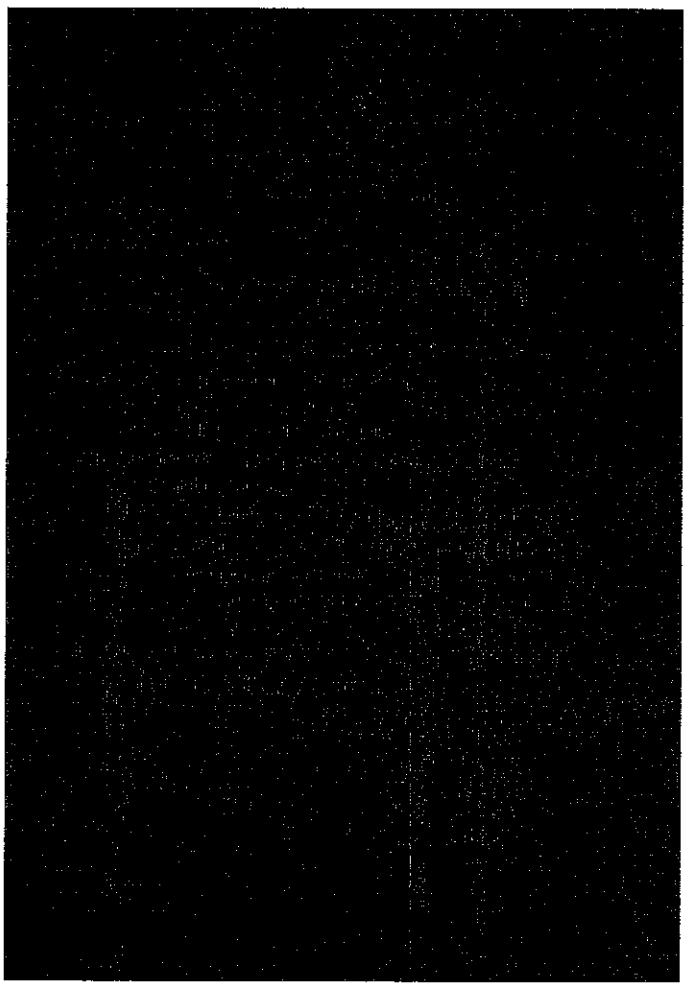
The approach proposed is the designation of Western Siem Pang as Protected Forest; this would make the area part of the national permanent forest estate, but not part of the Protected Areas system, and would represent an ideal arrangement for local communities and Government while conserving the area's biodiversity and carbon stocks. The Government wishes and needs to maximize revenue from forest, and large concessions are possible, which are ideal for conserving dispersed species; a

project response must deliver such revenue. Privately held forest leaseholds are permitted for logging concessions and Protected Areas, for up to 99 years. On 21 August 2009, the Ministry of Agriculture, Forestry and Fisheries of Cambodia decided to proceed with the sub-decree to establish Western Siem Pang Protected Forest covering 152,825 ha. However, this is not the last word: this needs to be approved by the Council of Ministers, and there are significant obstacles to this.

In 2001, the southern and central parts of the site were placed under two concessions to Cambodian companies to establish tree crop or biofuel plantations. This is not compatible with a REDD demonstration, biodiversity conservation, or equitable sharing of the benefits of forest use, and so a key priority for the year was to examine these concessions. These were found to be of dubious legality, and, in addition, it appeared that development work on the ground in at least one of the concessions was not proceeding according to the concession agreement. Accordingly the concessions were placed under a Government review process, while BirdLife continued its programmes at the site and national level to promote the importance of Western Siem Pang, and show that there was a viable alternative to the concessions.

These efforts included a series of meetings with Government officials, production of a portfolio of photographs of the site's rare wildlife, and continuing work of the BirdLife team based at the site to build strong relations with local stakeholders.

2. Forest concessions



A major result of these efforts came in August 2010. The concession licence for one of the two corporations seeking to log and convert the forest was cancelled. The Minister of Agriculture, Forestry and Fisheries submitted the letter to Prime Minister Hun Sen on 16 August 2010, requesting the cancellation of the Sekong Aphivat concession, and the Prime Minister gave his approval on 19 August 2010. With the green light from the Prime Minster, the Council of Ministers issued the official letter instructing the Minister of Agriculture, Forestry and Fisheries to cancel the concession contract on 27 August 2010; the letter was signed by His Excellency Bun Uy, Secretary of State for the Council of Ministers, on behalf of Deputy Prime Minister, His Excellency Sok An. By early 2011, the field team of this company, including all heavy equipment, had completely withdrawn from Western Siem Pang.

Council of Ministers letter cancelling the Sekong Aphivat concession.

In January 2011, the Head of the Forestry Administration of the Ministry of Agriculture, Forestry and Fisheries wrote to his Minister, firstly to propose a reduction in the land



Western Siem Pang is one of the key sites for vultures in SE Asia

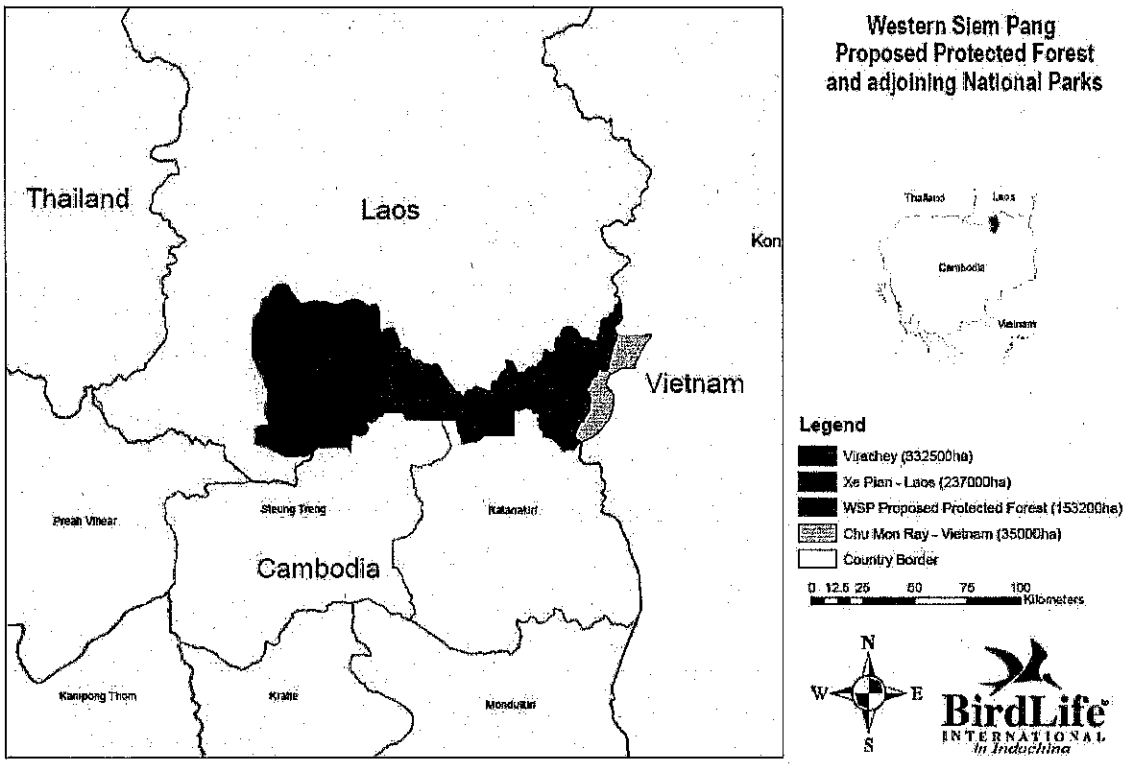
concession held by the other corporation in Western Siem Pang, and secondly to urge him to designate Western Siem Pang as Protected Forest. BirdLife is currently working with the Forestry Administration to draft the Minister's letter to the Prime Minister, to be submitted to the Prime Minister in March 2011.

These are momentous and unprecedented events, and it seems likely that 2011 will be the year in which the Government will take its decision on the size of the Western Siem Pang Protected Forest.

A new law enforcement team was set up at the site in December 2010 in addition to the Local Conservation Group. In January 2011, 6 chainsaws were confiscated as result of this new work.

3. Biodiversity assessment

BirdLife has been collecting biological information on Western Siem Pang for several years, and this is now moving towards a monitoring programme as the baselines become complete and trends can be identified. An important milestone in the last year has been the preparation of a full report describing the biodiversity of the site, and the threats to its



Map showing the proposed Western Siem Pang Protected Forest and contiguous protected areas in Cambodia, Laos and Vietnam

survival. The report, which will be published by BirdLife in the near future, is crucial in setting out the justification for protecting this now world-renowned area from large-scale agricultural development or conversion to plantation, based on high-quality, validated information. The review has revealed the following.

Western Siem Pang protects a large stretch of Deciduous Dipterocarp Forest and Semi-evergreen Forest along the border with Laos, and connects Virachey National Park, to the east in Cambodia, with the more westerly Xe Pian National Protected Area in Laos. Virachey is also linked in the east to Chu Mon Ray National Park in Vietnam; connecting these four areas by designating Western Siem Pang as a Protected Forest would create a trans-frontier protected area of about 757,700 ha, representing one of the most significant wilderness areas in Indochina, and conserving a unique set of globally threatened species and landscapes. Included in the area are forests that are vital for the protection of the upper watershed of the Sekong River, a major tributary of the Mekong. The Sekong and its tributaries probably play a significant role in sustaining important commercial fisheries in Stung Treng province, since fish populations are known to migrate from the Mekong into the Sekong and *vice-versa*.

To date, more than 100 plant species, 301 species of bird, 30 species of non-flying mammal, 12 species of reptile, 10 species of amphibian and 47 species of butterfly have been identified from within the proposed Western Siem Pang Protected Forest. It is anticipated that, with the exception of birds, these species lists will increase dramatically as new survey work is undertaken at the site. As referred to above, Western Siem Pang is one of only a handful of sites worldwide that supports populations of the astonishing total of five Critically Endangered bird species. As such, it is clearly an area of High Conservation Value and possibly eligible for international funding over a 30-year period under the global *Reducing Emissions from Deforestation and Degradation* initiative.

The five species of Critically Endangered bird species that occur in Western Siem Pang are three species of vulture (Slender-billed Vulture *Gyps tenuirostris*, White-rumped Vulture *Gyps bengalensis* and Red-headed Vulture *Sarcogyps calvus*) and two species of ibis (Giant Ibis *Thaumatibis gigantea*, White-shouldered Ibis *Pseudibis davisoni*). Indeed, the area has by far the largest known concentration of White-shouldered Ibises in the world. In addition there are three Endangered and five Vulnerable bird species. However, the conservation significance is not confined to these birds, and the area supports a significant population of Eld's Deer *Cervus eldii*, a highly localized Indochinese endemic. Other species for which Western Siem Pang has considerable conservation importance include globally Endangered Banteng *Bos javanicus*, Yellow-cheeked Crested Gibbon *Nomascus gabriellae*, Indochinese Silvered Langur *Trachypithecus germaini* and Sunda Pangolin *Manis javanica*, as well as increasingly threatened species such as Gaur *Bos gaurus* and sand-bar nesting birds, particularly River Tern *Sterna aurantia* and Great Thick-knee *Esacus recurvirostris*. There is the possibility that the area still supports a small population of Siamese Crocodile *Crocodylus siamensis* and even Tiger *Panthera tigris*. Lists of other faunal groups for the area are far from complete, but is seems likely that future surveys will reveal a wealth of diversity in fish, amphibians, reptiles and butterfly species.

Satellite imagery showed that more than 90% of Western Siem Pang is still covered with intact forest typical of the original vegetation of the region. About half is Deciduous Dipterocarp Forest – a fast disappearing biome characteristic of Indochina - whilst 40 % comprises denser Semi-evergreen Forest. But these habitats and the wildlife that they support, as everywhere, are under increased threat from local and commercial interests. As with almost everywhere in Indochina, forest cover is being reduced and modified within the proposed Western Siem Pang Protected Forest, but the state of the forest is still such that much that remains is considered to be in good condition.

4. Threat assessment

The review confirmed that the biggest threat to biodiversity in the proposed Western Siem Pang Protected Forest is undoubtedly the existence of the remaining land concession for the establishment of tree-crop plantations. This, the 100,852 ha Green Sea Agriculture Co. Ltd land concession, is valid until the year 2070, and overlaps considerably with the proposed Western Siem Pang Protected Forest. Indeed, almost the entire mosaic of Deciduous Dipterocarp Forest is currently within the Green Sea land concession area – a total area of overlap of 85,036 ha. This area of overlap is the most important area for many species of threatened wildlife in the proposed Protected Forest, including all five Critically Endangered bird species and Eld's Deer. However, the legality of the Green Sea concession is questionable and it is currently under government review. The establishment of tree crops in the proposed Protected Forest would have irreversible negative effects on the areas unique wildlife as well as on the lives of local communities, many of whom depend on the area to graze their livestock and collect non-timber forest products, including fish, frogs and resin.

Other threats, though of lesser concern at present, are nevertheless important to combat. These include illegal hunting and electro-fishing, trade in protected species, the establishment of inappropriate small-scale agriculture and dwellings, overgrazing of livestock and, in some instances, fire. A new, emerging but very serious threat is that of poisoning. In 2010, ten vultures were killed within Western Siem Pang by poisoning in one event, representing a very significant proportion of the total vulture population of Cambodia. It is not only local people who contribute to these threats, but also Lao nationals who cross the border illegally to hunt wild animals, catch fish and trap commercially valuable wildlife. Whilst these threats persist, various initiatives in the area have significantly raised awareness of the importance of the area amongst local communities, and members of these communities now monitor illegal activities in Western Siem Pang and work with local police and government officers to take action against perpetrators of destructive illegal activities.



Monitoring is carried out by BirdLife International staff and local community members

5. Ecotourism initiatives

Currently, only a few international tourists visit the area because it is not well known or publicized. The BirdLife team hosted a tourist visit of BirdLife's Rare Bird Club (a group of the strongest BirdLife supporters) to Cambodia, and helped them to visit Western Siem Pang. This tour generated great interest locally, and was an important pilot for future tourist visits, which could bring valuable nature-based enterprises to the area. If the populations of vultures and ibises are preserved, and large mammals increase, future ecotourism could make a significant contribution to the provincial economy and especially to local economic development.

Lack of food is the principle reason for decline of vultures in Cambodia, resulting from uncontrolled hunting of wild animals and tighter controls by farmers over livestock that used

to roam freely. BirdLife has introduced a "vulture restaurant" programme, putting out dead buffalo and cattle each month; this provides a spectacle for visitors (in turn providing benefits to local businesses), helps the vultures, and helps monitoring efforts. Previously declining vulture numbers in Cambodia seem to have stabilised, and the programme has helped to demonstrate this, and may have contributed directly: a national survey in 2004 found 140 vultures, and a repeat in 2009 found up to 286. Repeat events in 2010 again showed up the importance of Western Siem Pang: the site held one third of all White-rumped Vultures in Cambodia, and 46% of all Slender-billed Vultures; in addition, seven out of 40 Red-headed Vultures nationwide were counted at Western Siem Pang, although this bird is less attracted to vulture restaurants so the census method is less accurate.

Coordinated counts in 2010 also revealed a record-breaking 429 White-shouldered Ibis nationwide, and an estimate of around 200 birds at Western Siem Pang, confirming this site as the most important in the world for this species, sometimes considered the most endangered waterbird in South-East Asia.

6. Programme planning, advocacy and international awareness

Coinciding with the important government decisions, confirming the validity of the BirdLife approach to conserving the site, several initiatives were made to develop the programme and encourage donor support. Site visits were hosted by two large US Foundations who may be interested in funding the conservation management of Western Siem Pang Protected Forest, and in developing sustainable funding sources. This follows the preparation of preliminary carbon assessment for the site by the company Ecometrica; this indicated that modest funding through carbon markets could be generated by the programme.

Other programme planning and fundraising initiatives included:

- funding proposals were prepared and submitted to donors, two of which, to a US and a European donor, were successful;
- an appeal (following the Rare Bird Club trip) to the Club's wider membership, with an article on BirdLife's *Forests of Hope* programme in its Newsletter.
- four stories on BirdLife's website, concerning White-shouldered Ibis, Giant Ibis, the three Critically Endangered vultures, and Cambodian Government presence at a BirdLife *Forests of Hope* event in Singapore
- an appeal for funds on the BirdLife website

These stories and appeal can be viewed at:

- http://www.birdlife.org/community/2010/05/vulture-restaurants-a-hit-in-cambodia/
- http://www.birdlife.org/news/news/2010/09/white-shouldered-ibis-census.html
- http://www.birdlife.org/news/news/2010/04/giant-ibis.html
- http://www.birdlife.org/news/news/2010/08/harapan-singapore-events.html
- http://www.birdlife.org/appeal/western-siem-pang.html.

Income and Expenditure (all figures in US$)

The total expenditure of the programme in 2010 was as follows.

Personnel cost in Cambodia	38,133
Equipment, supplies and office costs	9,794
Travel in country (strategy and consultation)	41,485
Communications costs	1,488
BirdLife International staff	6,407
International travel	2,644
Finance, contracts, office, IT and HR support	4,998
Total	**104,948**

Income

Forestry Bureau of the Council of Agriculture of Taiwan	15,000
Cofinancing and BirdLife International contribution	89,948
Total	**104,948**

海馬計畫執行成果摘要

加拿大卑詩省大學(The University of British Columbia, UBC)魚類研究中心(UBC Fisheries Centre)和海馬計畫(Project Seahorse)所提計畫內容和成果，摘要如次：

本計畫提案人為 Project Seahorse 主任 Dr. Amanda Vincent。Dr. Vincent 也是加拿大海洋保育研究主任。計畫主要目的為支援有效執行重要商業海洋魚類列入華盛頓公約附錄二之相關措施。依據華盛頓公約(Convention on International Trade in Endangered Species of Wild Fauna and Flora, CITES)相關規範，自 2004 年 5 月 15 日起，所有海馬(genus *Hippocampus*)國際貿易出口文件需提出並未危及野外族群之證明。同樣的規定也適用於鯨鯊(whale shark, *Rhincodon typus*)和姥鯊(basking shark, *Cetorhinus maximus*)。2004 年末，大白鯊(great white shark, *Carcharodon carcharias*)和蘇眉(隆頭魚、曲紋唇魚 humphead wrasse, *Cheilinus undulates*)也被列入 CITES 附錄二物種。海洋魚類被列入 CITES 附錄物種，突顯了國際保育界對這些物種之重視，但各國經濟、社會等層面也會受到影響。

列入 CITES 附錄物種只是第一步，後續規範必須有效執行，才有保育效果。每年國際海馬貿易量超過 2,500 萬隻(70 公噸)，包括至少 34 種海馬，涉及將近 80 個國家。乾海馬零售價為一公斤約 US$1,200。

CITES 秘書處、美國(海馬列入附錄提案國)和許多其他國家都希望 Project Seahorse 能就貿易分析、技術和經營管理建議、鑑定指南等提供協助。同時，利益相關團體則希望 Project Seahorse 協助解說法令和指導因應措施等。

本計畫主要目的包括：

一、提供技術協助和相關參考資料給海馬貿易國，建立永續經營管理系統。
二、進行海馬貿易評估和海馬貿易管理可行性研究，以供其他海洋魚類案例研究之參考。
三、向國際社會宣導「以國際貿易管理方式，來經營管理漁業」之理念。

提案人 Dr. Amanda Vincent 履歷，Project Seahorse 所提供成果報告請參閱所附資料。Project Seahorse 數年來的工作報告，綜合主要內容如下：

2004 年「國際海馬貿易經營管理措施計畫」已達成下列目標：

一、取得正確的海馬成體長度市場貿易資料。
二、研發測量海馬長度的方法。
三、利用研究所獲新資料，修正 CITES 動物委員會所訂「海馬最小貿易長度」。
四、進一步瞭解海馬貿易現況。
五、調查 CITES 將海馬列入附錄後的市場變化。

2004 年「國際海馬貿易評估計畫」成果包括：

一、完成馬來西亞/泰國和印度國家報告。預訂的 27 個國家的海馬貿易報告，僅有印尼報告尚未完成。
二、重新整理國家報告，加以發表，擴大讀者群。已發表一篇報告。
三、2004 計畫成果報告「Measuring for management of the international trade in

seahorses, *Hippocampus* spp.」寄給贊助單位參考，包括林務局、CITES 秘書處和瑞士政府。該報告有摘要版(9 頁)和完整版(共計 82 頁)兩種。

2005 年計畫期末報告中所列工作成果包括：

一、提供 CITES 締約國技術支援。

二、完成海馬養殖對保育和經濟之影響相關報告，除向相關締約國簡報外，並於相關國際研討會中發表，並出版報告。

三、完成菲律賓海馬貿易分析報告「The catch, export and conservation implications of the seahorse trade in the Philippines, pre-CITES」，並將刊載於 Fisheries Management and Ecology 期刊。

四、全球海馬養殖或有興趣飼養海馬人士聯絡網(主要是公立水族館)於 1998 成立，當初只有 30 個會員，2005 年擴充至 284 個會員。

五、海馬研究人員聯絡網擴充至 112 人，分別來自 31 個國家，80 個單位(包括大學、政府機構、研究單位、養殖業者等)。

六、2005 年 7 月 13-15 日，於菲律賓之東南亞漁業發展中心(Southeast Asian Fisheries Development Center)向東南亞國協(Association of Southeast Asian Nations, ASEAN)成員報告海馬養殖對保育和經濟之影響。

七、2005 年 11 月 8-20 日，於英國水族館研討會(National Aquarium Workshop)報告「以法令和貿易許可方式，改善海洋觀賞魚類貿易之永續性」。

八、完成馬來西亞和泰國海馬貿易分析報告「Fisheries, large-scale trade and conservation of seahorse in Malaysia and Thailand」，並將刊載於 Biological Conservation 期刊。

2006 年計畫報告中所列工作成果包括：

一、設立「執行 CITES 規範全球支援網站(Global support website for CITES implementation)」，網址 www.HippocampusInfo.org。

二、協助香港傳統醫藥界人士，永續利用海洋資源。

三、提供 CITES 締約國技術支援。

四、全球海馬養殖或有興趣飼養海馬人士聯絡網(主要是公立水族館)2006 年擴充至 300 個會員，分別來自 17 個國家，75 個公立水族館或動物園和 7 個獨立機構。

五、海馬研究人員聯絡網擴充至 143 人，分別來自 36 個國家(包括大學、政府機構、研究單位、養殖業者等)。

六、完成海馬貿易分析報告初稿「The dried seahorse trade in key traditional medicine markets of East Asia」。

2007 年計畫報告中所列工作成果包括：

一、建立各國海馬貿易資料庫，第 1 階段先蒐集海馬列入 CITES 前之貿易資料，以後可加入官方記錄和海馬列入 CITES 之後的貿易資料。

二、製作完成海馬鑑定參考資料，包括基礎版和進階版。

三、研究製作動態海馬分佈圖之可行性。

2008 年計畫報告中所列工作成果包括：

一、完成網站開放測試工作。測試期間多位專家提供意見，改善網站之功能。

二、改善網站機能，包括網站架構、瀏覽、資料擷取、網站外觀等。

三、在海馬列入 CITES 附錄二前，將各國海馬貿易資料庫已建立事宜公告週知。
四、介紹管理方法，列出決定無危害程序(non-detriment finding procedure, NDF procedure)之建議事項，包括可輸出海馬之最小體長、棲地保護、法令執行和未來資料需求等。

Project Seahorse 團隊參加 2008 年 11 月於墨西哥召開的 CITES NDF 研討會，針對海馬部分協助各國 CITES 管理機構擬定標準，衡量可否輸出，提供如何決定 NDF 的方法。參加會議者約有 100 人，Project Seahorse 團隊的主要貢獻包括：
一、以海馬為案例，說明決定 NDF 的方法。內容包括海馬生物學、生活史、全球保育現況、面臨威脅、現行經營管理方法、貿易情形、NDF procedure 等。
二、公布海馬相關資料，請大家提供建議，以利改進海馬網站。與會認同海馬模式可作為其他物種之參考，許多人對網站的 NDF procedure 提出建議。

2009 年計畫報告中所列工作成果包括：

依據 2008 年 11 月於墨西哥召開的 CITES NDF 研討會之建議，已完成下列網站改善工作：

- 增列資料以回答各界「何謂海馬?」之問題。因為各國 CITES 管理機構人員科技背景差別很大，有許多人專長並非海洋。
- 與海馬圖鑑建立聯結，有需要者可印出 pdf 檔帶至現場運用。並為 8 個國家編訂海馬鑑定手冊，以協助相關管理工作。此包括 8 個主要海馬貿易國，以及面臨海馬管理問題的國家，例如巴西、中國(香港)、印度、印尼、馬來西亞、墨西哥、秘魯、菲律賓、泰國、越南。
- 改善互動式鑑定檢索表之使用簡介。
- 建立圖書館包括下列資料：
  1. 一般資料：海馬生物學、水產養殖、貿易、管理方法、族群評估等。
  2. 技術資料：調查設計、海馬測量和性別判定、貿易監測、上標和註記、快速族群評估、海洋保護區之優點、替代性管理方法等。也包括可印出的基本資料供攜帶至野外運用。
  3. 參考資料：包括大量第 1 項內容的參考資料。
- 改進網站之功能：例如網站架構、網站導覽、資料取得等。

另外，2009 年完成「國際海馬貿易追蹤：首次 CITES 貿易資料分析」報告，發現年度海馬出口量約為 19.4 噸，有 61 國涉及乾海馬貿易，98%輸出目的地為亞洲國家。以前不知道有海馬貿易的國家包括埃及、幾內亞、新喀里多尼亞(New Caledonia)、塞內加爾和多哥。泰國為最大乾海馬來源國，2004 年起每年均 16.2 噸，第 2 大輸出國為中國(但重量比泰國少 96%)。其他乾海馬輸出國包括幾內亞、秘魯、塞內加爾和越南。乾海馬貿易量記錄數量大幅下降，最明顯的是中國，海馬未列入 CITES 附錄前，中國每年平均輸入 30 噸，海馬列入 CITES 後，CITES 資料記錄為 2.1 噸。香港和臺灣也有類似現象。2004 年海馬列入 CITES 對活海馬貿易也有重大影響，CITES 資料顯示每年 101,359 隻活海馬輸出量中，野生海馬約佔一半。但未列入 CITES 前，100%為野生海馬。最大活海馬輸出國為越南，2004 年以來，每年平均輸出 23,750 隻，66%為人工繁殖海馬。活海馬主要輸入國為歐洲和北美國家，2004 年以來，每年平均輸入量分別為歐洲(24,919 隻)和北美國家(68,086 隻)。以前不知道有輸入活海馬的國家包括巴貝多(Barbados)、關

島、匈牙利、冰島、波蘭和南非。2004 年之後，人工繁殖場數量增加，尤其是越南和斯里蘭卡。不過，CITE 海馬輸出資料減少，有可能是貿易量真的下降，也有可能是各國資料少報，需與各國資料比對方可瞭解真相。

Project Seahorse 2010 年計畫內容及成果，摘要如下：

繼續協助加強「執行 CITES 規範全球支援網站」之功能。該網站之設立第 1 年由 Whitley Fund for Nature 贊助，網站設立主要目的係提供各國 CITES 相關機構或民間團體運用。網站資料包括：

一、海馬相關資料和海洋保育資料。網站提供相關資料之連結。

二、各國海馬和海洋相關活動，海馬生物和社經資料。
包括物種、族群現況、趨勢、貿易調查和分析等資料。第 1 年，主要針對 8 個海馬主要輸出國，包括印度、印尼、馬來西亞、墨西哥、秘魯、菲律賓、泰國和越南。

三、協助各國採取經營管理決策之相關資料。

網站正式運作後，因應各締約國的需求，進行的工作包括：

一、回應各界對網站的建議。

二、加入資料以提供全面性技術諮詢服務。

三、充實 8 個試用國家的海馬資料庫。

四、加入更多國家的海馬資料。

五、改善決策分析資料。

六、確保使用者能快速及有效查詢到網站上提供的資料。

七、各締約國或使用者瞭解本網站之潛力後，推廣運用到其他物種。

本網站與其他網站連結，以加強保育效益，包括：

一、FishBase：可連結大量魚類基本資料。

二、AquaMaps：可瞭解物種分佈之地理範圍和貿易路線。

三、GBIF/OBIS：可連結到博物館和有典藏海馬標本的機構。

四、Sea Around Us Project：可連結到地緣相關漁業、貿易和保育資料。

除了我國之贊助，Project Seahorse 也向其他國家或團體申請經費，經過數年計畫執行經驗及考量經費限制等因素，本計畫工作項目調整如下：

一、針對調查設計、測量和分辨海馬性別、貿易監測、標記和註記、快速族群評估、設立海洋保護區之優點、替代性經營管理方案等提供技術協助。

二、協助各締約國瞭解不斷更新的海馬分類系統(締約國必須列出海馬貿易之物種，並向 CITES 提出報告)。

三、更新 FishBase 中海馬相關資料，提供海馬之生物和保育資料，給締約國、資源管理和利益相關人士、保育團體等參考。

四、分送 Project Seahorse 有關海馬生物分析之報告。

五、與各國和相關團體分享貿易分析資料和報告。

六、分析非正式、各國和 CITES 貿易資料，瞭解貿易趨勢和型態，以供擬定保育措施之參考。

七、取得並分析 CITES 的第 1 份海馬貿易資料。

八、協助執行 CITES 有關海馬貿易長度限制(minimum size limit)之規定。

九、彙整並擴充海馬研究人員聯絡網，鼓勵資料分享，敦促各國遵守 CITES 規範，鼓勵各國採取保育海馬相關措施。

本計畫預計成果為強化「執行 CITES 規範全球支援網站」之功能，包括：
一、提供海馬族群經營管理、漁業和貿易相關技術指導資料。
二、協助各國 CITES 相關機構、海關、和資源管理人員執行海馬列入附錄二之相關規範。
三、建立海馬族群、漁業和貿易資料庫。

本計畫之效益包括：
一、各締約國及相關團體對 CITES 保護海洋魚類物種之瞭解有所提昇。
二、改善 CITES 貿易資料之一致性及可信度。
三、各國對附錄二物種輸出所需之無危害準則(non-determent findings)有更明確之界定。
四、推廣運用至其他 CITES 附錄管制貿易之物種，建立相關資料庫。
五、平面、廣播和電視媒體之報導。

2010 年彙整分析 1,200 份 CITES 海馬貿易資料，包括 2004-2008 年輸出、輸入和再輸出資料。分析結果包括：

- 記錄到 28 種海馬之貿易資料，18 種為乾海馬貿易，27 種為活海馬貿易。海馬列入 CITES 前所記錄到貿易種類為 24 種，海馬因此列入 CITES 後，貿易種類略有增加。2004-2008 年貿易資料中，77%記錄到種的層次，其餘的記錄到屬的層級。
- 2004-2008 年間，有 71 國(除南極洲外，各洲都有)被列為來源國或消費國。一半以上為乾海馬貿易，約有半數為活海馬貿易。有 46 國消費海馬，大多數為活體輸入。
- 累計至 2008 年，涉及海馬國際貿易，包括來源國和消費國共有 89 國。
- CITES 資料顯示 16 個新來源國(以前沒記錄)，另有 20 國之資料，沒有出現在海馬列入 CITES 前之貿易資料中。

Supporting a landmark CITES Appendix II listing for marine fishes of commercial importance (2010 grant)

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Grant received – September 2010
Final report – February 2011

The Forestry Bureau, Council of Agriculture, Taiwan generously granted us US$5,000 in 2010 to assist with our work in implementing the landmark CITES[1] decision to begin regulating international trade in seahorses, effective May 2004. We here provide a final report of the work that your funds were able to support under this year's grant.

During 2010-2011, we used the support received from the Forestry Bureau to generate new information of critical importance for populating our one-stop resource website for CITES Authorities (www.hippocampusinfo.org). In particular, we undertook the first ever analysis of seahorse trade data provided by CITES Parties under their responsibilities for Appendix II listed species (http://unep-wcmc.org/citestrade/). We have used the figures from 2004-2008 to (a) develop an overview of the status of the international seahorse trade after the CITES listing, (b) assess the post-CITES situation with our own pre-CITES trade surveys and analyses of occasionally older national data, and (c) evaluate the benefits, limitations and possible means of improving the current CITES reporting structure for listed species.

The Scientific Support and Capacity Building Units of the CITES Secretariat have both expressed great interest in our analyses, partly because such a systematic evaluation of CITES records is rare for any taxon listed under CITES and partly because seahorses were the first marine fish species of commercial importance to be listed under CITES since 1975. We have also sent some of our findings to the CITES Parties (and Taiwan) that recorded seahorse exports or imports, to ask for their input. As soon as they are validated, country-specific data will be made available on the one-stop resource website. We have also written a substantial report on these analyses – linked to the resource website - and drafted a scientific paper for submission to a primary journal. All outputs will acknowledge and thank the Forestry Bureau.

In total, we compiled and formatted over 1,200 CITES seahorse trade records (exports, imports and re-exports) from 2004-2008 to synthesize and evaluate trends over time. The kind funding from the Forestry Bureau allowed us to cover five weeks' salary of a postdoctoral research assistant (US$4,819 including benefits) to conduct the most

[1] Convention on the International Trade in Endangered Species of Wild Fauna and Flora, with 175 signatory nations (www.cites.org).

advanced work needed for the report, along with her communications costs. This included sensitivity analyses to evaluate the impact of our different decisions on how best to interpret data and to infer units where none were available.

Here are just some of the findings extracted from our analyses of the CITES data:

- A total of 28 species (of perhaps 47 valid species) were recorded in trade, of which 18 were found in the dried trade and 27 were traded live. This is a slight increase from the 24 species found through pre-CITES trade surveys. Our analyses showed that 77% of all CITES trade records from 2004-2008 were reported to the species level, while the others were entered only by genus.
- A total of 71 countries (from all continents other than Antarctica) were reported as sources and/or consumers of seahorses from 2004-2008. More than half traded dried animals while just over half traded live seahorses. A total of 46 countries consumed seahorses, with most importing live animals.
- The cumulative tally of all countries supposedly involved in the international trade of seahorses, either as a source or consumer until 2008, now stands at 89.
- CITES data showed 16 previously unrecorded source countries for seahorses while 20 countries recorded in the pre-CITES surveys did not appear in the CITES data.

We are not yet providing our data on volumes in trade, or key importing countries, until we have heard back from the CITES Authorities that we have just consulted; at a global average of 372 seahorses per kg, it makes quite a difference as to whether missing units are kg or individuals.

Quite apart from its interest in seahorse data in particular, the CITES Secretariat (and particularly the Capacity Building Unit) is keen to evaluate the generic lessons deduced from our seahorses analyses. One great benefit is that the UNEP-WCMC database should, theoretically, provide global coverage of trade in a way that is impossible in trade surveys or specific national analyses. However, the reliability of the records in the CITES database is entirely dependent on the accuracy with which CITES Parties report these data. Challenges arose in interpreting whether the data provided were numbers traded or the numbers allowed by permits but the biggest issue lay in the accuracy and completeness of the data. Ambiguity in volume units limited the use of the trade data for monitoring and management purposes and frequent lack of taxonomic specificity (i.e., genus level only) makes it difficult to infer conservation implications of the trade.

In the final eventuality, our unusual combination of Project Seahorse field surveys and CITES formal data may be the only way to develop comprehensive understanding of trade.

We deeply appreciate the Forestry Bureau's generous assistance in providing support for our CITES work. During 2010, your funding was matched with counterpart funding received from the John G. Shedd Aquarium, Guylian Chocolates Belgium and the Langar Foundation, allowing $5000 to be effective in achieving substantial and important information generation for seahorses and marine conservation. We look forward to more collaboration in the years to come.

野生鮭魚中心計畫報告摘要

野生鮭魚中心(Wild Salmon Center, WSC)所提「遠東哲羅魚保育計畫」歷年來計畫報告摘要如附：

本計畫宗旨為保護瀕臨絕種 Sakhalin taimen 之棲地及永續經營管理。Sakhalin taimen 為大型鮭魚，又名 Ito 或 Japanese huchen，成體體重 50-100 公斤，體長超過 2 公尺，壽命超過 30 年。俄羅斯僅限日本海沿岸和庫頁島，另外，日本北海道和千島群島(Kuril Islands)有少量族群。Sakhalin taimen 於 2006 年被列入 IUCN 紅皮書中。俄羅斯 Sakhalin taimen 棲地雖然大都完整，但許多重要河流系統受到日益增加之威脅，例如盜獵、商業捕鮭業之誤捕、伐木、發展快速的石油和天然氣相關工業。依據俄羅斯漁業統計誤捕資料(Bycatch record of the Russian commercial fishery)顯示 Sakhalin taimen 過去 50 年來數量減少 70%。日本的 Sakhalin taimen 可能少於 2,000 隻。

2008 年計畫報告摘要如下：

俄羅斯的庫頁島州立大學(Sakhalin State University)、俄羅斯聯邦漁業局奧卡辦公室(Okha Office of Russian Federal Fisheries Agency)、庫頁島鮭魚中心(Sakhalin Salmon Initiative Center, SSIC)、遠東魚類試驗所(Far East Fisheries Institute)和野生鮭魚中心(Wild Salmon Center, WSC)共同至 Langry 和 Bolshaya 兩條河流，進行野外調查 2 次，評估魚類多樣性及豐富度，蒐集水質和地形基本資料，同時蒐集魚鰭(Fin clips)樣本供 DNA 分析之用。並運用這些資料，草擬建議設立保護區之文件及 Langry 流域保育行動計畫。除上述單位外，共同執行計畫之單位包括庫頁島魚類和海洋學試驗所(Sakhalin Fisheries and Oceanography Institute)、位於莫斯科的俄羅斯科學院遺傳研究中心(Institute of General Genetics, Russian Academy of Sciences)和美國之華盛頓大學(University of Washington)。

一、研究

- 研究團隊發現 Langry 和 Bolshaya 流域鮭魚物種多樣性很高，但也發現 Bolshaya 流域密集盜獵的現象很嚴重。
- 研究團隊於 Langry 的支流發現一尾遠東哲羅魚，證明 Langry 流域為唯一兩種瀕臨絕種哲羅魚(Sakhalin and Siberian)都有分佈的區域。以前的調查尚未發現這兩種魚之棲地有重疊的狀況。這項發現的生態意義重大，並可協助持續研究 2 種魚特殊棲地需求。
- 俄羅斯科學家也同時蒐集水質化學資料、動植物和鳥類資料，包括數種瀕危物種和全球新發現種。這些資料均將納入「保護區設立提案文件」中，並於 2009 年底遞件至政府主管單位。調查結果舉例說明無下：
  1. 發現列入紅皮書的卡盧加鱘(Kaluga sturgeon)和鱖魚(Chinese perch)。
  2. 大型無脊椎動物分析結果發現許多稀有及新發現種。
  3. 記錄到第 1 次在庫頁島發現的 1 種珍珠貝(pearl oyster)，並建議納入庫頁島紅皮書中。
  4. 記錄到第 1 次在庫頁島發現的 6 種軟體動物，其中 4 種為新種。
  5. 寶刀魚科(chironomids)和昆蟲部分，發現 3 個新種、1 個俄羅斯新紀錄種和 12 個庫頁島新紀錄種。

- 因為輸入生物樣品困難，WSC 決定在俄羅斯建立哲羅魚基因分析設施，預計 2009 年於莫斯哥遺傳試驗所開始進行此物種之基因分析研究。

二、教育

- 本計畫成果促成民間團體參與資源經營管理新機制，此為俄羅斯首例。SSIC 與奧卡(Okha)省府協談合作，設立流域委員會(watershed council)，負責辦理設立保護區之公聽會。
- 建立以社區為基礎之反盜獵計畫。

三、保育

- 研擬 Langry 流域保育行動計畫，目標物種為 Sakhalin and Siberian taimen, summer chum salmon, fall chum salmon, lenok, grayling。內容包括因應威脅因子之策略、反盜獵策略、建議設立保護區、保育團體聯合行動發展地區和全國性反盜獵策略、監測油污染等。
- 推動設立保護區計畫。
- SSIC 和美國阿拉斯加魚獵部(Alaska Department of Fish and Game)合作，設立長期監測站，持續追蹤 taimen 活動、產卵、遷移行為等。

2009 年計畫報告內容，摘要如下：

2009 年原計畫目標為：

一、研究：進一步瞭解 Sakhalin taimen 族群結構，及進行監測計畫。

- 蒐集更多之魚鰭樣本。
- 進行 DNA 分析，區分 *Hucho perryi* 和 *Hucho timen* 族群分佈界限。
- 研發和執行估計族群數量(escapement)和產卵量(spawning)之正確方法。
- 以釣(angling)、網(netting)和誘捕(trapping)方式進行鮭魚族群調查，瞭解其分佈範圍。

二、教育：提升社區參與保育行動。

- 針對新設立之 watershed council 會員，訓練計畫籌備和流域評估方法。
- 評估於當地推動 Salmon Watch 教育宣導計畫之可行性。
- 邀請所有相關單位和人士共同參與保育行動計畫之修訂及後續執行，尤其是反盜獵部分。

三、保育：藉由反盜獵建立保護區方式，增加族群數量。

- 根據野外調查結果，修訂保育行動計畫。
- 於鮭魚產卵季節(8 月和 9 月)加強巡邏，並持續以前之保育策略。
- 完成設立保護區提案，並送交政府單位審查。

2009 年日本最大造紙公司 Oji Paper 與 WSC 合作設立保護區，保護日本最大的淡水魚 taimen。另外，WSC 之俄羅斯合作單位 Sakhalin Salmon Initiative 榮獲俄羅斯的公司團體贊助獎(Corporate Donor Awards)最佳計畫(Best Program)獎項。2009 年研究、教育和保育成果包括：

一、研究

- 2009 年 WSC 的俄羅斯主要合作單位 SSIC 與俄羅斯科學院遺傳研究中心正式簽訂 3 年研究合作協定，並取得俄羅斯自然資源部(Ministry of Natural Resources)核准進行 Sakhalin taimen 相關研究。對瞭解族群結構助益良多。

- 2009 年研究團隊在 Langry 流域沒有發現 Sakhalin taimen，而且只取樣到 2 隻 Siberian taimen。證實 Langry 流域的 taimen 很少，可能是盜獵造成的。因此族群復育需有配套管制措施。
- 研究團隊在 Dagi 流域發現大量的 Sakhalin taimen，有可能是全世界 Sakhalin taimen 密度最高的棲息地。
- 於 Dagi 流域取樣 20 餘隻 Sakhalin taimen，紀錄捕獲地點，魚的長度、重量和大約年齡。並取魚鰭(Fin clips)樣本供 DNA 分析之用。俄國和奧地利專家將合作分析，結果可供族群保育和復育之用。
- 研究團隊在 Langry, Dagi, Kura, Bakhura, Dudinka, Anna 流域蒐集鮭魚族群數量、未成年往外遷移和產卵資料。這些基本資料可做為未來保育和反盜獵之參考。

二、教育

- 2009 年 5 月，辦理專題演講「研擬有效策略供庫頁島鮭魚委員會運用」，自然資源管理、社會發展專家與委員共同討論經營管理、反盜獵和環境教育等議題。
- 庫頁島 6 個流域委員會針對學生辦理多場生態保育宣導活動，例如辦理畫圖比賽、兒童季活動、生態保育納入幼稚園教材、青少年環境科學暑期課程等。並於 2009 年 11 月 28-29 日辦理成果發表會。
- 獲准實施 Salmon Watch 中小學課程和 Water Droplet 幼稚園課程。共有 200 餘位學生參加 7 梯次 Salmon Watch 戶外教學活動。已有 20 個幼稚園、30 個小學和 34 個中學採用這兩項教育課程。2009 年 10 和 11 月，有 80 位教師接受此項課程之訓練。SSIC 專家於俄羅斯生態教育專家會議演講 Salmon Watch 計畫，來自 60 多個團體 600 餘人參加。
- 4 位俄羅斯教師和 12-15 歲學生 12 人，參加 2009 年 7 月 22-31 日於美國奧勒崗舉辦之第 1 屆國際鮭魚營活動。俄羅斯學生由保育徵文比賽中遴選優秀者參加，共有 160 人報名徵文比賽。
- 2009 年 9 月 19 日，辦理第 7 屆鮭魚季活動，有 300 名兒童人和 60 名成人參加。活動內容包括 9 個學校說明當地社區生態保育計畫，學童參加河流沿岸淨灘活動，庫頁島自然資源保育演說，以及野外觀察鮭魚活動。
- 2009 年 9 月 26 日，辦理繪圖比賽，分為鮭魚生活史、鮭魚與人以及保護鮭魚三大主題。共有 100 人參加比賽，選出 11 位優勝作品，並製作 2010 年月曆(WSC 有提供一份供參)。

三、保育

- 2009 年夏季於 Langry 盆地推動以社區為基礎之反盜獵計畫。由當地社區人士和執法人員 22 人，共組反盜獵小隊和設立檢查站。計查獲 3 個盜獵營地，逮捕盜獵者 20 人。10 月 6 日攔截一部貨車載運 450 公斤魚子醬和鹽漬 chum salmon。在河流中下游發現非法漁網，約沒收 1,000 至 1,100 公斤魚子醬。另外，蒐集鮭魚族群數量、未成年往外遷移和產卵資料等，評估反盜獵措施之成效。
- 選定 Dagi 流域推動下一階段之保育行動計畫(Conservation Action Planning, CAP)。
- 俄羅斯遠東和莫斯科 6 地區鮭魚專家會議，選定 Langry 和 Dagi 流域為設立「鮭魚保育區」候選名單。

四、夥伴關係

參與 2009 計畫之單位包括：遠東魚類試驗所(Far East Fisheries Institute)、俄羅斯科學院遺傳研究中心、俄羅斯聯邦漁業局奧卡辦公室、庫頁島魚類和海洋學試驗所、庫頁島鮭魚中心、庫頁島州立大學、華盛頓大學、奧地利格拉茲大學(University of Graz, Austria)。

2010 年計畫報告摘要如下：

一、研究：

- 2009 年蒐集 52 份 Sakhalin taimen 樣本，2010 年進行 DNA 分析研究，發現不同河流間基因差異很小，顯示河流間有遷徙族群。但有兩個例外，Vabaisky Lake 顯現隔離繁殖(reproductive isolation)現象，最近也證實通往該湖的遷徙行為受阻。另外，Nabile 和 Dagi 兩河流族群之遺傳特性相似，但與其他河流族群差別很大。
- 由 Dagi River 蒐集到之資料顯示該河為 Sakhalin taimen 產卵之理想地點，但林業和道路工程嚴重影響產卵棲地。
- 建立 Sakhalin taimen 分佈和風險評估模式，2011 年初將於 Transactions of the American Fisheries Society 發表報告，並將林務局列入感謝名單。

二、教育： 2010 年有 3,979 人參加相關教育宣導活動。

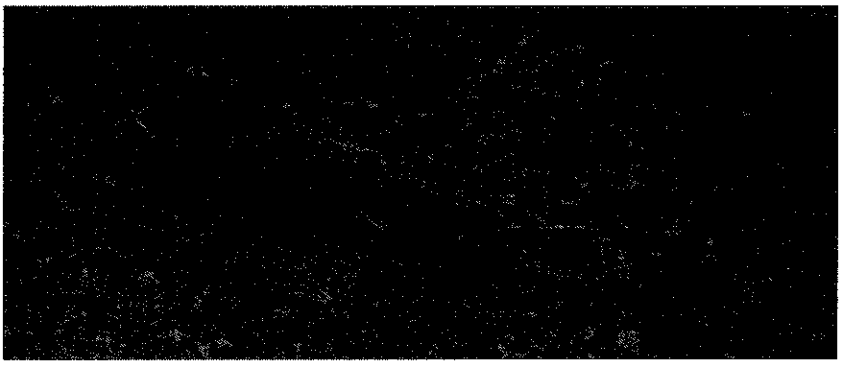
- Save Salmon 繪圖比賽有 975 件參賽作品，優勝作品編製桌曆。(註：WSC 寄來之月曆將於會場傳閱)。
- 9 位教師和 24 位學生(美國奧勒崗 8 人、俄羅斯 16 人)12 人，參加 2010 年舉辦之第 2 屆國際鮭魚論壇。
- 於 40 所中小學推廣 Salmon Watch 和 Water Droplet 課程，195 人參加認識本土鮭魚野外活動。
- 229 位學生參加鮭魚產卵地水下參觀之旅活動。
- 2010 年 9 月舉辦第 8 屆年度鮭魚季活動，吸引 300 人參加。
- watershed council 之 64 位會員參加三次訓練班課程。

三、保育：

- 經過十餘年之努力，設立保護區 Koppi River Preserve。
- Smirnykh river Partnership 入圍 2010 年國際河流研討會(International River Symposium)國際河流獎(International River Prize)，雖未得獎，但引發更多人對此地區之關心。
- 當地政府和社區支援 watershed council 進行 300 次反盜獵行動。

Sakhalin Taimen Conservation Partnership

Final Report for the 2010 Grant from the Forestry Bureau, Taiwan Council of Agriculture



1. Project Goals and Objectives

The goal of this project was to support the implementation of stakeholder-driven conservation strategies for habitat protection and sustainable management of Sakhalin taimen, one of the largest and most endangered salmonid fishes in the world. Wild Salmon Center (WSC) and our partners proposed to focus on understanding and protecting Sakhalin taimen (*Hucho perryi*) on the Dagi River in Sakhalin Island, Russia. Our objectives were as follows:

- **Research:** Improve understanding of the population structure of Sakhalin taimen across its natural range, with a particular focus on the Dagi River, a stronghold for the species in Sakhalin.
- **Education:** Promote community involvement in conserving some of the last remaining strongholds for Sakhalin taimen through strengthening community-based watershed councils and educational programs for youth.
- **Conservation:** Increase the numbers of spawning adult Sakhalin taimen through reducing poaching and establishing one or more Fisheries Reserve Zones for rivers identified as strongholds for Sakhalin taimen.

2. Summary of Progress

WSC has made some significant progress this year in the Russian Far East. The Institute of General Genetics was granted permits to conduct scientific research on Sakhalin taimen, a species listed in the Russian Federation's Red Data Book. The new data obtained during these field studies has provided WSC and our partners with a deeper understanding of the risks facing Sakhalin taimen and genetic diversity within the species.

Our conservation efforts last year were particularly successful. Last fall, the Khabarovsk Krai Administration passed a resolution to establish the Koppi River Preserve in the Khabarovsk region. Over a decade in the making, the 94,000 acre preserve will permanently protect habitat for 20 fish species including the critically endangered Sakhalin taimen, the Siberian tiger and other rare wildlife. This reserve marks an important milestone for protecting taimen. Important progress has also been made on the Dagi River on Sakhalin Island. WSC and our partners are currently working on a proposal to the Sakhalin Ministry of Natural Resources and Environmental Protection requesting that the river basin be added to the Ministry's list of protected areas. Once the river is included on the list we can begin work on establishing a Dagi River preserve.

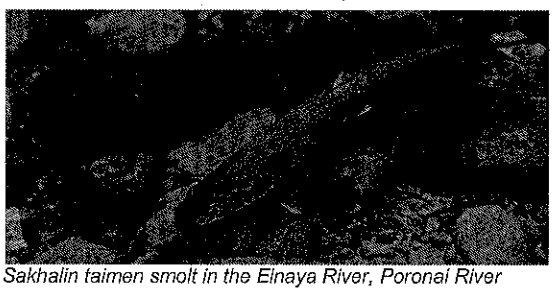
So far, community-based strategies to reduce poaching have been very successful. Watershed councils led over 300 community-based anti-poaching raids in six regions throughout Sakhalin in 2010. Although it will take some time for our science team to be able to definitively determine the success of anti-poaching efforts in quantifiable terms, visual observations seem to indicate that our efforts are working. From observations made during surveys conducted last year scientists believe that poaching activity seems to be declining.

Efforts to educate the community about the value of its salmonid populations have also grown significantly. Last year, 40 elementary and secondary schools throughout Sakhalin participated in the recently created environmental education programs, "Salmon Watch" and "Water Droplet", requiring the production and distribution of 200 additional copies of "Salmon Watch" workbooks. Students participated in a variety of activities throughout the year including field sessions, underwater snorkeling excursions, the International Junior Salmon Forum, and the 8th annual regional festival "Live Salmon!"

3. Accomplishments

Research

- We collected 52 genetic samples of Sakhalin taimen during field expeditions conducted in 2009. DNA extraction and analysis of the samples are now being conducted at Vavilov's Institute of General Genetics of the Russian Academy of Sciences. Preliminary results indicate very little genetic differentiation among populations. One way to interpret these results is that there has been a level of gene flow between populations that is sufficient to conclude that these are open, interacting populations. Because this species has been observed in coastal trap nets for decades, it is not surprising that we see evidence of panmixia (interbreeding) among these river populations. This underscores the idea that these are migratory species, and it is reasonable to conclude that, at least in recent history, there were migratory links between river populations, even in some instances across international borders. We did find two exceptions to this pattern. We found strong evidence that one population is reproductively isolated (Vabaisky



Sakhalin taimen smolt in the Einaya River, Poronai River basin. ©Tatiana Boyle, WSC

Lake in southern Sakhalin) from all others. We have recently confirmed (A. Semenchenko, Sakhalin Salmon Initiative, pers. comm.) that there appears to be a migratory impediment in the outlet river to this lake that likely prevents marine migration for the population resident there. Thus, this population should be considered as a distinct unit. In addition, we found two river systems in northeast Sakhalin that group strongly together and were both highly differentiated from all the others (Nabile and Dagi Rivers in the Northeastern region of Sakhalin). This population is also unique in that it shows evidence of hybridization with other salmonids.

- Sakhalin Salmon Initiative (SSI) Center staff carried out an expedition to the Dagi River in order to assemble existing data on the river, as well as collect new information regarding the spatial distribution of spawning grounds for various salmon species, including the critically endangered taimen. Research showed that the substrate composition of the river is ideal for taimen spawning. However, forestry, roads, and other uses affecting floodplain vegetation are having detrimental effects on the viability of spawning grounds. Three stages were clearly defined in the life cycle of Sakhalin taimen in the Dagi, including two of the most vulnerable ones: the mass migration from the spawning grounds in the second half of June and migration to the wintering grounds by the second half of October.
- In collaboration with Steve Weiss at the University of Graz, one of WSC's partners, Dr. Zhivotovsky, is using microsatellite DNA markers to reveal gene-flow barriers among neighboring river systems that will help identify unique populations. To date, Dr. Zhivotovsky has successfully identified 12 loci (adding two new loci), and has begun generating results from his laboratory. This represents an important step forward in laying the foundation for future genetic studies of Sakhalin taimen and other salmonids on Sakhalin to help inform on-going and future conservation planning.
- As a way to gain a clearer understanding of factors responsible for the species' decline and to help guide the selection of candidates for establishing new protected areas for Sakhalin taimen, we developed a model to describe the distribution and extinction risk throughout the known range of the species. Specifically, we analyzed the spatial distribution of taimen, and concluded their distribution is highly contiguous, suggesting that migratory exchange among river populations occurs, but may be limited in spatial extent. We found that watersheds that are of low gradient with large floodplains, and minimal conversion of land to agriculture are much more likely to support taimen populations. Further, we found that intermediate precipitation patterns and a relatively cold climate were critical for maintaining stable status for the species. It appears a combination of precipitation and temperature places a northern limit to the species' historical distribution. These results provide useful guidance in identifying candidates for protected area status in the northern portion of their range, and these results certainly have implications in how these fish might be able to adapt to climate change in the future. We currently have a paper in press to a prestigious journal in the field (Fukushima et al., in press[1]). We acknowledge support from the Forestry Bureau in the acknowledgements section of this publication. We expect it to be published in early 2011.

[1] Fukushima, M., H. Shimazaki, P.S. Rand, and M. Kaeriyama. In press. Reconstructing Sakhalin taimen (*Parahucho perryi*) historical distribution and identifying causes for their local extinction. Transactions of the American Fisheries Society.

Education

- A total of 3,979 people participated in environmental education and awareness activities in 2010:
    - Russian partners held a drawing competition for local children called "Save Salmon!" They received 975 submissions from throughout the Sakhalin region. Selected works were included in a professionally designed calendar and distributed regionally.



Oregon and Sakhalin delegates at the Second International Salmon Youth Forum; Sakhalin, Russia. ©Tatiana Boyle, WSC

    - Nine instructors and 24 adolescents (eight from Oregon and 16 from Russia) participated in the second annual International Salmon Forum, where the middle school students developed a salmon conservation declaration in both English and Russian. Oregon students recently presented this declaration to the Oregon State Senate.
    - To date, our educational programs, "Salmon Watch" and "Water Droplet," have been implemented in 40 elementary and middle schools and other education centers throughout Sakhalin. In cooperation with scientists from the Aniva region, Russian students participated in seven "Salmon Watch" excursions throughout 2010. These excursions introduced 195 children to the migration patterns of pink salmon, as well as other native salmonids, and the different methods scientists use to study multiple species and populations.



Local ichthyologist teaches "Salmon Watch" session, Sakhalin. ©Sakhalin Salmon Initiative Center

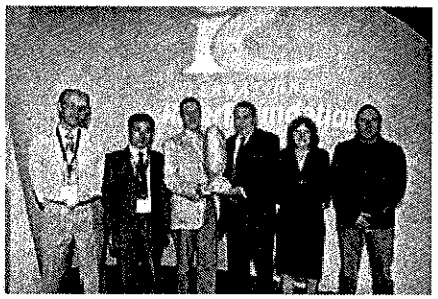
    - Additionally, 229 elementary and middle school students participated in nine underwater (snorkeling) spawning excursions. Participants studied the structure and function of spawning grounds for pink salmon in order to gain a more in-depth understanding of their life cycle.
    - In September 2010, approximately 300 guests from seven Sakhalin districts attended the 8th Annual Salmon Festival. Groups from local schools presented their ecological accomplishments from the past year and participants learned about the migration patterns of pink and chum salmon and visited a temporary laboratory where they were taught how to monitor water quality in the river.
- This past year 64 council members from several watershed councils across Sakhalin Island participated in three educational seminars. These trainings were organized and planned in accordance with council needs and requests.
    - Last spring the Sakhalin Salmon Initiative Center (SSIC) conducted a seminar entitled "Attraction of Financing and Optimization of Work of Salmon Councils of

Sakhalin in 2010". Representatives from seven regional districts participated. Attendees reviewed 2009 council reports and analyzed current work plans.

- The second seminar, "Control of Occupancy of Spawning Rivers by Salmon in 2010", was conducted last July and focused on helping councils implement their projects more effectively. More than 30 representatives from government, industry, and the local community participated.
- The third training, entitled "Attracting Funds and Developing Project Mentality", took place in November 2010. Seventeen representatives from six salmon councils, as well as representatives from indigenous communities in Northern Sakhalin, presented their pilot projects and shared successful strategies.

Conservation

- The creation of the Koppi River Preserve marks the completion of more than a decade of collaborative work between the WSC, the Khabarovsk Wildlife Foundation (KWF), and the Ministry of Natural Resources of the Khabarovsk Krai to win formal protection of the biologically diverse Koppi River watershed. WSC and KWF began conducting ecological surveys of the Koppi Watershed in 2000, the results of which helped support the legal designation of the area as a protected preserve. The research also led to the addition of the Sakhalin taimen to the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species in 2006. There are plans to create a Koppi River Watershed Council to act as a regional governing body to coordinate sustainable watershed management, anti-poaching efforts, and discuss regional development opportunities, such as ecotourism and catch and release sport fishing.
- The Smirnykh River Partnership was one of four finalists for the prestigious International River Prize Award at the 2010 International River Symposium last October (http://www.riverfoundation.org.au/). The prize is awarded for outstanding achievements in river basin management. While we did not win, the honor brought valuable recognition and increased interest to the area.



Dmitry Lisitsyn, a Chairman of Sakhalin Environment Watch, member organization of Smirnykh River Partnership at the gala-award ceremony, Perth, Australia. ©River Prize conference; ©International River Foundation

- The Dagi watershed was chosen for the next phase of Conservation Action Planning (CAP) based upon the extremely high density of Sakhalin taimen observed in the river during 2009. The CAP framework for the Langry was adapted in 2010 to assist our future work on the Dagi.
- With the support of local government and communities, public watershed councils led over 300 anti-poaching raids in 2010.

- Aniva's watershed council arranged a community anti-poaching group consisting of 17 inspectors. The group conducted 165 anti-poaching raids and identified 152 violations (representing 25.4% of the total number of identified violations in the district).



Remains from salmon roe (caviar) poaching operation

- Smirnykh's council carried out 67 anti-poaching raids, resulting in one criminal case and eight administrative violations. At an established temporary checkpoint on the Pervomaysk-Okruzhnoe road, 800 vehicles were inspected. Eight cases of transporting equipment for processing salmon caviar were confiscated.
- Okha's council removed and destroyed over 60 poaching nets, three stationary poaching fishing spots and caviar workstations, and various processing equipment.
- Members of the Nogliki anti-poaching council conducted 32 raids at spawning rivers and bays located within their district, resulting in 15 environmental violations.
- In Uglegorsk, several anti-poaching measures took place on the Pokosnaya river watershed, including informational meetings and anti-poaching raids. The anti-poaching work, took 55 days, and included the inspection of 38 rivers and tributaries. Two poaching brigades and fishing spots were found during the raids.
- Poronaysk's council set up three checkpoints and performed inspections on several spawning rivers in the area.

4. Partnerships

In addition to receiving support from the Taiwan Council of Agriculture Forestry Bureau, this project was funded by The Mohamed bin Zayed Species Conservation Fund, National Geographic Conservation Trust, Sakhalin Energy Investment Company, and Turner Foundation. Partner institutions and organizations included (alphabetical order):

- Far East Fisheries Institute
- Institute of General Genetics, Russian Academy of Sciences, Moscow
- IUCN Salmonid Specialist Group
- Okha Office of Russian Federal Fisheries Agency (Sakhalinrybvod)
- Sakhalin Environment Watch (SEW)
- Sakhalin Fisheries and Oceanography Institute (SakhNIRO)
- Sakhalin Salmon Initiative (SSI)
- Sakhalin Salmon Initiative Center (SSIC)

- Sakhalin State University
- University of Graz, Austria

5. Expense Report

BUDGET ITEM	BUDGET AMOUNT
Project Personnel	29,081
Transportation Expenses	7,424
Communications	12,316
Equipment/Supplies	144
Other Expenses	77,726
Administrative Overhead: NOT COVERED	0
TOTAL in US $	**$126,693**

貓科動物專家小組計畫報告

國際自然保育聯盟(IUCN-The International Union for Conservation of Nature)物種存續委員會(Species Survival Commission, SSC)貓科動物專家小組(Cat Specialist Group, CSG)計畫執行進度報告，摘要如次：

IUCN/SSC 貓科動物專家小組(CSG)主要由全世界 200 多位貓科動物專家組成，包括學者、野生動物經營管理人員和保育人士等。成員廣佈全球 57 國，主要工作是推動全世界 37 種貓科動物的研究及保育工作。CSG 之各項工作由貓科動物專家小組之友(Friends of the Cat Specialist Group)支援，CSG 之財務由瑞士伯恩大學會計部門專業管理。

IUCN/SSC 專家小組除評估動物的保育和族群現況外，也推動原產國保育計畫之執行。IUCN/SSC 新設的物種保育規劃小組(SSC Species Conservation Planning Task Force, SCPTF)，負責研擬更有效率的保育瀕臨絕種動物計畫，尋求保育物種更有效作法。CSG 也參與此項工作，以及全球各地貓科動物保育策略之研擬。貓科動物專家小組曾經提供報告供我國參考，包括 CAT NEWS 特刊「高加索花豹保育現況」、CAT NEWS 特刊「非洲南部獵豹保育現況」、非洲東部及南部非洲獅保育策略、高加索生態區花豹保育策略、肯亞獵豹和非洲豺犬國家保育策略、CSG 2006/2007 年年度報告、德文版全世界貓科動物簡介、物種保育策略計畫概要(Strategic Planning for Species Conservation: An Overview)、物種保育策略計畫指南(A Handbook)等。我國贊助計畫有印出林務局 logo，或列入贊助者名單。

2006 年贊助之「貓科動物數位圖書館計畫」，2007 年和 2008 年報告內容如下：

2005 年間貓科動物數位圖書館(Digital Cat Library, DCL)約有 6,000 份 PDF 檔報告，供會員運用，網址為 www.catsg.org。DCL 每年約增加數百份文件。原本只能依字母次序找到要下載的文件，或由目錄搜尋作者、年代或關鍵字。重新設計後，可直接網路查詢本文，例如由關鍵字搜尋現有文件等，功能包括：

一、每份 PDF 檔文件包括完整參考資料(作者、標題、發表時間、來源)和英文摘要等一般文字檔資料，以利蒐尋。
二、加入全文蒐尋功能，可供蒐尋 PDF 檔文件。

重新設計的網頁可有下列不同的版面(以下引用 2007 年報告原文)：
- list view (with customizable columns),
- details view – shows all fields of a particular record,
- cite view – displays record entries in a citation style chosen by the user,
- print view – eases printing or coping of records.

新版貓科動物數位圖書館網站已於 2007 年 12 月與 CSG 網站連結，開放專家使用。新版蒐尋項目包括 Highlights, Update, Reference Search, Keyword Search, Browse Library, DVD, About。About 的內容中有列出所有贊助單位之名稱。

2007 年贊助之「修訂貓科動物分類系統—Cat News 特刊」計畫，2008 年至 2011

年進度報告，摘要如下：

IUCN 的紅皮書(IUCN Red List)是全球瀕臨絕種動植物的重要指標，紅皮書的評估有賴正確的動植物分類系統。目前使用的貓科動物分類系統係依據 Nowell and Jackson (1996)出版之「Wild Cats-Status Survey and Conservation Action Plan」。依據最近的分子生物和型態學研究，貓科動物分類系統已有所修訂，亟需儘速修訂。

本計畫執行之步驟包括：
一、成立貓科動物分類專家工作小組，完成「貓科動物分類系統修訂版」初稿。
二、請專家審閱「貓科動物分類系統修訂版」初稿。
三、出版「修訂貓科動物分類系統—Cat News 特刊」，包括動物照片和分佈圖。

工作小組之召集人為 Andrew Kitchener，成員包括 Colin Groves, Steve O'Brien, Eduardo Eizirik, Lars Werdelin, Mel Sunquist, Gustav Peters, Carlos Driscoll, Christine Breitenmoser。已於 2007 年 9 月於英國開會討論新貓科動物分類相關議題，草擬「貓科動物分類系統修訂版」過程中，又有新發現(尤其是東南亞地區)，初稿修訂後供專家審閱。已編輯本 Cat News 特刊版面。動物繪圖部分，由藝術家 Linda Rosen-Dupuis 負責。2010 年初，依據基因分析、型態學和動態生物地理學完成「修訂版貓科動物分類系統」初稿。2010 年 10 月開會討論物種階層議題及 2011 年工作計畫。下次會議預計 2011 年 3 月召開。最新加入的資料包括：

- Balkans 的 lynx 被列為 Eurasian lynx 之亞種 *Lynx lynx balcanicus*。此項變更將可納入 IUCN 紅皮書評估為 Critically Endangered。堪稱為分類對保育的重要性之最佳範例。
- 2011 年 1 月發表之報告，Borneo 和 Sumatra 雲豹(clouded leopard)為不同種，學名分別為 *Neofelis diardi diardi* 和 *Neofelis diardi borneensis*。

2008 年贊助之「貓科動物保育方法之彙集計畫」工作項目及 2009 年至 2011 年報告，摘要如下：

一、檢視 SCPTF 的建議，並針對貓科動物之需求予以調整。
二、針對貓科動物現況報告、保育策略、物種或族群保育和經營管理行動計畫之研擬，訂定一套可遵循的方法或模式。
三、整理可協助規劃上開報告的各種方法。
四、設立資料庫，收納世界各地已完成的貓科動物保育策略和行動計畫。
五、將新規劃的方法或模式、資料庫、保育策略和行動計畫 PDF 檔納入 CSG 網站及貓科動物數位圖書館。

CSG 持續推動全球各地貓科動物保育策略之研擬工作，已蒐集 84 件保育策略和行動計畫，納入資料庫及進行初步分析，並避免各區域資料不平均的狀況。2009 年資料比例為歐洲 20%、北美洲 27%、亞洲 41%、非洲 9%、南美洲 9%。貓科動物 37 種中，蒐集到的保育策略和行動計畫，包括 18 種。老虎的文件最多，其次為美洲豹和雪豹。

依據 SCPTF 所訂指南，CSG 研擬適合貓科動物之保育策略(Conservation Strategies)和國家行動計畫(National Action Plans)，並根據上述經驗，擬定保育計畫流程圖，

列出步驟和方法等。

2009 年進行工作包括：

- Regional Conservation Strategies 部分：非洲中部和西部獅子、非洲東部和南部獅子、Arabian Leopard、高加索地區花豹、非洲東部獵豹、非洲南部獵豹、巴爾幹半島山貓(Balkan Lynx)
- National Action Plans s 部分：波札那獵豹(Cheetah in Botswana)、肯亞獅子、蘇丹南部獵豹和獅子

2010 年，已完成下列工作：

- 完成如何拯救貓科動物：物種保育策略計畫(How to Save the Cat: Strategic Planning of Species Conservation Programmes-A Cat Conservation Cookbook)初稿 70 餘頁。
- 2010 年 6 月召開會議，討論 Species Conservation Task Force (物種保育小組)未來工作及上述初稿。
- 完成較少頁數之 Strategic Planning of Species Conservation Programmes-A Cat Conservation Compendium (約 40 頁，詳如報告資料)。
- 預計 2011 年 3 月於英國召開新設立之 IUCN/SSC Sub-committee for Conservation Planning 會議。
- 更新現況報告和保育策略清單。
- 更新 CSG 網站架構及設計。
- CSG 網站新設 Cat Conservation Centre，內容包括 Cat Conservation Compendium 和相關文件。

2009 年贊助之「世界貓科動物—Cat News 特刊計畫」，計畫性質、工作項目和進度報告摘要如下：

除了參與科學領域外，CSG 也有責任扮演保育界和一般民眾(例如媒體、政府、學生和老師等)之橋樑，提供正確且容易取得的 37 種貓科動物之生物、生態和保育資料給大眾運用。以往係由 Cat News 和 CSG 網站提供，但這些資料主要依據 1996 年的「貓科動物行動計畫(Cat Action Plan)」，資料已過時。資料更新工作陸續進行中，第 1 階段工作為全世界貓科動物基本資料描述。2008 年 11 月 1 日，在瑞士伯恩舉辦「All for the Cats 研討會」時，編纂一份德文版全世界貓科動物簡介小冊，廣受歡迎。CSG 已翻譯為英文，除出版紙本外，也將納入網站。下一期 Cat News 正好是第 50 期，將以「世界貓科動物」為主題出版特刊，提供所有 37 種貓科動物基本資料。本計畫工作項目包括：

一、更新並翻譯貓科動物資料。
二、更新插圖，聯繫提供照片專家，洽談版權事宜。
三、Cat News 特刊排版。
四、Cat News 特刊印刷，預計印 1,000 本。
五、Cat News 特刊發表和分送。

2010 年初完成初稿，請 CSG 專家審查後，完成 Cat News 特刊彩樣。完稿(詳如報告資料)已送印，將與 Cat News 54 同時出刊及分送。

2010 年所提「貓科動物保育教材研擬計畫」，計畫內容及成果摘要如次：

CSG 致力於全球 37 種貓科動物之保護及監測，協調及支援來自 57 國 200 餘位學者專家、政府機構保育和野生動物管理人員之工作。因 CSG 專家仍是歐洲和北美佔多數，為加強訓練其他國家參與貓科動物保育工作，CSG 與瑞士伯恩大學合作，每年開辦為期三週之訓練課程。本計畫預計研擬指南、操作手冊、簡報資料等。訓練課程內容包括：

一、保育計畫
- 物種保育策略計畫
- 現況報告和基本資料調查
- 策略和行動計畫之執行
- 保育計畫之執行和控管

三、監測
- 分層監測的概念(stratified monitoring)
- 大規模監測 1：歐亞山貓(Eurasian lynx)實作-ELOIS 計畫(即歐洲歐亞山貓調查計畫)和 SCALP 計畫(Alpine lynx 族群現況和保育計畫)
- 大規模監測 2：偶發性觀察(chance observation)、出現/不出現資料(presence/absence data)、棲地模式(habitat modeling)
- 中等規模監測：分佈和相對豐富度
- 小規模監測：捕捉/再捕捉(capture-recapture)方法、無線電追蹤(radio-telemetry)

四、實作訓練
- 主持保育研習班
- 照相偵測(camera-trapping)：設計、野外調查和分析
- 獸跡採樣 Track transects (identification of signs) for occupancy analyses
- 山貓捕捉系統和處理(handling)

為提升成效和長期效益，有必要編纂資料供受訓者攜回，以供將來擔任訓練教師時運用，這些資料包括：
- 監測手冊：調查和監測理論和指南
- 野外調查手冊：野生動物研究和監測方法實作說明
- 教材資料例如 PowerPoint 簡報資料等

本計畫工作項目包括：
一、整理所有和保育課程相關課題之資料
二、準備教具展示箱(頭骨、足印、毛皮、照相偵測器材等)
三、於第一屆訓練課程中試用此套教材
四、採用對上述教材之試用建議
五、教材定稿並印製手冊

2010 年工作進度如下：
準備一系列簡報資料，題目如下：
List of prepared presentations
1. Introduction簡介

1.1. Presentation of Cat SG貓科動物專家小組簡介

1.2. Presentation of KORA瑞士伯恩大學

1.3. Ecology of lynx in Switzerland瑞士山貓生態

2. Conservation planning保育計畫

2.1. And how is the cat? Assessment of status and conservation needs of felids

2.2. How to save the cat – Strategic conservation planning保育策略計畫

2.3. How to save the cat 2 – Development of status report, conservation strategy and national action plan研擬族群現況報告、保育策略和行動計畫

3. Monitoring監測

3.1. Principles of monitoring監測原則

3.2. Camera trapping照相偵測

3.3. Baseline surveys基礎調查

3.4. Disease surveillance疾病監測

3.5. Conservation genetics保育遺傳學

3.6. Habitat modeling棲地模型

4. Practical training實務訓練

4.1. Kill identification辨認死亡個體

4.2. Scat analysis排遺分析

4.3. Trapping systems陷阱系統

4.4. Field anesthesia of Eurasian lynx歐亞山貓野外麻醉

4.5. Animal location and home range analyses動物位置和活動範圍分析

4.6. Camera trapping – practical aspects照相偵測實務

5. Concepts概念

5.1. How to write a scientific paper如何撰寫科學報告

5.2. SCALP: an expert network for cross border cooperation in conservation 保育專家聯絡網

撰寫野外調查手冊，內容如下：

Content of Field Handbook

1. Field signs and kill identification野外痕跡和死亡個體辨識

1.1. Species accounts物種介紹(1 page A5 per species: Picture, fact sheet, track, etc.)

1.2. Field signs (Tracks, scats獸跡、排遺)

2. Collection of data and samples for monitoring蒐集供監測用資料或樣品

2.1. Baseline surveys (Interviews: Protocols, forms訪談規範表格等)

2.2. Recording of (chance) observations (Categories, forms)觀察記錄

2.3. Recording of kills死亡個體紀錄(Protocol: kill site, kill, killing signs; Data recording: Pictures, measurements, forms...)

2.4. Genetic samples遺傳樣品(Captures: blood, hairs, etc.; Necropsies; Field: saliva, hairs, scats (e.g. at kills)

2.5. Scats & urine排遺及尿液

2.6. Photos照片(Taking pictures in the field; Storing pictures in the system)

3. Tracking & Transects獸跡追蹤和條形樣區

3.1. Purpose and goals目標(Opportunistic (e.g. to find kills) versus "behavioural" tracking versus transects)

3.2. Field procedures野外調查程序(Personal gear and tools; Protocol(s); Recording data in the field (forms))

3.3. Transfer of data and data analysis (Download of GPS data, pictures, field notes, etc.)

3.4. Track transects獸跡採樣

4. Camera trapping照相偵測 (photo and video)
   4.1. Planning & preparation規劃及準備(Identification of reference area and sites (grid, density, distribution...) (Guidelines?); Materials, inventory, checklists)
   4.2. Camera-trap handling照相偵測處理(Types of camera traps, uses and handling)
   4.3. Setting and checking架設和檢查(Mounting at different sites (path, kill, marking spot); Controls and control rhythm; Materials and checklists)
   4.4. Analyses of the data資料分析(Analogue cameras/films: development, scanning; Digital camera/pictures: handling of cards, downloading, storing... ; Brief (detailed in Guidelines): Identification of lynx, construction of capture history, estimation of abundance and density)
5. Captures and immobilization捕捉和固定
   5.1. Box traps誘捕籠(Description and function; Installation and set up; Survey (alarm system) and control; Maintenance; Materials, checklist)
   5.2. Foot-snares纏腳式捕獸器and leg-holds獸夾(Description and function; Installation and set up; Survey (alarm system); Maintenance; Materials, checklist)
   5.3. MICS多重指標調查系統(Description and function; Installation and set up; Maintenance; Materials, checklist)
   5.4. Immobilization & animal handling固定和動物處理(Introduction (drugs); Material and checklist (capturing kit); Application of drugs; Handling of immobilized animals incl. vet. Protocols; Transport of immobilized animals)
6. Telemetry遙測
   6.1. Introduction簡介: the meaning of life and telemetry
   6.2. VHF甚高頻(Materials; Field procedures, protocols and forms)
   6.3. GPS (GSM)全球定位系統
   6.4. Data handling...資料處理

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SPECIES SURVIVAL COMMISSION
CAT SPECIALIST GROUP

Revision of the Cat Taxonomy - Special Issue of Cat News

Progress Report February 2011

In July 2007, the Forestry Bureau, Council of Agriculture of Taiwan, has granted the IUCN/SSC Cat Specialist Group an amount of US$ 10,000 for the revision of the cat taxonomy and the production of a Special Issue of Cat News on this subject. This grant enabled us to set up a Task Force of renowned taxonomists to review the classification of the FELIDAE.

Despite the unavailability of the chair of the taxonomy revision group during most of 2010, the project has made some small steps since the last report:

- The chairs of the Cat Specialist group had a meeting with Andrew Kitchener in October 2010 to discuss issues on the species level and the program for 2011. The next meeting of a small group of experts will take place in March 2011.
- Some new material has been integrated:
    - The lynx from the Balkans has been described as a subspecies of the Eurasian lynx, *Lynx lynx balcanicus*. Based on this, it can now be assessed and integrated into the IUCN Redlist as Critically Endangered. This is a good example how important taxonomy is for conservation.
    - In January 2011, a paper was published showing that the clouded leopards on Borneo and Sumatra belong two different subspecies: *Neofelis diardi diardi* and *Neofelis diardi borneensis*

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IUCN SSC

SPECIES SURVIVAL COMMISSION
CAT SPECIALIST GROUP

A Collection of Cat Conservation Tools

Progress Report February 2011

In September 2008, the Forestry Bureau, Council of Agriculture of Taiwan, has granted the IUCN/SSC Cat Specialist Group an amount of US$ 10,000 to adapt the recommendations of IUCN/SSC's Species Conservation Planing Task Force for cats and to compile the experience in the development of Strategies and Action Plans in a set of conservation tools, and also to build a database and a library of existing Strategies and Action Plans in order to facilitate their implementation and revision. These recommendations, tools and the library will be made available through the Cat Specialist Group's web portal (www.catsg.org).

The project although well advanced has undergone the following major steps and improvements/changes during the past year:

- IUCN/SSC has organized a meeting in the Abruzzo Mts, Italy, in June 2010, to discuss the future of the Species Conservation Task Force. The meeting provided important input for the Cat Conservation Cookbook.
- Because of this meeting, we have been asked to produce a shorter version of the cookbook, which is close to be completed (see attachment).
- Based on our input and the shorter document we have been appointed as members of the newly formed IUCN/SSC Sub-committee for Conservation Planning, which will meet for the first time in person in Oxford in March 2011.
- The list of status reports and conservation strategies has been updated.
- The Cat SG website needs to be renewed, as it is technically outdated in many respects. The new structure and the design have been finalised. The website is currently being programmed and we will be able to start soon filling in content.
- The Cat Conservation Compendium and the documents will become an important part of the new section "Cat Conservation Centre" (see attachment for the new design and the new structure of the Cat SG website).

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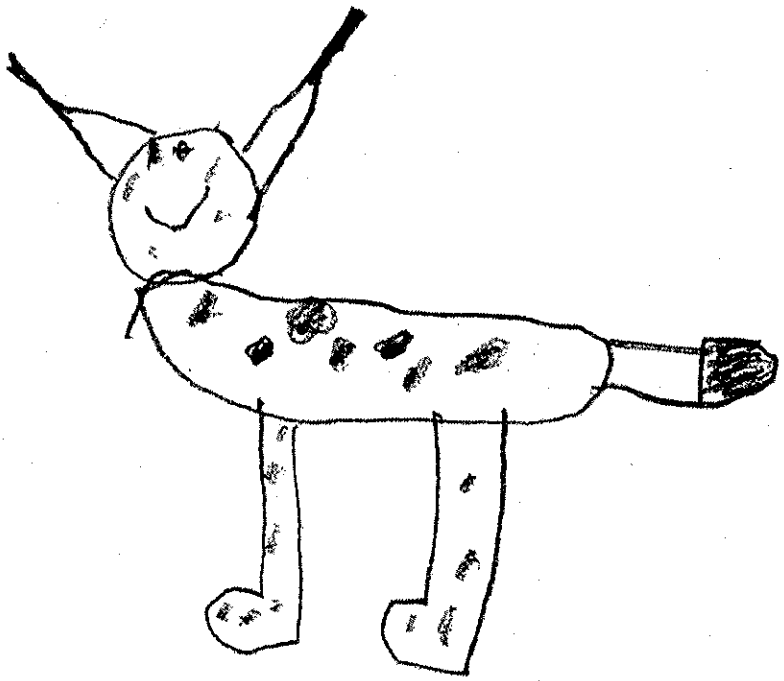
Cat Conservation Compendium



Strategic Planning of Species Conservation Programmes -

A Cat Conservation Compendium

compiled by the

IUCN/SSC Cat Specialist Group

IUCN SSC

SPECIES SURVIVAL COMMISSION
CAT SPECIALIST GROUP

Cat Conservation Compendium

Urs Breitenmoser, Christine Breitenmoser-Würsten and Kristina Vogt

The Cat Conservation Compendium has been prepared with support from the Taiwan Council of Agriculture's Forestry Bureau and the Wild Cat Club

Content/Structure

Acronyms
I. Introduction
II. *How to save the cat:* A cat conservation programme in six steps
1. *Shall we venture on a hike together?* – Preparing the ground
1.1. Identification of the conservation unit: taxonomic entity and geographic scale
1.2. Building partnership
1.3. Identification of stakeholders
1.4. Securing the political support and mandate
1.5. Agreement on process and procedures
2. *Where do we start from?* – Status assessment
2.1. Identification of experts and contributors
2.2. Preparing the Status Report
2.3. Review and distribution of the Status Report
3. *Where do we want to go?* – (Regional) conservation planning
3.1. Participatory development of the Regional Conservation Strategy
3.2. Problem analysis
3.3. Editing and review of the Regional Conservation Strategy
3.4. Endorsement of the Regional Conservation Strategy
4. *How do we get there?* – (National) action planning
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Acronyms [Page 6]

CatSG	Cat Specialist Group of the IUCN/SSC
CBSG	Conservation Breeding Specialist Group of the IUCN/SSC
CCC	Cat Conservation Compendium (*this document*)
CCCC	Cat Conservation Compendium Complement
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
GIS	Geographic Information System
GO	Governmental Organisation
IUCN	International Union for Conservation of Nature and Natural Resources
LCIE	Large Carnivore Initiative for Europe
LogFrame	Logical Framework (Approach)
NAP	National Action Plan
NGO	Nongovernmental Organisation
OC	Organisation Committee
PVA	Population Viability Analysis
RCS	Regional Conservation Strategy
Red List	IUCN Red List of Threatened Species (www.iucnredlist.org)
SCALP	Status and Conservation of the Alpine Lynx Population
SCP	Species Conservation Programme
SCS	Species Conservation Strategy
S.M.A.R.T.	Specific, Measurable, Achievable, Realistic, Time-bound
SR	Status Report
SSC	IUCN Species Survival Commission
WCS	Wildlife Conservation Society
WWF	World Wildlife Fund

I. Introduction

Cat conservation faces a number of specific challenges, as a consequence of biological features of the felids and their particular relations with humans. The high degree of specialisation that the cats have acquired during their evolution makes them vulnerable to environmental changes; 45 % of the 37 cat species are threatened according to the IUCN Red List of Threatened Species (www.iucnredlist.org). Most cats live solitarily at low densities (compared to their prey of the same size); viable populations therefore need extended areas of suitable habitat with sufficient prey. All felids are mandatory hunters, typically depending on a rather narrow spectrum of prey from one trophic level. The hunting tactic is adapted to the main prey and the habitat. The predatory lifestyle brings the cats into conflict with humans: They compete for game, but cats also kill livestock from chicken to cattle, and some large cats are even dangerous for humans.

Cats are admired, feared and hated for their beauty, supremacy and ferocity. Some of the cats are great cultural symbols and have an outstanding ceremonial value, but the living cats are mere mystic shadows in the forest, and some of the smaller species are virtually unknown even to local people. All this makes cat conservation a complex endeavour. Seldom is it enough to grant a cat species legal protection to secure its survival. Typically, cat conservation includes habitat protection, prey management, conflict mitigation, and law enforcement over large areas and for many years.

For a conservation programme to be successful, a sincere cooperation between various key players is required: Governmental institutions, which are responsible for legislation and law enforcement, experts, who provide the necessary information, and local people and stakeholders, who need to coexist with the cats and need to support the implementation of conservation measures. We call this the Triangle of Conservation (Fig. 1):

- Experts provide information: No meaningful conservation without sound scientific understanding;
- Authorities provide leadership: No effective conservation without political endorsement, leadership and law enforcement;
- Local people and stakeholders provide support: No successful implementation of conservation actions without involvement of local people and stakeholders.

Of course, there are many more key players and stakeholders, but these three groups have their specific roles and responsibilities, and it is important to distinguish between these assignments in order to organise a sensible cooperation: Experts tend to regard conservation mainly as a rational and scientific exercise, but it is not. It is as much an emotional and socio-political process, and human dimension aspects need to be considered throughout the planning and implementation phases. It is of utmost importance that we follow a straightforward scheme that everybody allows to see where we are and what his/her personal position and contribution is.

Fig. 1. Triangle of Conservation. Governmental institutions (authorities), experts and scientists, and local people have different responsibilities in conservation, but they need to work together for successful implementation of actions.

Conservation partnership has to be carefully built up. Shortcomings in the planning phase, in the establishment of partnerships, and in the involvement of local people or relevant stakeholders can

cause losses of valuable means and time or complete failure of conservation projects even if, from an academic viewpoint, the conservation plan was correct. Conservation must be a participatory process already in the planning phase. IUCN/SSC has published two documents outlining the participatory process in conservation planning: (1) Strategic Planning for Species Conservation: An Overview (IUCN/SSC 2008a), and (2) Strategic Planning for Species Conservation: A Handbook (IUCN/SSC 2008b). The Cat Conservation Compendium (CCC, this document) bases on these two publications and uses the same terminology. The CCC is a short document, meant to provide a checklist-like step-by-step guidance for the development and implementation of a cat conservation programme. Further explanations, additional materials and examples are compiled in the Cat Conservation Compendium Complement. Both the CCC and the CCCC can be downloaded as PDFs from the Conservation Centre at the Cat SG website (www.catsg.org).

II. How to save the cat: A cat conservation programme in six steps

The aim of a Species Conservation Strategy (SCS; IUCN/SSC 2008a, b) is to secure the long-term survival of a cat taxon (species or subspecies) in form of a viable metapopulation in its entire range or in a certain region. Although we try to be as concrete as possible, the variety of situations and conditions under which cats need to be conserved is too wide to cover all possibilities. Users of the CCC may have to adopt the process to their particular situation. As an outset, we imagine a standard situation as we encounter it often when invited to facilitate the development of a SSC for a felid species: The conservation unit is a species, subspecies or metapopulation stretching over several countries, hence requiring international cooperation. Working on geographic scale that involves several countries, cultures, languages, and legal systems implies that the strategic planning (valid for the entire conservation unit) and the action planning (to be implemented on a national or local scale) need to be separated, because for very practical reasons (e.g. language), it is not possible to involve all local interest groups on an international level. In this case, the SCS consist of two documents, the Regional Conservation Strategy (RCS), providing guidance of the range-wide conservation, and the National Action Plans (NAP), describing conservation measures to be implemented on a national or local scale.

Fig. 2. Family preparing for a mountain hike. The questions stand for decisions made at important milestones of the journey. As in conservation planning, the careful preparation is crucial for the success.

Conservation planning can be pictured as family going on a mountain hike (Fig. 2). The family has to take a number of decisions to prepare and to complete the journey, and these questions can be translated into steps in planning and implementing cat conservation actions, which are explained in the this chapters and summarised in the central flowchart and planning checklist (Fig. 3, pages X–X). These questions and corresponding steps are the following:

1. Shall we venture on a hike together? – Preparing the ground
2. Where do we start from? – Assessing the status of the species
3. Where do we want to go? – Defining the strategic goals and objectives
4. How do we get there? – Planning the conservation actions

5. Ready, steady, go! – Implementing the conservation plan
6. Are we on the right way? – Monitoring the effects and adjusting the plan

These questions and steps are interrelated and build on each other. But if we want to develop a transparent and participatory process, it is important that all family members or partners understand the process from the start to the end and know their tasks and responsibilities. If we have decided to venture on a journey together, we need to define the goal and then agree on the route. This is most often the most difficult part of the planning, but it is obviously impossible without a consensus on the end of the journey. It goes without saying that the purpose of the whole process is not to have a plan; our intention is to hike together and to reach our destination. But careful planning helps a lot.

1. *Shall we venture on a hike together?* – Preparing the ground

Some important issues have to be clarified before starting the planning process: We need to delineate the geographic extent of the process, find partners, identify stakeholders, secure the support from the relevant authorities, agree on processes and procedures, and raise the funds needed.

1.1. Identification of the conservation unit: Taxonomic entity and geographic scale

For most cat species, their global area is too large for on-the-ground cooperation and implementation of conservation activities. On the other hand, focussing on one local population might neglect the long-term genetic viability or important influences from neighbouring areas (e.g. source-sink gradients). The scale of the adequate conservation unit is important from a biological perspective and has consequences for the subsequent process. The biological conservation unit can be a species, a subspecies, a metapopulation (consisting of several distinct subpopulations), or in rare cases a single population. In the three examples in Box 1, the species level represents a small, the metapopulation (geographic distinct part of the area of a subspecies) a medium, and the subspecies a very large conservation planning unit. A biological meaningful conservation unit at which strategic goals are should be at least large enough to host a genetically viable metapopulation (for an extended discussion see Breitenmoser, Breitenmoser-Würsten and Boitani 20XX). If the geographic extension is relatively small, within one country where all stakeholders share one common language, the strategic and action planning can be merged. There is no upper limit for a conservation unit; strategic goals might be defined at the level of the global distribution range of a species. However, it the scale is very large and stretches over several countries and cultural areas, the planning process may have to be split and organised in several stages in order to allow involving local people and stakeholders.

1.2. Building partnership

Creating ownership through a participatory process implies early involvement and consistent mutual information among the partners in the Triangle of Conservation (Fig. 1). At the beginning of the process, potential partners must be identified and invited, and an organisational group must be

established. For the development of any SCS, it is helpful to form an Organisation Committee consisting of international and local specialists, if possible a person or an institution from every country concerned. International active conservation organisations such as IUCN, WWF or WCS have regional representatives or national offices. For the organisation of the planning workshops for the African lion, SSC and the Cat SG cooperated with the Regional Offices of IUCN, with WCS, with the two regional lion working groups and the wildlife conservation authorities of the host countries. The development of the conservation strategy for the leopard in the Caucasus was facilitated by the Cat SG, but organised in Tbilisi (Georgia) by the WWF Caucasus Office with support from the Caucasus Biodiversity Council. To secure the proper logistical organisation, cooperation with a local NGO and the relevant governmental institution (e.g. the wildlife or conservation department of the national Ministry of Environment) is recommended. The OC selects the proper Facilitator(s). A Facilitator should be familiar with the topic and experienced in the process, but not personally involved, hence not belong to any of the stakeholder groups.

1.3. Identification of stakeholders

To ensure that a SCS has a good chance of being implemented, the process should be a multi-stakeholder participation. Stakeholders, as defined by IUCN/SSC (2008b) are those who are concerned, have expertise, and/or power in the process. All stakeholder groups who can support or who have a possible interest to oppose the conservation of the cat species of concern in the target area should be invited to participate. Interest groups may differ from region to region and need to be identified, but typical sectors concerned are state agencies (environment, agriculture and forestry, mining), scientists, conservation NGOs, hunters, livestock breeders, tourism organisations, and representatives of local communities. Even groups who are part of the problem should become part of the solution. Sometimes it is not possible to involve all important groups from the beginning, because their awareness of the conservation problem may not yet be high enough, but they must at least be informed about the development of a conservation plan. Generally, even opposing stakeholders prefer to be involved and have a voice in the process than to be left out and have to accept decisions made by others.

1.4. Securing political support and mandate

Governmental institutions play a special role in the national and cross-border implementation of any SCS, as they are responsible for international agreements, laws and regulation, and for law enforcement, and they have therefore a particular role in the planning process. No RCS or NAP will be effective without the respective political endorsement. NAPs are most often endorsed at ministerial level, but for endorsing RCSs, which may touch cross-border issues, several governmental institutions have to be consulted. RCSs might even be endorsed by international bodies. The African lion conservation strategies, for instance, were presented to the Southern African Development Community SADC. This needs to be clarified before starting the planning process. No governmental body will endorse a RCS or a NAP without being given the opportunity to review it, and most likely these institutions also want to be involved in the development of the plans. But the process and the agencies conceding the endorsement must be clarified in advance.

1.5. Agreement on process and procedures

The Organisation Committee OC has to decide on how to develop the SCS. We describe here the procedures according to IUCN standard (IUCN/SSC 2008a, b). A SCS is developed in two steps: A technical-scientific situation analysis (Status Assessment in Fig. 4; detailed description in Chapter 2) that provides input information to a participatory multi-stakeholder workshop (Logical Framework in Fig. 4; detail in Chapters 3 and 4) approach is used to develop a RCS or a NAP. The OC has to organise these two procedures raise the funds needed for the whole planning process.

Fig. 4. Process for developing a Species Conservation Strategy SCS. A Status assessment provides input information to develop a Regional Conservation Strategy RCS or a National Action Plan NAP. RCS or NAP are drafted in a participatory process using a facilitated Logical Framework approach.

The Status Assessment is, from an organisational point of view, a straightforward process, and its budget depends on (i) how much information is readily available, (ii) how detailed the preparatory analyses should be (e.g. whether a habitat modelling exercise is required), (iii) whether the experts available can provide their time for free or need to be paid, and (iv) in which form the Status Report is being distributed.

Organising a SCS workshop is more complicated (Box 2) and can be rather expensive, depending on the place, number and journey of participants. Participatory workshops using a LogFrame approach are most efficient with 20–40 participants. For range-wide RCS with many countries and interest groups involved, the number of group sometimes needs to be larger. The workshop for the development of the strategy for the conservation of the lion in southern and eastern Africa that took place in Johannesburg in 2006 had over 80 participants. Such a large group is difficult to facilitate and to integrate in a participatory process. In such cases, splitting the process needs to be considered. Continental workshops as needed for the development of the two RCSs for the African lion, with considerable international travelling are always big and expensive events, whereas a workshop for the development of a NAP can be organised as a modest meeting. NAP workshops are often organised and financially supported by national agencies, whereas international, range-wide workshops require considerable international fund raising efforts.

2. *Where do we start from?* – Status assessment

Although the development of a SCS is a participatory process where the opinions of all participants are of equal importance, the facts about the species' conservation status need to be summarised in advance and be available at the workshop. A well-prepared Status Report supports the planning process considerably and helps the workshop participants to be much more focussed on the specific situation, e.g. when working on the threats. A SR is time-bound and geographically scaled to the conservation unit defined for the SCS (IUCN/SSC 2008a, b). The SR can be an informal compilation of documents distributed as PDFs to the workshop participants, but sometimes, SRs are organised as stand-alone publications made available to a broader public (Box 3).

2.1. Identification of experts and contributors

The status assessment is a scientific-technical process. A group of experts compile the best available information. In certain situations, specific analyses need to precede the workshop. A map with the known present and the potential distribution as revealed by a habitat modelling exercise is a very helpful tool (Box 3). The Status Report presents not only biological information on the target species, but also background information important to understand threats, human dimension aspects and socio-economic conflicts, policy, constraints or enabling conditions. Accordingly, the list of authors should be wide. The status assessment provides the first opportunity for involving a wider group of contributors at the expert level and offers the chance to include contributions from experts that might not be able to participate in the planning workshop.

2.2. Preparing the Status Report

Depending on the conservation unit delineated and the quality and quantity of information available, status assessments can be organised by themes (e.g. biology/ecology, population status and trend, habitat conditions, prey situation, conflicts and threats) or by countries. For preparing the RCS for the Arabian leopard, experts from five countries (Arabian Emirates, Oman, Yemen, Saudi Arabia, and Jordan) compiled information based on a standardised template (see CCCC and www.catsg.org), because no published information was available and the remnant nuclei of the leopard were far and isolated from each other. In a similar situation for the leopard in the Caucasus, a group of 25 authors from 9 countries worked together to compile information on different topics, such as (i) biology and ecology of the leopard in the Caucasus, (ii) distribution, status and trend, (iii) status and trend of prey populations, (iv) habitat modelling and potential distribution of leopards in the ecoregion, and (v) political, legal, socio-economic and cultural aspects for leopard conservation.

2.3. Review and distribution of the Status Report

Ideally, the Status Report is circulated for review and distributed to the participant of a workshop in advance, so that they have the opportunity to prepare themselves. This however implies planning well ahead and is in reality not very realistic. Nevertheless, the SR is an integral part of the SCS, describing the situation at the beginning of the process. It should be completed and distributed along with the RCS or the NAP, so that it can be used as a reference point for the subsequent implementation and monitoring phases (Chapter 5 and 6).

3. *Where do we want to go?* – (Regional) conservation planning

After we have performed a status review to know where we start from, we can tackle the next two questions: "*Where do we want to go?*" and "*How do we get there?*" Although these topics are closely related and will be answered using the same procedure (LogFrame) and at least partly also at the same workshop, it is important to separate the two questions, both for conceptual and for practical reasons.

The first question is about the strategic goals and priorities. This is a socio-political question that needs a broad societal discussion and cannot be answered by experts alone. Our societies have, in a general way through several international treaties and through most national statute books, decided that (cat) conservation is important and that we should maintain viable populations, but scope and priorities need to be discussed with those directly concerned. Experts can define the biological requirements and, together with authorities and stakeholders, work out a plan how to secure viable populations. The strategic part of the LogFrame (Fig. 4) is to draw a Vision and to define the Goal and the Objectives. To decide how to realise these strategic instructions is then mainly a technical process and a matter of negotiations between different stakeholders and interest groups.

We need to distinguish between the strategic and "tactical" questions also for practical reasons. A participatory LogFrame workshop uniting people from various sectors and regions is limited to about 50 participants working for a maximum of 4–5 days. If the conservation unit is large and stretches over several countries, as is often the case in cat conservation, it is impossible involve all local stakeholders in one meeting. We need to split the process and define two geographic and conceptual levels, the "regional" and the "local". These two levels correspond also more or less the "strategic" and "tactical" differentiation. In practice, the separation is often done through developing an (international) Regional Conservation Strategy RCS, defining a general goal and superior, range-wide objectives, and then operationalises these general instructions in National Action Plans NAPs (Chapter 4).

Targets and Actions are also required at the regional or international level. As a matter of fact, a RCS and a NAP often look rather similar (see CCCC), but they clearly distinguish in the geographic scope and in the definition of Targets and Actions. In order to distinguish between the "strategic" and "tactical" level, the guidelines for Strategic Planning for Species Conservation (IUCN/SSC 2008 a, b) recommend defining "Goal Targets" as a medium-term subset of the Goal. The Cat SG is however using a simpler form of the LogFrame (Fig. 4) in order to make the whole process easier to understand. We rather recommend a geographic differentiation. In certain situations only one level is needed (e.g. in the case of the Iberian lynx), sometimes, even three levels would be adequate, as e.g. in the case of the African lion, where a range-wide (African), a regional (e.g. East Africa) and a national level is practical. It is the task of the organisers and the facilitators (hence the users of the CCC) to decide about structure of a strategic planning approach and to instruct and guide the workshop participants so that they distinguish between the strategic/regional and tactical/local levels without being too confused.

3.1. Participatory development of the Regional Conservation Strategy

A workshop for developing a Regional Conservation Strategy RCS with participants from several countries will typically take three days (Box 4). During the LogFrame process (Fig. 4), we work from general and long-term perspectives (Vision, Goal) to the specific and short-term assignments (Targets and Actions). After having defined a Vision and translated it into a more concrete Goal (definition in Box 5, examples in Fig. 5), we break the Goal up into several Objectives, who address directly threats or shortcomings as revealed in the problem analysis (Chapter 3.2.). The definition of Objectives is a crucial step, because here we confront our intention (expressed in the Vision and Goal) with the real situation, the threats, constraints, strengths, and opportunities.

A reasonable conservation plan has about 5–8 Objectives. Each Objective is then split into 1–3 Targets. The Target is the direct result or outcome of an activity, it should hence be realised through one (rarely more than one) Action. The Target is the most concrete of all outcomes, is must be formulated so that it is SMART: specific, measurable, attainable, relevant, and time-bound (Box 5). In the tabulated form of the LogFrame (Chapter 3.3. and CCCC), each Target gets an Indicator telling us when a Target is fulfilled. An Action should be defined as clear and concrete as possible (who does what, how, where and until when?). In the tabulated LogFrame, each Action is completed with the Method, Actor, and Timeline.

At some point, the implementation of the RCS needs to be budgeted and funds will need to be raised. This is of course an crucial and difficult task and can most likely not be done during the workshop. Furthermore, many of the Actions proposed – even if they are considered to be important for all or most of the Range Countries – will have to be implemented, and therefore budgeted, at the level of each Range Country. However, if possible, it is helpful to have at least a rough idea or a magnitude of the costs estimated to carry out a specific Action, especially for range-wide and cross-border activities. The working groups should be encouraged to add an estimated budget to each of these Actions proposed. It is then up to the Plenary and the Organisation Committee to decide whether and in what for form to include such figures into the drafts and final version of the RCS. But we strongly recommend that the Organisation Committee works out a budget for the implementation of the RCS (considering which Action are implemented range-wide or country-wise, respectively) towards the end of the process.

Fig. 6. Pin wall, writing cards, digital photography and computer projection as tools for workshops. The Problem Tree at the sticky wall (photo) is part of the problem analysis. Combined with the status review and considering the Goal, this is used to phrase 6 Objectives on the pin wall (photo), which are then typed into the computer.

The most important working tool for a workshop are pin walls (or sticky or magnet walls) and writing cards and for smaller working groups flip charts. Combined with digital photography and computer projection, pin wall and flip chart results are easily captured, presented to a large audience and transferred into presentations and text documents (Fig. 6). To be more efficient during a workshop, the plenary is repeatedly split up into 3–5 working groups. On the one hand, we advance faster when distributing assignments; on the other hand, in a small group each participant has a higher rate of interventions and more opinions are captured. Working groups are organised as outlined in Box 6. They present their results to the plenary, generally always at the beginning or end of a (half) working

day (Box 4). After the discussion in the plenary, the facilitation team integrates the results from the group works into the draft strategy. If within a reasonable time of plenary discussion, no consensus can be reached over a certain question, it is recommended to have a small group of participants – e.g. one member of each working group – preparing a compromise proposal for the next plenary session.

3.2. Problem analysis

Between the identification of the Vision and the Goal and the definition of Objectives, we undertake a problem analysis. Several ways of identifying threats to the survival of a species or population have been proposed. A set of threats is already available from the status review (Chapter 2), based e.g. on the IUCN Red List assessment procedures. During the workshop, this analysis is used as input information, but the negative and positive preconditions for the SCS are further explored in a brain storming with all workshop participants. To speed up the process, the brain storming can be done in working groups and then presented to and discussed in the plenary. A way to stratify the problem analysis is proposed in Box 7. Negative factors (threats, causes, constraints, and gaps) and enabling conditions (strengths and opportunities) are presented to the plenary and ranked at the pin wall into a Problem Tree (Fig. 7). Categorising and ranking threats and enabling conditions help phrasing the correct and achievable Objectives.

The ranked Problem Tree is then tabulated and used for a country-wise review towards the end of the workshop (Box 4), in order to prepare the development of National Action Plans. For instance, in the workshop for the RCS for the leopard in the Caucasus (see CCCC), country-working groups used a matrix listing all Threats, Gaps, and Enabling Conditions (as identified in the workshop) and decided whether for their respective country, a specific factor was "very important and urgent", "important", or "not important or not applicable".

3.3. Editing and review of the Regional Conservation Strategy

At the end of the workshop, an Editorial Team is elected that produces the first draft of the RCS. The Editorial Team sends the draft to all participants for review until a certain deadline. The Editorial Team then integrates the comments and produces the "final draft" RCS. It is still considered a draft until it is endorsed by the Range States' authorities in charge. A RCS contains the following elements:

1. Introduction: Reason for and scope of the RCS;
2. Background information: Short to detailed review of the situation, depending on whether the Status Report was published as a stand-alone document or not;
3. Procedures: Development of the RCS and information on the workshop process, list of participants;
4. Problem analysis (including ranked table with country-wise assessment of the individual threats, gaps, and enabling conditions);
5. Regional Conservation Strategy: Vision, Goal, Objectives, Targets, Actions in text form;
6. Tabulated RCS: Short version of the RCS in form of a table (or spreadsheet) with indicators for each target and actors, methods, timeline, and financial needs for each action (see CCCC for examples and published RCS in the Conservation Centre on www.catsg.org);

7. Conclusions: Transformation of the RCS into NAPs, implementation, supervision, and revision;
8. Additional information and extended lists as appendices as needed.

3.4. Endorsement of the Regional Conservation Strategy

The draft RCS as approved by the workshop participants must then be submitted to the Range States authorities and possibly international bodies identified for the endorsement process (Chapter 1). Most likely, these institutions will again review the RCS before endorsing it. If the changes proposed are significant, another consultation of the participants might be necessary. This is a rather complicated process, but it is important to create a co-ownership of the RCS between the workshop participants and the Range Countries. To prepare the agreement and the endorsement through the Range States, it is therefore important that senior staff of the respective authorities participate at the workshop. In addition, it is recommendable to submit a RCS to international organisation – e.g. specific political or environmental institutions active in the conservation unit concerned – if such exists and ask for their endorsement, too.

4. *How do we get there?* – (National) action planning

Strategic planning (long-term biological goals securing the demographic, genetic and ecological viability of the species, subspecies or "significant conservation unit") has to be done for the entire distribution area or at metapopulation level (conservation unit), hence range-wide or for a biological significant conservation unit. For most cats, a meaningful conservation unit will be transboundary, and the guiding plan is compiled in a Regional Conservation Strategy RCS (Chapter 3) synchronising the conservation of the species at the international level. Implementation of activities (with exception of cross-border or multi-national Actions) however is tied to a legally uniform management unit, hence a country. In countries with a federal structure, action plans may even have to be done for individual states or provinces. The instrument to control the implementation of conservation measures at this level is the National Action Plan NAP. If a species, a subspecies or an isolated meta-population is endemic to one country alone, RCS and NAP can be compiled in one document. In this chapter, however, we assume that the conservation unit is international and a RCS exists. The NAPs should therefore consider the range-wide goals and agreed conservation principles. The NAPs are hence much more than tools for the implementation of conservation actions; they are subsets of the RCS with which each country contributes in solidarity with its neighbours to the goals and objectives of the RCS. This is important especially for the conservation of large and conflict-ridden cats, which to conserve is often considered an unwelcome obligation.

The procedures used for developing an NAP are much the same as for a RCS. We hence refer mainly to Chapter 3, but point our important differences.

4.1. Organisation of the (national) action planning

The organisational preparation for a workshop for developing a NAP is not principally different from a RCS workshop (Box 2; Fig. 3, Checklist 1), just less complicated. Instead of inviting the international actors, the local stakeholder groups need to be identified and invited. All (local) people who are interested and concerned should be represented in the process. As most of the actions are implemented on national/local level, people living with and in the cat's range will more and directly be affected. If we want to gain their support for the implementation of actions, they must have a voice in the development process. The RCS may provide a frame for a NAP ("Where do we want to go?" in Fig. 2), but local people and stakeholders need to have the freedom to define Targets and Actions on national/local ("How do we get there?" in Fig. 2). Of course, all discussions need to be done in the national or local language(s), and it is important that all relevant parts of the RCS to be considered or respected at the NAP workshop are translated into the national language(s) and made available to the interest groups and participants.

If the Status Report prepared for the range-wide planning is not sufficiently or adequately capturing the national/local situation, an additional national Status Report (in the local language) should be compiled (Box 3) and distributed. If the regional Status Report – prepared by specialists – is also presenting the national situation, it should be presented and put to discussion.

4.2. Development of a National Action Plan

As for the RCS, we use the LogFrame approach (Boxes 5, 6 and 7) to develop a NAP, and the workshop programme is very similar (Box 8). The main difference will be that more time is needed to agree on Targets and Actions and to define Indicators, Actors, and timelines. On the one hand, actors at national level are often much easier to be defined because responsibilities are already attributed, on the other hand, Targets and Actions must be very concrete and hence need more discussion. It is also likely that local (economic) interests collide more directly with the conservation aims, and that differences or even conflicts between stakeholders are more prominent than on international level. To overcome such differences needs longer discussions, but for the sake of the implementation of actions, it is important to seek and find consensus. An agreement is easier achieved if the NAP is subject to regular revision. Supervision and monitoring of the implementation and revision of the NAP must be discussed and defined at the workshop. The lifespan of a NAP depends on the time needed to fulfil most of the actions proposed, but is typically 2–5 years.

4.3. Editing and review of the National Action Plan

Towards the end of the workshop, an editorial team is elected to write the draft NAP. The content of a NAP is similar to a RCS (see Chapter 3.3):

1. Introduction: Reason for and scope of the NAP, reference to the RCS;
2. Background information: Summary of the status and situation of the species on national level with reference to the regional situation and the importance of the national population for the entire species, subspecies, or meta-population;
3. Procedures: Development of the NAP and information on the workshop process, list of participants;
4. Problem analysis (with reference to the ranked table with country assessments in the RCS);

5. National Action Plan: Vision, Goal, Targets, Actions in text form;
6. Tabulated NAP: Short version of Objectives, Targets and Actions as a table or spreadsheet with detailed indicators for each target and clearly defined actors, methods, timeline, and financial needs for each action (see CCCC for examples and published RCS in the Conservation Centre on www.catsg.org);
7. Follow-up: Endorsement, implementation, supervision (monitoring) and revision of the NAP;
8. Additional information and extended lists as appendices as needed.

This draft is sent to the workshop participants for review. The review process is an important consultation of the stakeholders, but no participant or stakeholder group is allowed to change substantial aspects of the plan if at the workshop a consensus was reached over this point. It goes without saying that all elements of the NAP must be in accordance with the national legislation.

4.4. Endorsement of the National Action Plan

The NAP needs to be endorsed by all authorities in charge of its implementation. At a national level, this goes generally beyond the ministry of environment and may include other ministries and departments at national or provincial level. The endorsement protocol needs to be defined before developing the NAP (Fig. 3, Checklist 1), and all endorsing agencies need to be invited to participate in the workshop.

CCC Figures

Colour scheme: Larissa
Typeface: Comics Sans MS

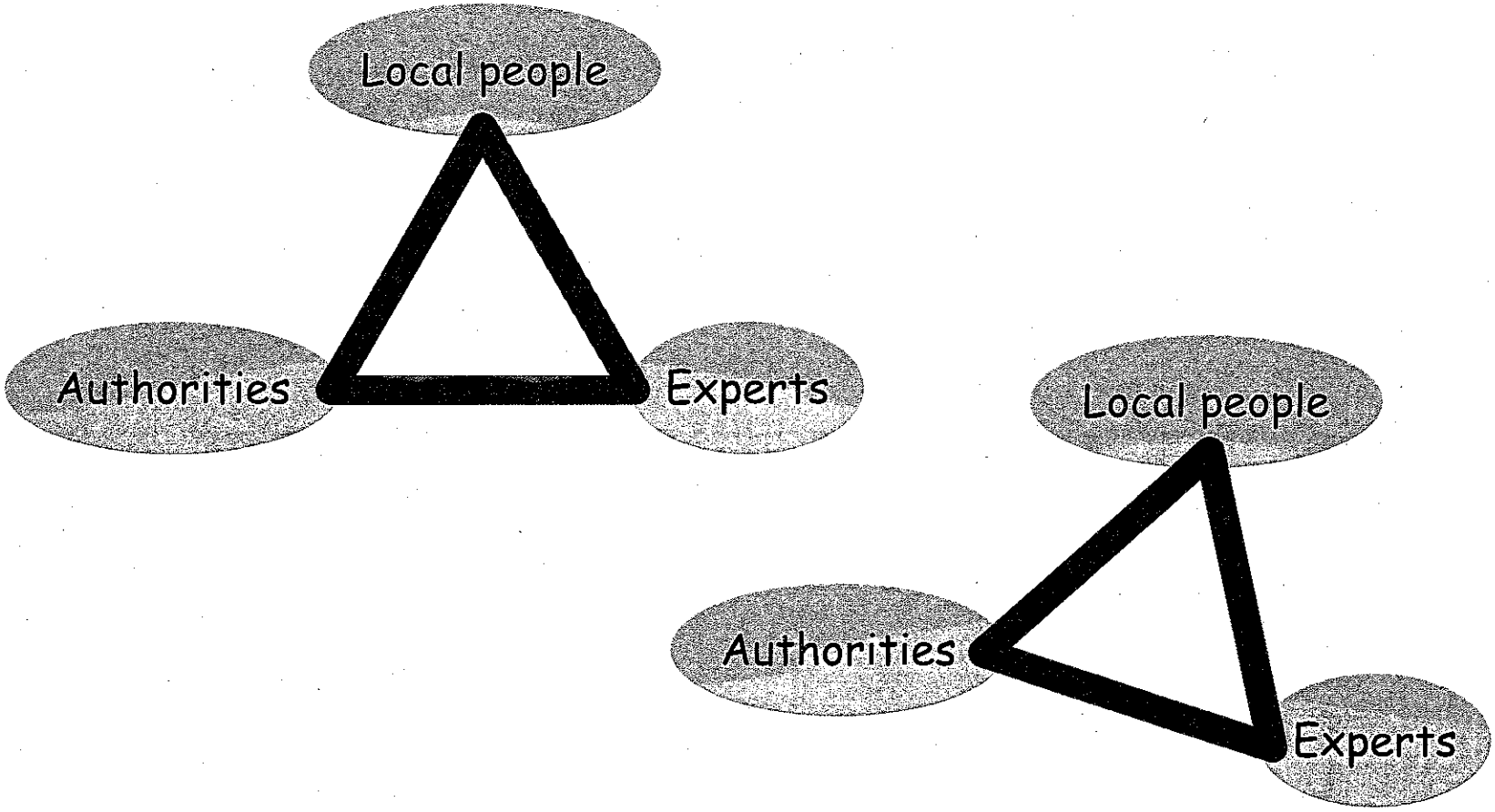


Fig. 1. Triangle of Conservation. Governmental institutions (authorities), experts and scientists, and local people have different responsibilities in conservation, but they need to work together for successful implementation of actions.

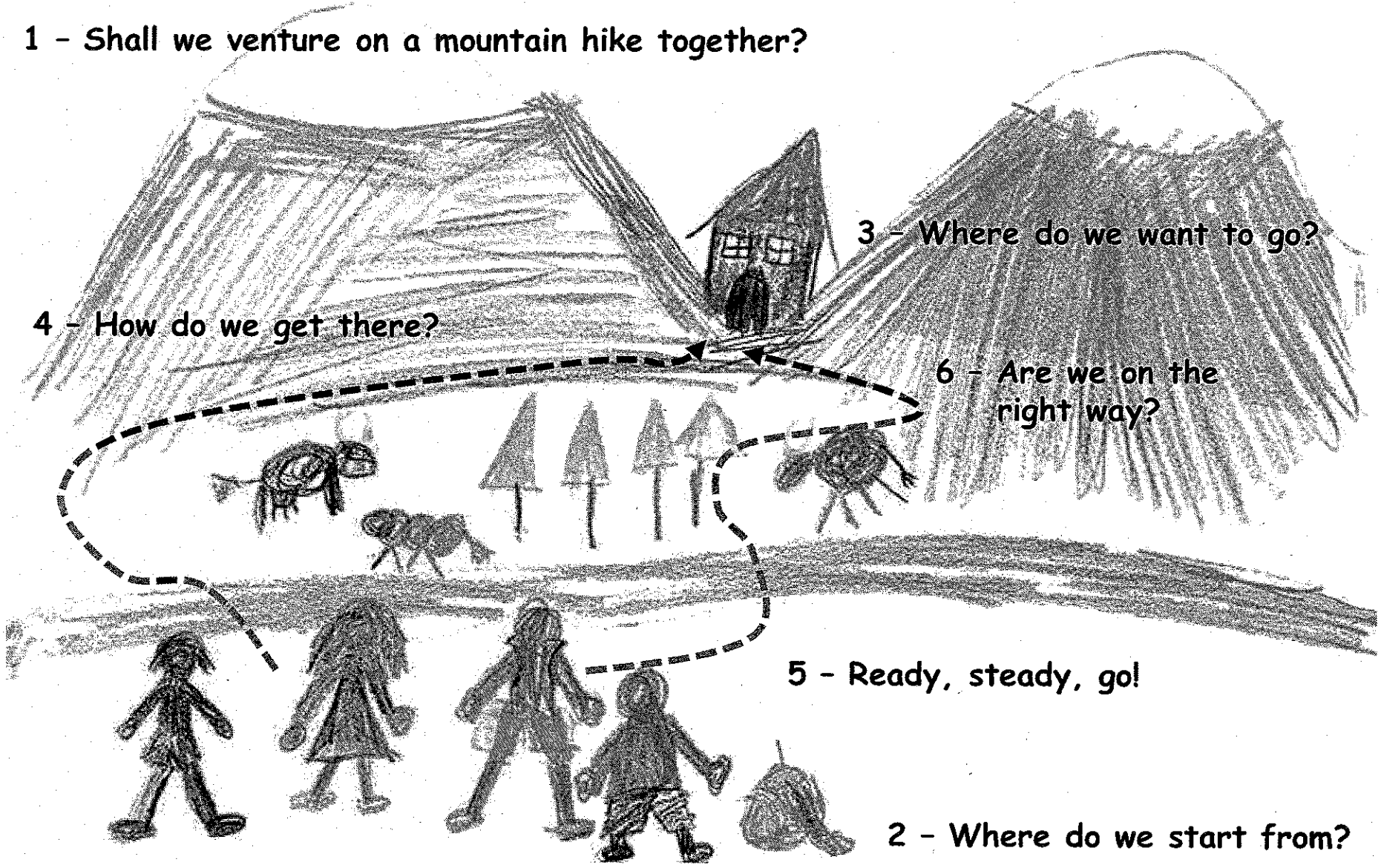


Fig. 2. Family preparing for a mountain hike. The questions stand for decisions made at important milestones of the journey. As in conservation planning, the careful preparation is crucial for the success.

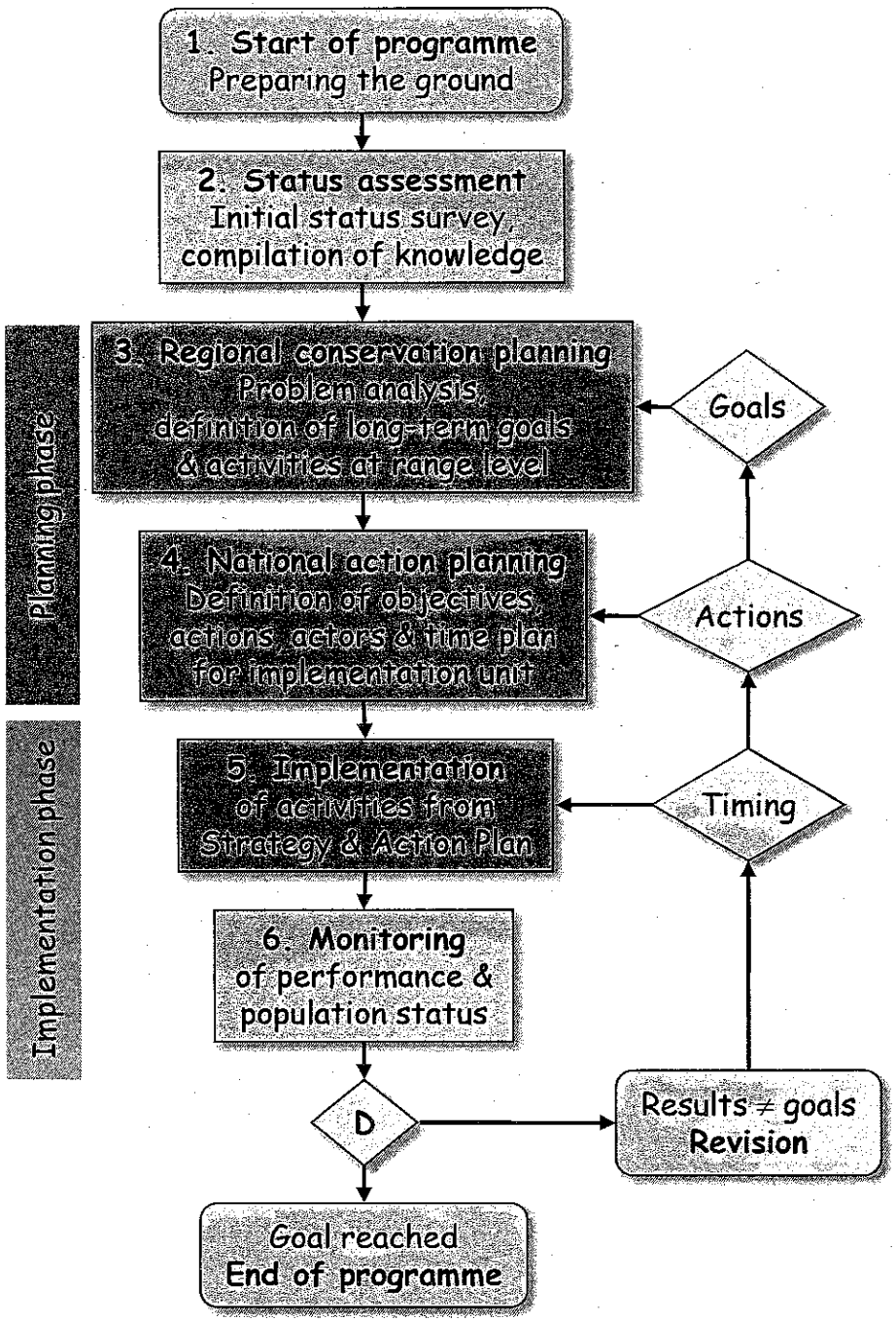


Fig. 3. Flowchart and checklist for the cat conservation programme. The six steps correspond to the programme points explained in chapter II. How to save the cat.

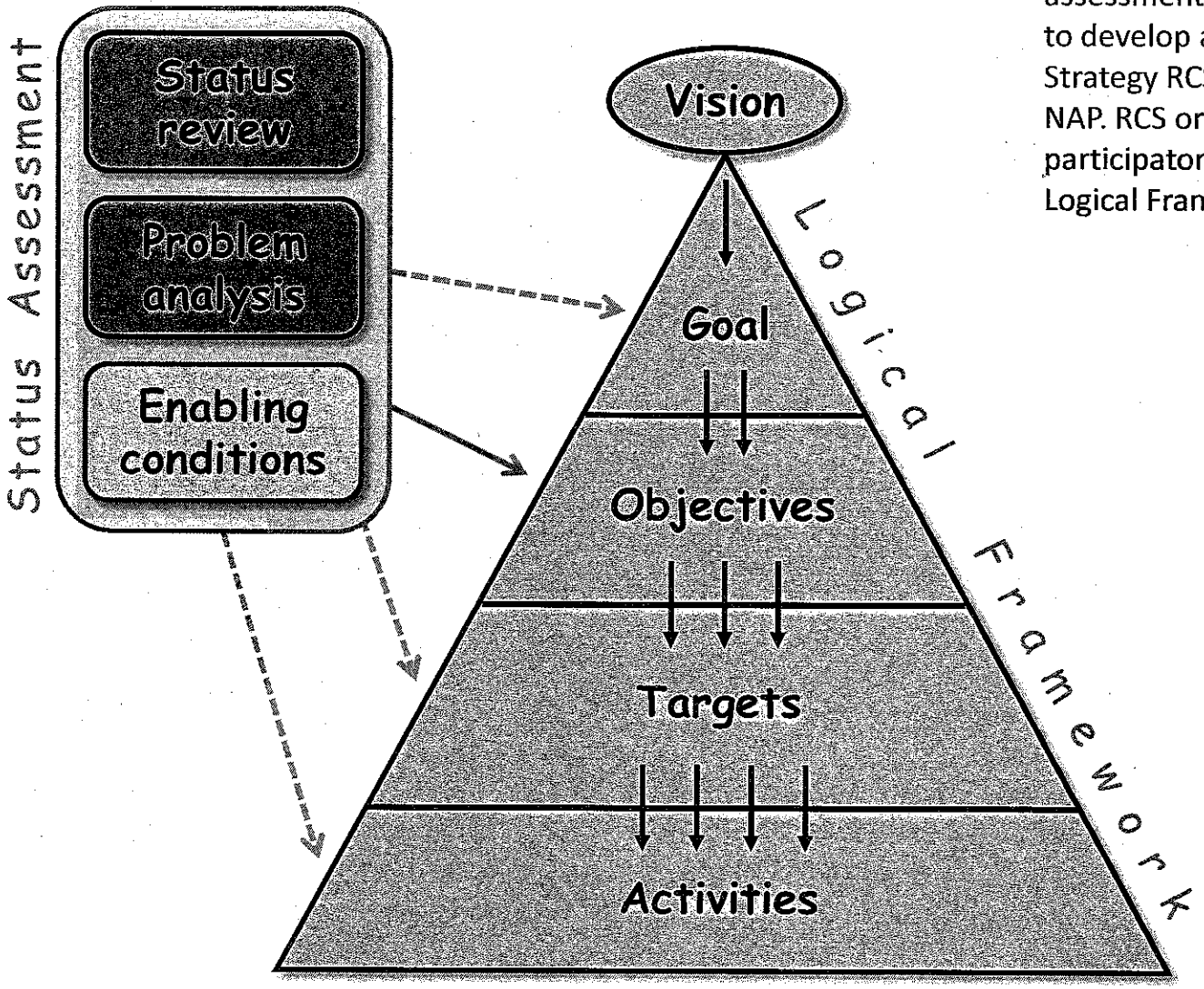
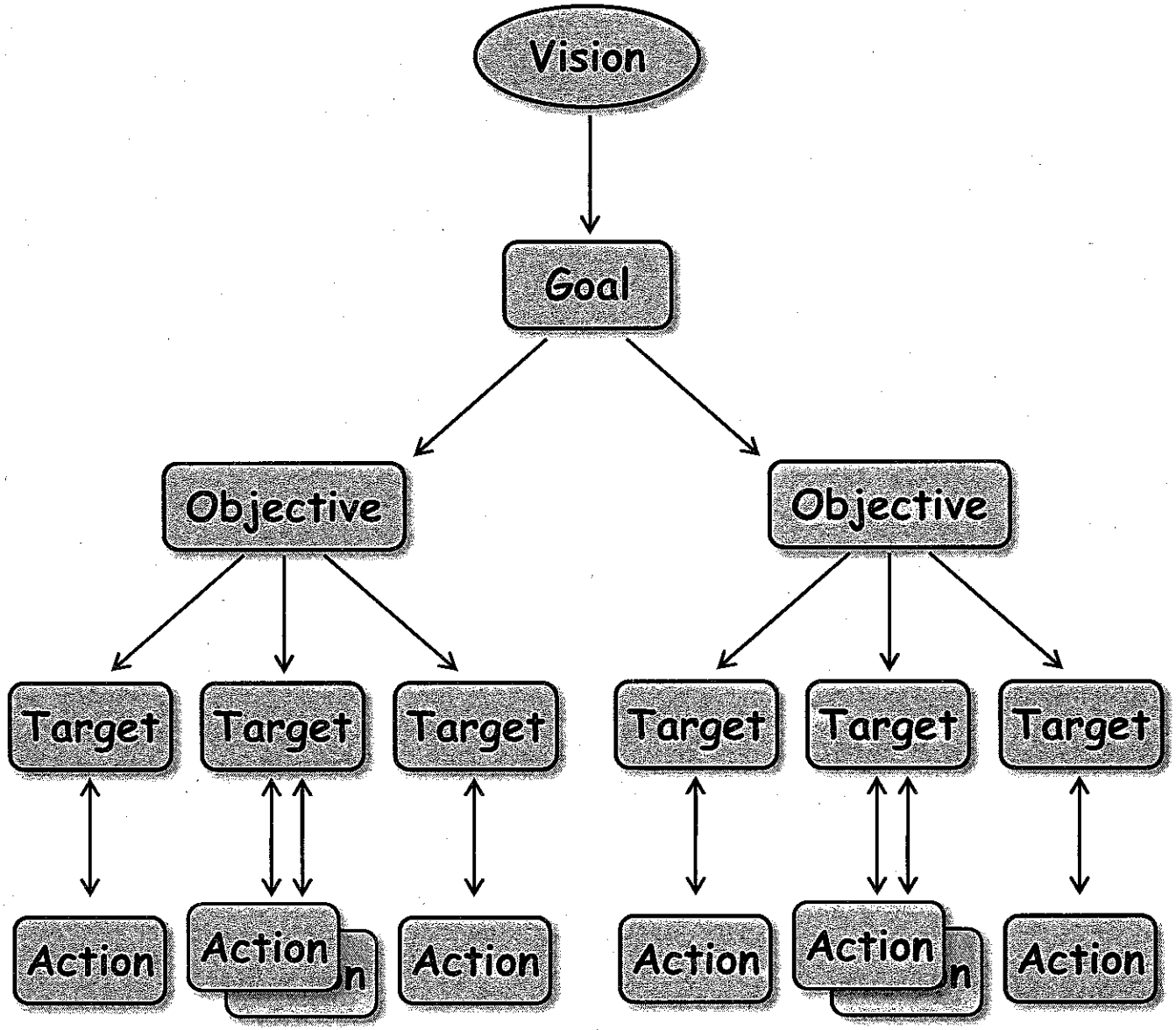


Fig. 4. Process for developing a Species Conservation Strategy SCS. A Status assessment provides input information to develop a Regional Conservation Strategy RCS or a National Action Plan NAP. RCS or NAP are drafted in a participatory process using a facilitated Logical Framework approach.


Vision
Goal
Objective
Objective
Target
Target
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Action
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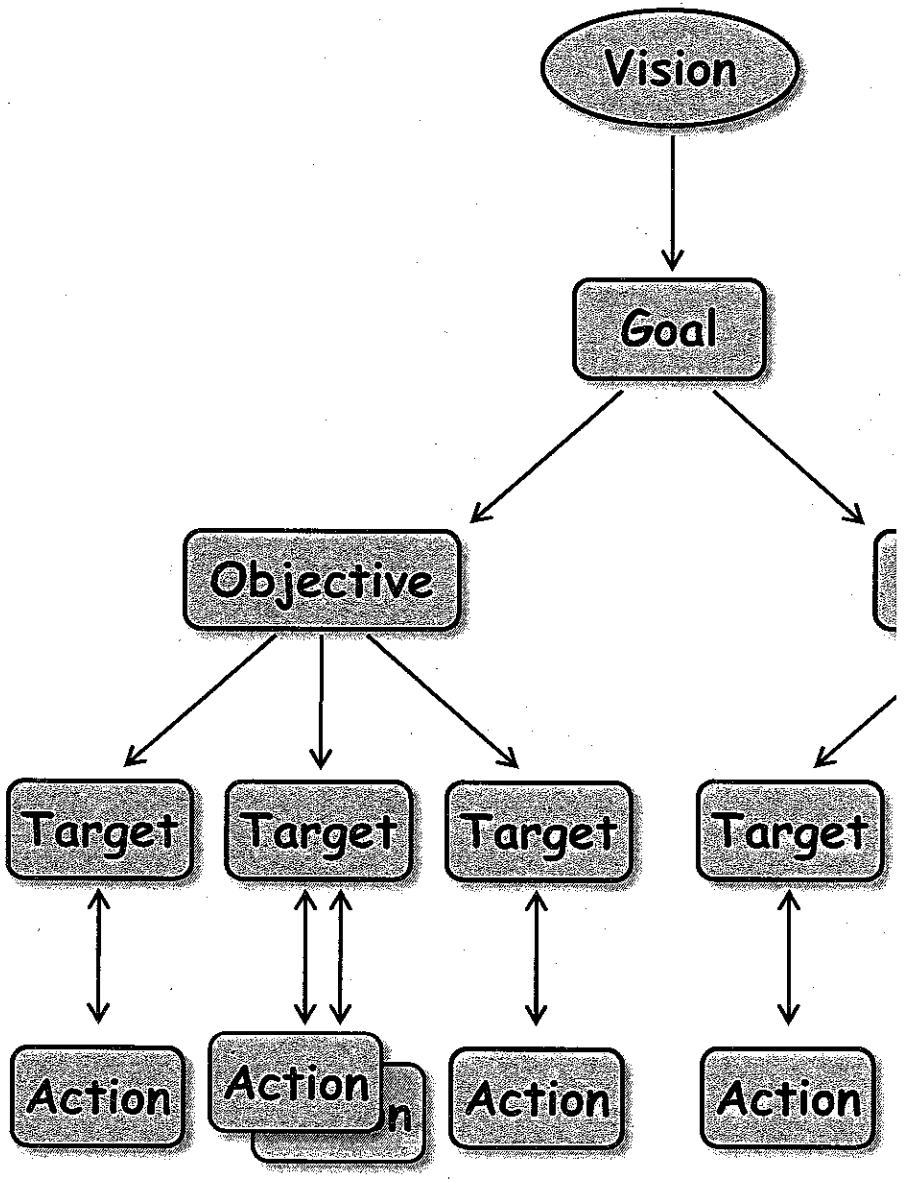


Vision: Leopards and all wildlife prosper in natural habitats across the Caucasus eco-region in harmony with people.

Goal: Ensure conservation and sustainable management of viable leopard and wild prey metapopulations and their habitats, and build coexistence mechanisms with local communities across the Caucasus ecoregion.

Objective 2. Complete survey for leopards and wild prey of the entire eco-region and establish a joint, standardized monitoring system and research programme.

Target 2.2. A joint, standardized monitoring system is completed and launched by 2010.

Activity 2.2.1. Develop standardized monitoring system for leopards and its wild prey.

Activity 2.2.2. Find and train experts in each range country for monitoring activities.

Fig. 5. Example of LogFrame phrasing from the Strategy for the Conservation of the Leopard in the Caucasus Ecoregion.

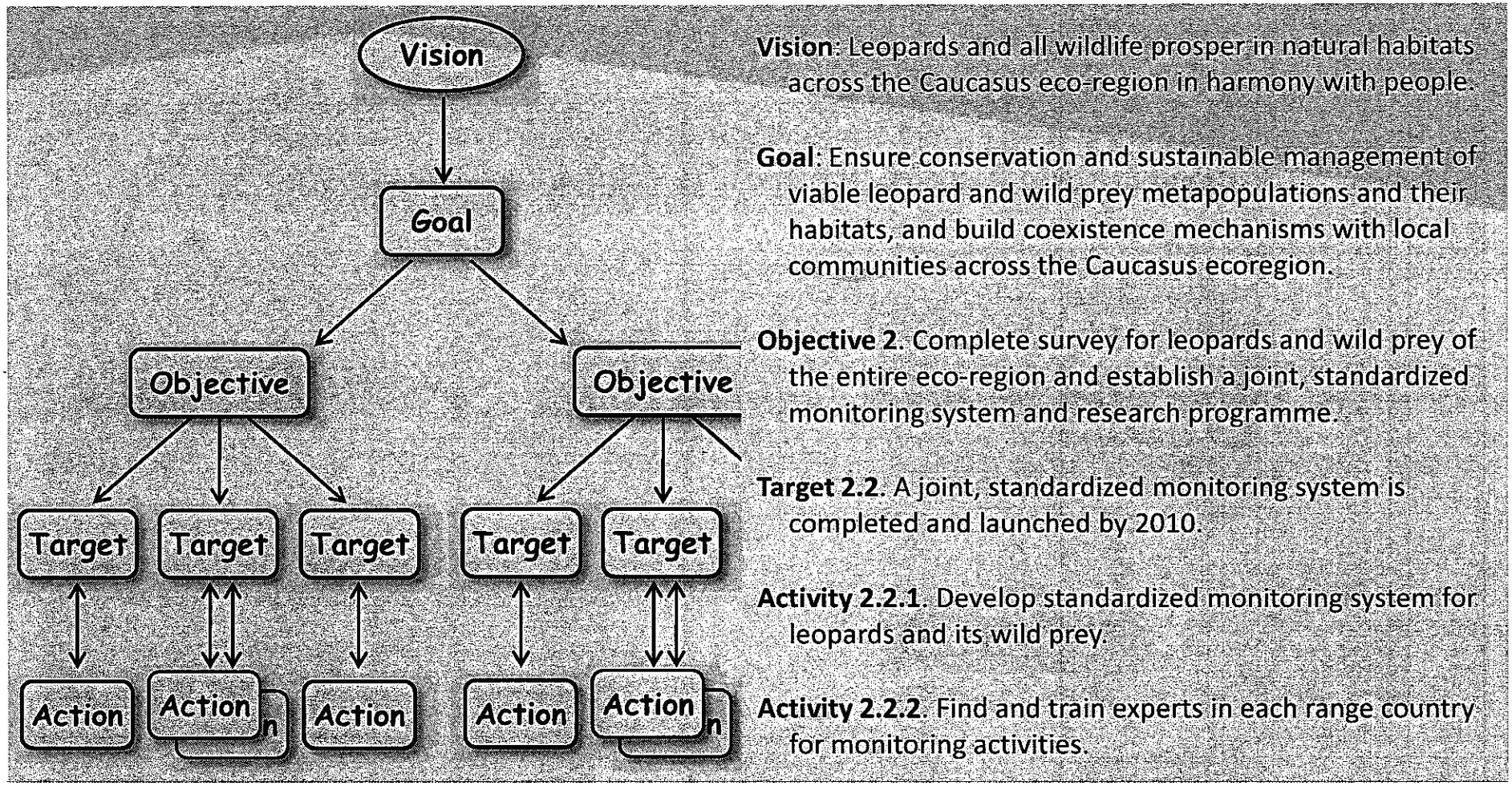


Fig. 5. Example of LogFrame phrasing from the Strategy for the Conservation of the Leopard in the Caucasus Ecoregion.

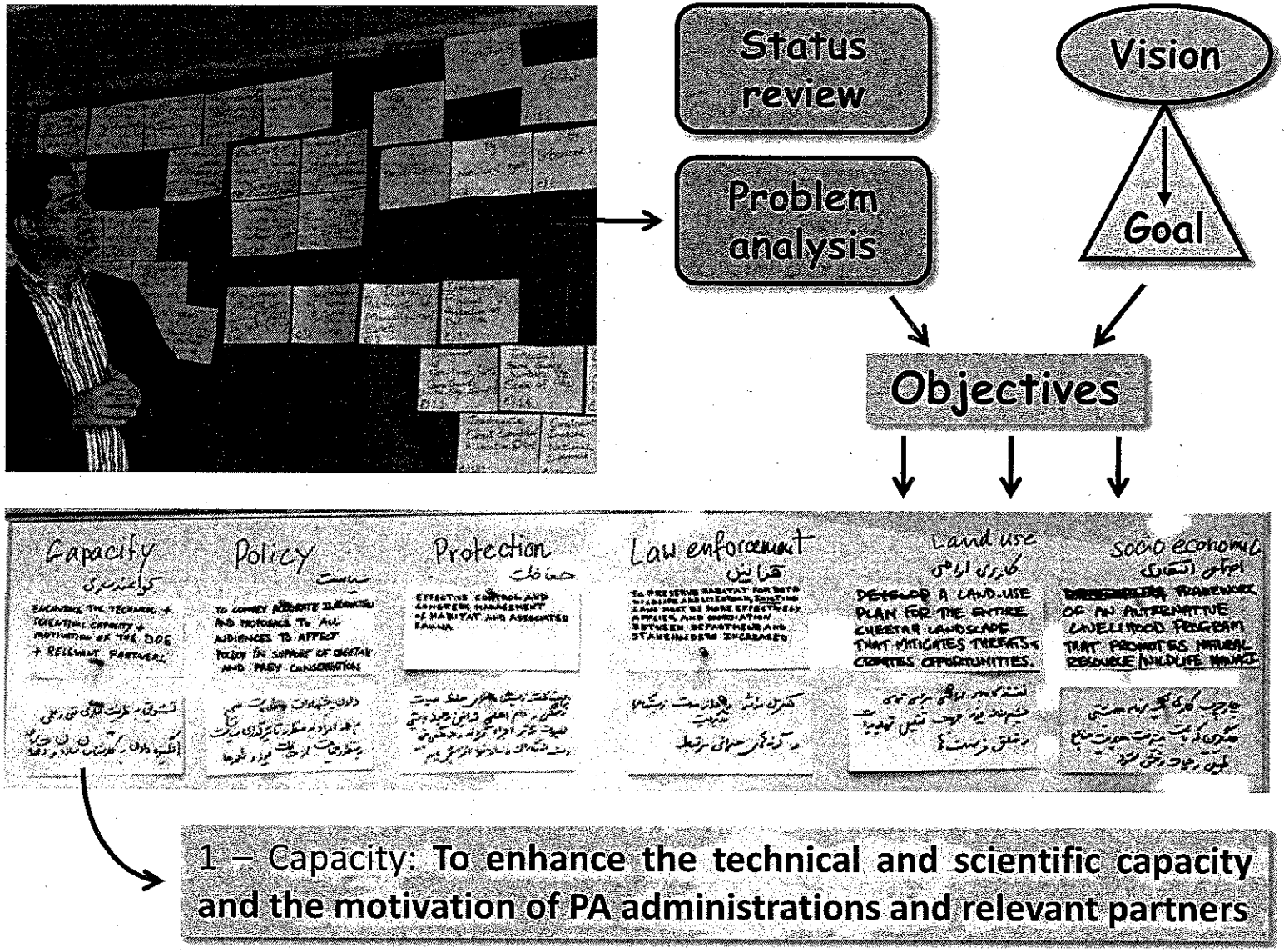


Fig. 6. Pin wall, writing cards, digital photography and computer projection as tools for workshops. The Problem Tree at the sticky wall (photo) is part of the problem analysis. Combined with the status review and considering the Goal, this is used to phrase 6 Objectives on the pin wall (photo), which are then typed into the computer.

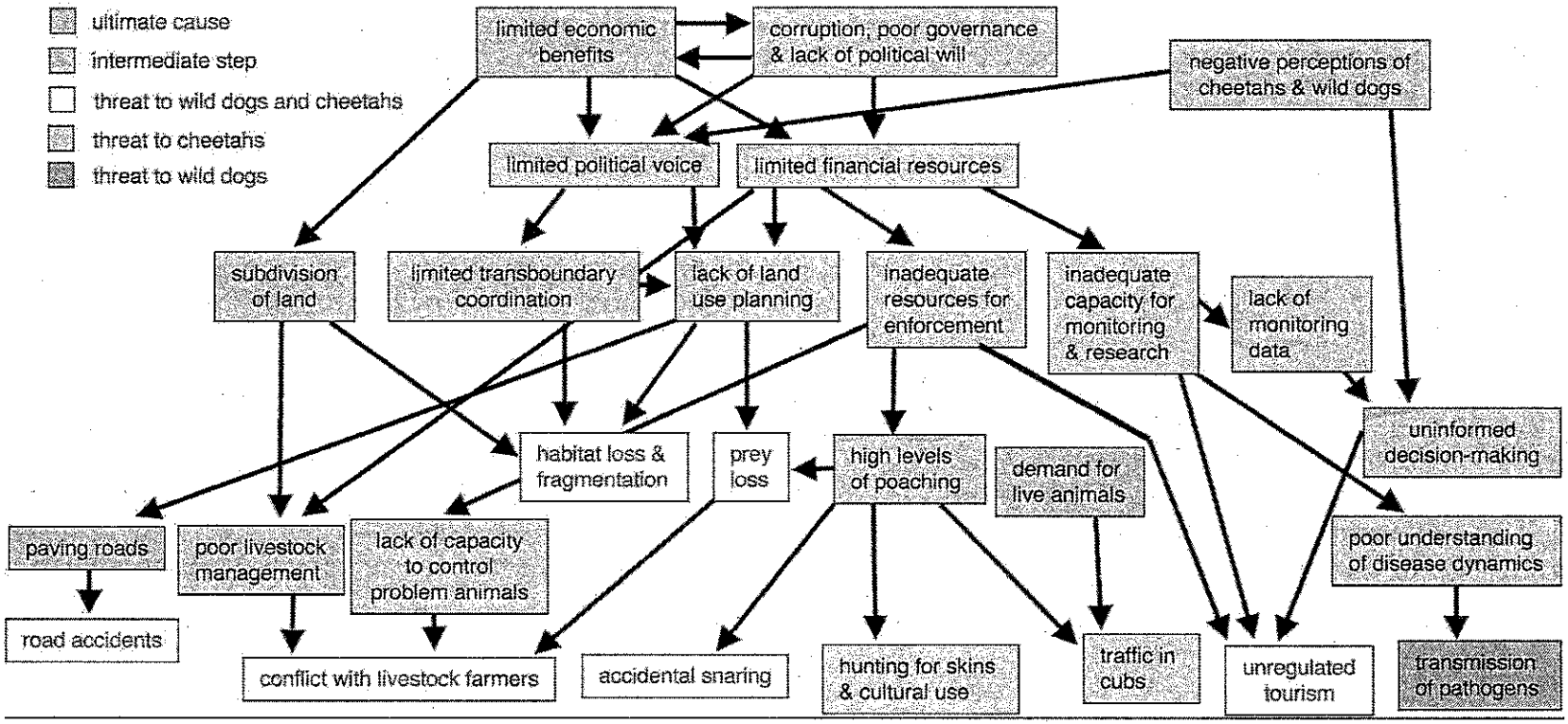
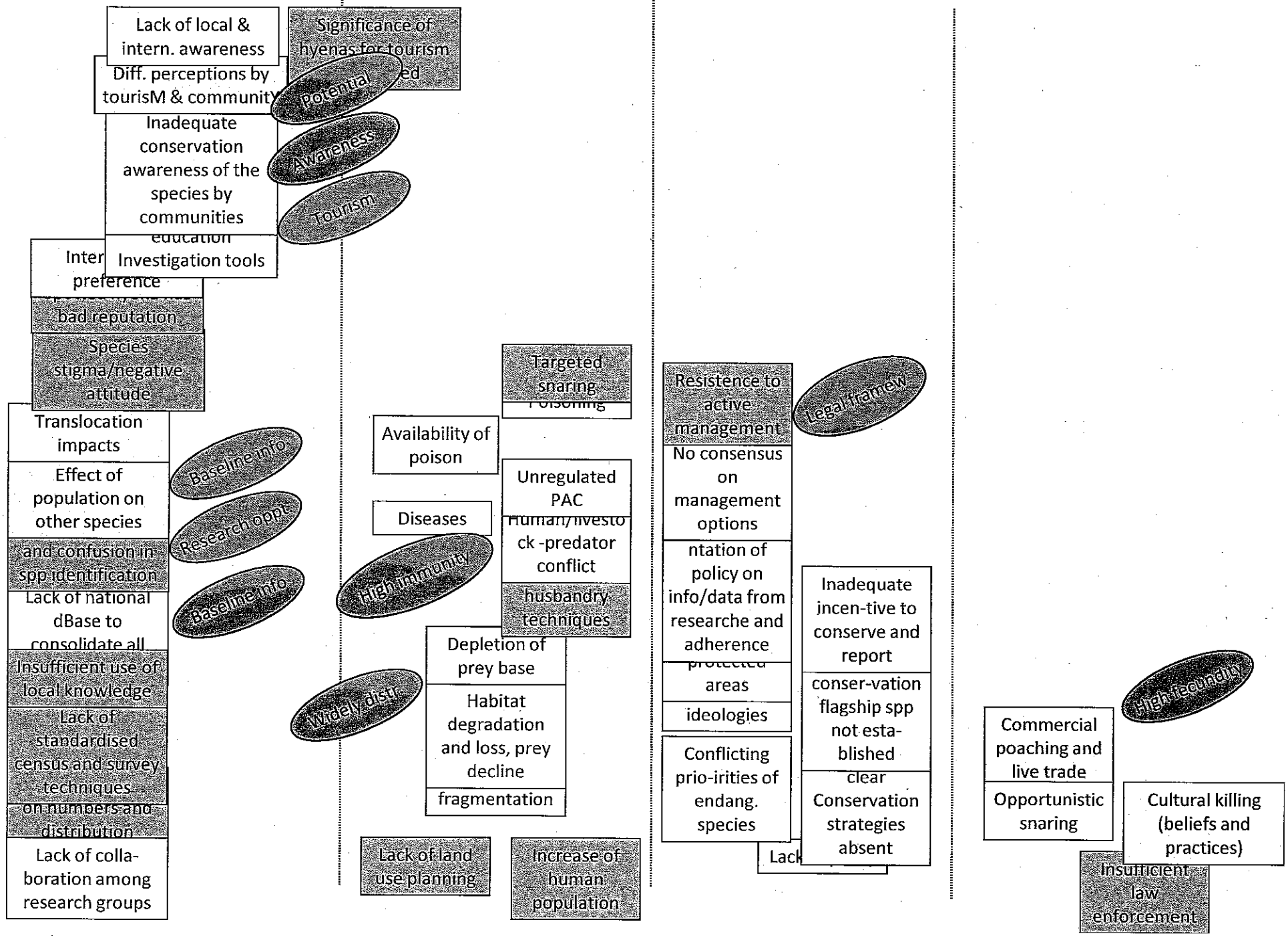


Fig. 7. Problem Tree. Example from a national workshop on lions and spotted hyaena in Kenya (KWS 2009).

Problem tree – Lion and spotted hyaena workshop, Nairobi, 18-20 February 2008



Box 1. Geographic scale of conservation planning units for cats

A cat conservation unit should embrace a significant biological unit, such as a species, a subspecies or a viable (meta-) population. For many cats, such a unit will have a geographic expansion including several countries.

1. Small – Iberian lynx *Lynx pardinus*: The only Critically Endangered felid species occurs in two distinct populations in the Spanish province of Andalucía. All stakeholders (with exception of some international experts) speak the same language and belong to the same administrative region. In this case, the entire distribution range of the species was the conservation unit both for strategic planning and the definition and implementation of concrete actions.

2. Medium – Persian leopard *Panthera pardus saxicolor* in the Caucasus: The highly endangered leopard is a flagship species for conservation in the Caucasian Ecoregion and needs to be considered as one metapopulation stretching over six countries and many cultures. As it was impossible to bring local stakeholders from all countries together, general conservation principles and cross-border cooperation were defined in a Caucasian conservation strategy, which was then translated into six National Action Plans for the implementation of conservation activities.

3. Large – African lion *Panthera leo leo*: The Vulnerable African subspecies of lion is distributed over 42 countries and numerous cultures, which do not even share a common administrative language. Nevertheless, based on a CITES resolution, a common conservation strategy was to be developed for the whole continent. In this case, two Regional Conservation Strategies were developed (for south and east Africa in English, for central and west Africa in French), which build the common ground for National Action Plans to be drafted by each county.

For more details and more examples see CCCC. All RCS and NAP for the examples mentioned above are available as PDFs in the Conservation Centre at the CatSG website www.catsg.org.

Box 2. Checklist for the organisation of a SCS workshop

1. Build an organisation team with local partners ☐
2. Identify the facilitation team of 3–5 people (not necessarily identical with organisers). Facilitators should be from a neutral organisation and not part of a stakeholder group ☐
3. Identify dates (3–5 days): consider local holidays, elections, climatic conditions, high prices season, etc. ☐
4. Identify participants: consider stakeholder representation ☐
5. Identify locality: accommodation for 50–60 people, big meeting room and possibilities for 3–5 working groups ☐
6. Write proposals, make budget, and submit to potential funders ☐
7. Send invitation letters in time to people in need of a visa ☐
8. Develop workshop agenda: 3–5 days depending if a mapping exercise and status review is included or not. The agenda needs to give the facilitation team enough time for preparing the next steps in the process ☐
9. Define introductory talks to the species and the process and the respective presenters based on the status report ☐
10. Develop facilitator's agenda including backstage work: who needs to do what and when? ☐
11. Prepare handouts for workshop participants explaining all steps in the process and the working group rules (Chapters 3 and 4) ☐
12. Assure the necessary infrastructure and material for the workshop: projector, screen, printer, pens, paper, writing cards, pin wall or sticky wall, tape, maps, etc. ☐

Box 3. Status assessment and Status Report

The Cat SG is recommending a template to produce Status Reports for cat species in a given area. The template contains the following main topics (see CCCC on www.catsg.org) that can either be presented by country or by topics for the whole region:

1. Stats distribution and development of the cat population
2. Habitat of the species
3. Prey species and prey population status
4. Domestic animals as prey
5. Legal status
6. Threats to the cat species, prey and habitats
7. Conflicts and public awareness
8. People and institutions important for the cat's conservation
9. Current research and conservation projects
10. Recommendations for the most urgent conservation actions
11. Inventory of captive animals or museum collections
12. References

Several tools have been used for a more rigorous assessment either ahead of a workshop or during a workshop:

- IUCN Red List Assessment process (e.g. for the Jaguar in Brazil, Cat News Special Issue 7);
- Population Viability Assessment (PVA; e.g. for the Jaguar in Brazil, Cat News Special Issue 7) or PHVA (IUCN/SSC 2008a, b);
- Habitat suitability model (e.g. for jaguar in Brazil, Cat News Special Issue 7; for leopard in the Caucasus, Zimmermann et al. 2007).

Status reports have been produced as input information for a RCS planning workshop for

- Leopard in the Caucasus Ecoregion (thematic, Cat News Special Issue 1);
- Arabian leopard (by countries, Cat News Special Issue 2);
- Cheetah in southern Africa (by countries, Cat News Special Issue 3);

Or as input information for a NAP planning workshop for

- Lion in Mozambique (Chardonnet et al. 2009)
- Lion in Ethiopia (Gebresenbet et al. 2010)

Box 4. Agenda for a workshop for the development of a Regional Conservation Strategy RCS

Day 1

Morning:

- Introduction, presentation of participants
- Range country statements
- Presentations of the Status Report (topical)

Afternoon:

- Plenary: Introduction into the LogFrame workshop process
- Group work: Definition of Vision and Goal
- Group work: Problem analysis: Identification of threats and enabling conditions
- Plenary: Presentation and discussion of Vision and Goals

Day 2

Morning:

- Plenary: Problem analysis: Ranking of threats and enabling conditions (Problem Tree)
- Group work: Definition of Objectives

Afternoon:

- Plenary: Presentation and discussion of Objectives
- Group work: Definition of Targets and Activities (per Objective)

Day 3

Morning:

- Plenary: Presentation and discussion of Targets and Activities
- Group work: Definition of Indicators (Targets) and Methods, Actors, Timeline (Actions)

Afternoon:

- Country working groups: Country-wise review of the problem analysis; recommendations for National Action Plans based on draft RCS
- Plenary: RCS drafting team, review and revision, post-workshop agenda (endorsement and implementation of the RCS, development of NAPs), final discussion.

Box 5. Logical Framework approach and definitions

A conservation strategy for any cat species in form of a RCS or a NAP is developed in a participatory workshop process using the so-called 'logical framework' (LogFrame) methodology. Logical frameworks are widely accepted management tools used for improving the performance of interventions. The LogFrame facilitates the coherent, logical and succinct presentation of the links between different parts of an intervention and identifies strategic elements (Vision, Goal, Objectives, Targets, and Actions) in a transparent cascade of analytic steps. This methodology enables participants with different backgrounds, value systems and priorities working together towards a general aim and translates a common dream – the Vision – into purposeful and specific Actions.

The long-term Vision is expressed as a more realistic Goal. The Goal is then put into concrete Objectives by considering the results of the Status Report and the Problem Analyses. For each Objective, a number of SMART Targets and for each Target one Actions to reach it are then defined. Finally, Indicators (for the Targets), actors, methods and timeframes (for the Actions) are identified.

Definition of terms used in the logical framework approach:

Vision	Has a wide scope *and* represents the ideal situation *on a very long term (e.g. 25 years). The Vision is really a "futuristic dream".*
Goal	Represents the ideal situation in the long term (here estimated at 10 years). The strategy (RCS or NAP) should contribute to the achievement of the goal, but does not assume full responsibility for it. However, the goal must be – different from the vision – realistic and measurable
Objectives	A series of specific outcomes to be achieved by implementing the strategy to address the problems (Status Assessment and Problem Analyses) and achieve the Goal. The timeline is approximately 5 years. Clear objectives aid the task of planning and implementation!
Target	Are the standards by which achievement of the goal and objectives are judged. Targets usually relate to changes in the scope, extent and magnitude of threats (reduction of pressures). A target should be formulated as a direct result or outcome of an Activity or Action. Targets must be S.M.A.R.T. (**S**pecific, **M**easurable, **A**ttainable, **R**elevant and Time-bound) and their achievement is controlled through Indicators. Timeline 1–5 years.
Action	Action or Activities are an operation with a defined actor (responsibilities), method and schedule to reach a Target.

Box 6. Working Groups

Working group organisation. Working groups are organised in a way that participants from different countries, different institutions and with different background are well mixed, so that a variety of experience and opinions are represented in the group. To work efficiently, working groups have to be convened and some special tasks need to be distributed:

- **Convener** guides the discussion. He/she assures that each group member can express his/her opinion and watches time. The convener's opinion is however not superior to other opinions!
- **Flip chart recorder**: Outlines the group's ideas on the flip chart (or alternatively on pin wall or by means of computer projection). Write clear and legible and use drawings, diagrams, pictures wherever possible!
- **Recorder**: Takes notes of discussion and flip chart records on notebook computer. Helps group to remember and revise earlier statements. Asks group to repeat statements whenever needed. Brings after each session group results on memory stick to the organisers/facilitators!
- **Reporter**: Presents group findings and conclusion of sessions to plenary. Prepares presentation with recorder, flip chart recorder and convener.

Working group rules. In order to capture all opinions and to avoid getting lost in discussions of details, each group member hast to consider the following rules:

- You are here to provide your experience and knowledge, not to defend your personal or institutional position!
- All ideas are valid – the only bad ideas are those not expressed!
- Everyone participates, no one dominates! Listen to each other and treat each other with respect.
- Seek common ground (where do we agree?) rather than insisting on differences.
- Observe time frame! All interventions and discussions should be concise and to the point!
- Make sure all ideas are recorded and hand in group reports every noon and evening.

Box 7. Structure of the problem analysis

To assign parts of the problem analysis to different working groups, we distinguish negative and positive factors and stratify them according to the following scheme:

Negative factors (obstacles to the survival or conservation of the cat species):

- **Causes**: Factors that lead to the decline of the species but no longer effective (e.g. bounties).
- **Threats**: Factors presently threatening the survival of the species with a direct impact on the population (e.g. poaching, fragmentation, inbreeding).
- **Constraints**: Factors without direct impact on the population, but limit indirectly the conservation of the cat (e.g. political priorities, insufficient legal protection).
- **Gaps**: Deficiencies in our capacity to conserve the cat, such as lack of knowledge and scientific understanding.

Positive factors (conditions enabling us to conserve the species in the present situation):

- **Opportunities**: Socio-political, economic or cultural chances in advantage of implementing a SCS for the cat at the time being.
- **Strengths**: The group's own capacities and strong points to achieve the Goal and Objectives.

Repetitions and overlaps between working groups are no problem. They can easily be sorted out when constructing the Problem Tree and ranking the threats.

Box 8. Agenda for a workshop for the development of a National Action Plan NAP

Day 1

Morning:

- Introduction, presentation of participants
- Presentations of the Regional Conservation Strategy
- Review of the range-wide and national status the species (national Status Report)
- Position statements of the national/local stakeholder groups

Afternoon:

- Plenary: Introduction into the LogFrame workshop process
- Group work: Definition of Vision and Goal
- Group work: Review of threats and opportunities at national level
- Plenary: Presentation and discussion of Vision and Goals

Day 2

Morning:

- Plenary: Problem analysis: Ranking of threats and enabling conditions (Problem Tree)
- Group work: Definition of Objectives

Afternoon:

- Plenary: Presentation and discussion of Objectives
- Group work: Definition of Targets and Activities (per Objective)

Day 3

Morning:

- Plenary: Presentation and discussion of Targets and Activities
- Group work: Definition of Indicators (Targets) and Methods, Actors, Timeline (Actions)

Afternoon:

- Group work (cont.): Indicators (Targets) and Methods, Actors, Timeline (Actions)
- Plenary: NAP drafting team, definition of review and revision process, post-workshop agenda (endorsement and implementation of the NAP), final discussion.

Structure IUCN/SSC Cat SG website 2011

1. Cat Specialist Group
    - 1.1. History
    - 1.2. Manifesto
    - 1.3. Structure
    - 1.4. Members
        - 1.4.1. Asia
        - 1.4.2. Africa
        - 1.4.3. Australensis
        - 1.4.4. Europe
        - 1.4.5. North America
        - 1.4.6. South America
        - 1.4.7. Southwest Asia
    - 1.5. Partners
    - 1.6. Activity Reports
2. Cats
    - 2.1. The Americas
        - 2.1.1. Andean cat
        - 2.1.2. Pampas cat
        - 2.1.3. Ocelot
        - 2.1.4. Margay
        - 2.1.5. Geoffroy's cat
        - 2.1.6. Oncilla
        - 2.1.7. Huigna
        - 2.1.8. Jaguarondi
        - 2.1.9. Puma
        - 2.1.10. Jaguar
        - 2.1.11. Bobcat
        - 2.1.12. Canada lynx
    - 2.2. Eurasia
        - 2.2.1. Iberian lynx
        - 2.2.2. Eurasian lynx
        - 2.2.3. Snow leopard
        - 2.2.4. European wildcat
        - 2.2.5. Asiatic wildcat
        - 2.2.6. Manul
        - 2.2.7. Chinese Mountain Cat
    - 2.3. Africa
        - 2.3.1. Black-footed cat
        - 2.3.2. African golden cat
        - 2.3.3. Cheetah
        - 2.3.4. African lion
        - 2.3.5. Serval
        - 2.3.6. Leopard
        - 2.3.7. Caracal
        - 2.3.8. African wildcat

For all species cover the following topics:

- Description
- Status and distribution
- Habitat
- Ecology and behaviour
- Prey
- Main threats
- Current conservation efforts

- 2.4. Asia
  - 2.4.1. Asiatic lion
  - 2.4.2. Jungle cat
  - 2.4.3. Sand cat
  - 2.4.4. Clouded leopard
  - 2.4.5. Asiatic golden cat
  - 2.4.6. Bornean bay cat
  - 2.4.7. Flat-headed cat
  - 2.4.8. Rusty-spotted cat
  - 2.4.9. Fishing cat
  - 2.4.10. Marbled cat
  - 2.4.11. Leopard cat
  - 2.4.12. Tiger
- 2.5. Map Center

3. Cat Conservation Centre
   - 3.1. Cat Conservation Compendium
   - 3.2. Strategies
   - 3.3. Action Plans
   - 3.4. Status Reports
   - 3.5. Red List
     - 3.5.1. Categories
     - 3.5.2. Documentation
     - 3.5.3. Cats and the Red List
     - 3.5.4. Cats in the Red List
   - 3.6. CITES
     - 3.6.1. How it works
     - 3.6.2. Cats in CITES
     - 3.6.3. Conference of the Parties
     - 3.6.4. Animal Committee
     - 3.6.5.Standing Committee
   - 3.7. Species Compendia
     - 3.7.1. Iberian lynx
     - 3.7.2. Balkan lynx
     - 3.7.3. Cheetah
4. Digital Cat Library
5. Support
6. Links

Buttons, from each page

1. Cat News
    1.1. Current Issue
    1.2. Archive
    1.3. Special Issues
    1.4. Archive CD
2. Project of the Month
    2.1. Current Project
    2.2. Archive

SPECIES SURVIVAL COMMISSION
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CAT news

Workshops in Mavrovo MK, 21-23 April & Tirana AL, 25-26 April 2005

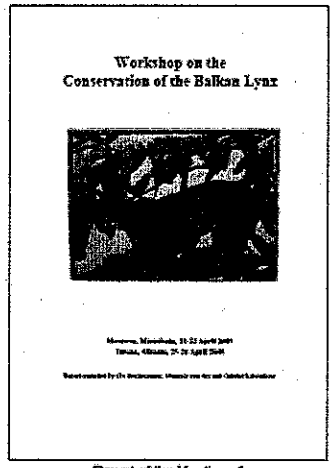
BREITENMOSER, U., VON ARX, M. & SCHWADERER, G. 2005.
WORKSHOPS ON THE CONSERVATION OF THE BALKAN LYNX.
Report of the Meetings and Excursions 21-26 April, Macedonia & Albania: 1-36.

Balkan_Lynx_workshop_report_April_2005.pdf (1'211k)

smaller files:
BL_workshop_report_April_2005_pages1-18.pdf (502k)
BL_workshop_report_April_2005_pages19-36.pdf (721k)

BREITENMOSER, U. 2005.
WORKSHOPS ON THE CONSERVATION OF THE BALKAN LYNX.
Cat News 42: 27.

Breitenmoser_2005_Workshops_on_the_Conservation_of_the_Balkan_Lynx_CatNews42.pdf (534k)



Report of the Meetings 1



Meeting report to the Standing Committee, Bern Convention:
Breitenmoser, U., Schwaderer, G., von Arx, M., Zimmermann, F., Spangenberg, A., Breitenmoser-Würsten, Ch. & Linnell, J. 2005: The Conservation of the Balkan Lynx - Seminar on Large Carnivores in the Balkans and Workshop on the monitoring of the Balkan Lynx.

(c) IUCN/SSC Cat Specialist Group (IUCN - The World Conservation Union)

IUCN SSC

SPECIES SURVIVAL COMMISSION
CAT SPECIALIST GROUP

Special Issue - Cat Portraits

Final Report February 2011

In September 2009, the Forestry Bureau, Council of Agriculture of Taiwan, has granted the IUCN/SSC Cat Specialist Group an amount of US$ 10,000 to produce "species portraits" for all cats and publish them as a Special Issue of Cat News, the journal of the Cat Specialist Group.

The review process took much longer than anticipated, but has now been finalised. All updated text has been included into the layout of the special issue. Many of the pictures have been exchanged with photos from the field of our members' work. The final version has been submitted to the publisher (see attachment). The Special Issue will be distributed together with Cat News 54.

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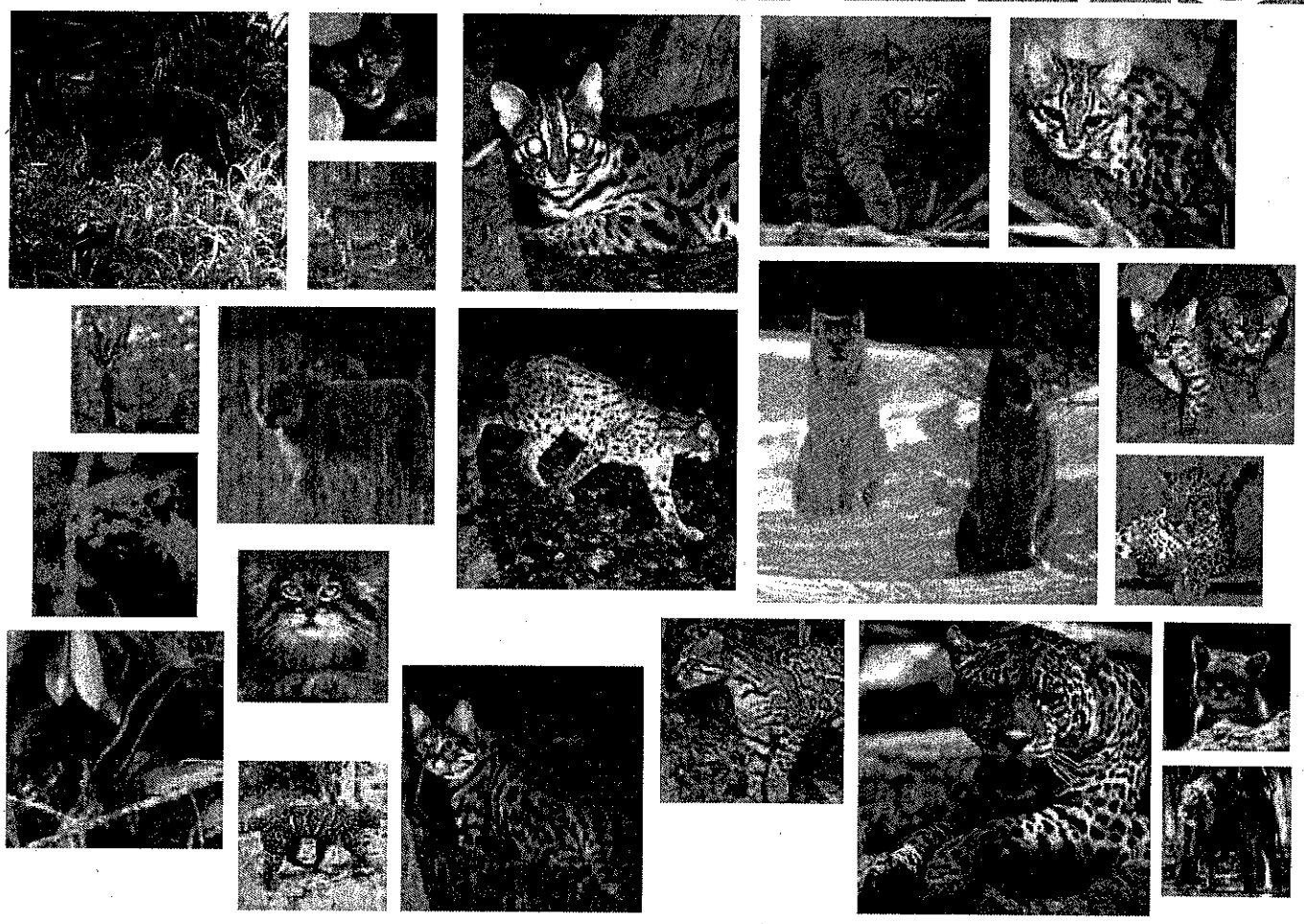
Special Issue

N° 6 | SPRING 2011

CAT NEWS

Cats of the world – snapshots



SPECIES SURVIVAL COMMISSION

CAT SPECIALIST GROUP

Cat News SI 5 Cats of the World_Final_2.indd 1 18.02.2011 15:07:41

CATnews is the newsletter of the Cat Specialist Group, a component of the Species Survival Commission of the International Union for Conservation of Nature (IUCN). It is published twice a year, and is available to members of the Cat SG and to the Friends of the Cat Group.

For information please contact Christine Breitenmoser at ch.breitenmoser@kora.ch

Original contributions and short notes about wild cats are welcome. **Send contributions and observations to ch.breitenmoser@kora.ch**

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URS BREITENMOSER

Cats of the World

Cats are – as every true cat supporter knows – the pinnacle of evolution. Admittedly, by rights this spot can be claimed by many other creatures, but at least among mammals, cats have, in their 10 million year long evolutionary history, become perfect and highly specialized predators that are second to none within the order of Carnivora. With their sharp gaze and good hearing, their sleek, muscular body, their sharp claws and the strong bite of their canines in their short jaws, they are plainly the perfect hunters. They are not only perfect, but also highly specialized carnivores. Of the species that are well studied, we know that they often depend on very few, sometimes even only one, prey species. In the following short portraits information on the "Feeding Ecology" section is often scant simply because we know precious little about many of the smaller cat species. We are neither familiar with their ecology nor with their behaviour and information about their distribution is often based on rough guesses which makes it difficult to asses their population status.

A high degree of specialisation takes its toll: it makes a species vulnerable to environmental changes. Cats are intelligent and adaptive animals, but they are sensitive to degradation of their habitat or decline of their prey species. Changes in their environment are often accompanied by increased persecution as humans penetrate the cat's realms and claim resources. Not only the lion seizing Massai cattle, the lynx taking the hunter's roe deer or the snow leopard which for want of ibex is forced to change to domestic goats incur the wrath of humans; also the small and inconspicuous guiña that snatches poultry is slain while in the chicken run.

Ultimately it is not decisive how many cats are killed, it is more important how many can survive. The tiger, the most powerful cat of our time, now only populates less than 10% of the range he roamed over a hundred years ago. Cheetahs and lions have been reduced to pitiful population sizes in Asia. Slash and burn agriculture and logging continually reduce the habitat of cat species from the oncilla to the jaguar in the Amazon basin and the forests of western Africa are almost stripped of their wildlife. Long have cats been able to resist the strain imposed upon them by humans. No cat species has disappeared since the massive alterations at the end of the last glacial period. But in the last 50 years the populations have diminished drastically. A few subspecies have already become extinct and many more are in an alarming state. On the other hand a more positive development can also be observed: the puma in North America and the lynx in Europe have experienced remarkable comebacks within the last few decades. These two examples both support the view that wild cats can also live and survive in areas strongly utilized by humans – if we protect their habitats, preserve prey populations and regard them with due respect. Why should this not be possible for other species in other regions of the earth?

It is, however, a requirement that we have to gather knowledge of what we want to preserve. These short portraits should make a contribution to this knowledge.



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Andean cat *Oreailurus jacobita* (Cornalia, 1865)



Andean cat
Andenkatze, chat des Andes

Weight	4–7 kg
Body length	57–65 cm
Tail length	41–48 cm
Longevity	unknown
Litter size	1 cub

IUCN Red List: Endangered

The Andean cat is about the size of a large domestic cat and resembles the Pampas cat but has a longer tail. The Andean cat has large ears and a black nose. The coat is very long and thick, about 40 mm on the back and 35 mm on the tail. Its coat is pale silvery grey, and marked with brown-yellowish to dark grey or black blotches. The underparts are white and marked with dark spots. The long and bushy tail measures 70 % of the cat's head and body length and is marked with 6-9 wide dark brown or black rings. The legs have narrower dark stripes or blotches.

Habitat and Distribution

The Andean cat occurs mainly in the high Andes of Peru and Bolivia, northeastern Chile and northern Argentina up to 5,000 m. Recently, the species was discovered also living at lower altitude in Patagonia down to 650 m. Its range thus covers four Andean ecoregions: the high Andes, the Puna region, the southern Andean steppe and the northern portion of the Patagonian steppe. It inhabits valleys with patchily distributed rocky walls. Because of its extreme habitats and the uneven distribution of its prey, the Andean cat has a patchy distribution.

Feeding Ecology

The Andean cat feeds on small mammals, birds or lizards. It mainly hunts mountain vizcachas which depend on vegetation along the sparsely covered and often dried up waterways.

Behaviour

Ecology and way of living of the Andean cat are hardly known. One cat was observed early in the morning shortly after sunrise on an elevation of 4,600 m. For about one hour it hunted under rocks. A radio-collared animal in Bolivia was mainly nocturnal and the activity pattern was similar to the mountain vizcachas.

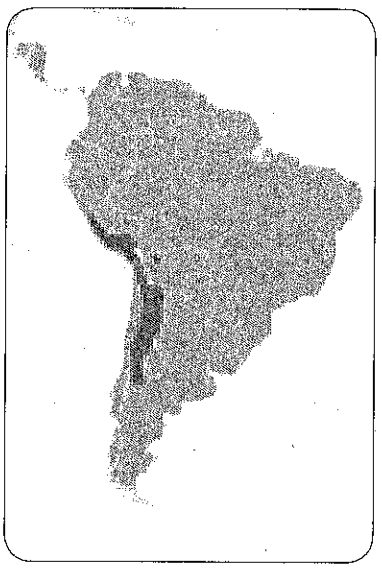
Threats and Conservation

Habitat loss and degradation through oil extraction an mining are the main threats to the Andean cat, followed by hunting. The Andean cat is hunted and used for ceremonies in many parts of its distribution range. It is considered sacred and is associated with rich harvests and the abundance and fertility of livestock. Its main prey species, the mountain vizcacha, is also hunted for meat and fur. The Andean cat has become very rare and most populations are probably isolated. In 1999, scientists founded the Alianza Gato Andino to advance research and conservation of the rare and unknown Andean cat across borders. More information on their work can be found at www.gatoandino.org.



Local person with stuffed cats used for ceremonies.





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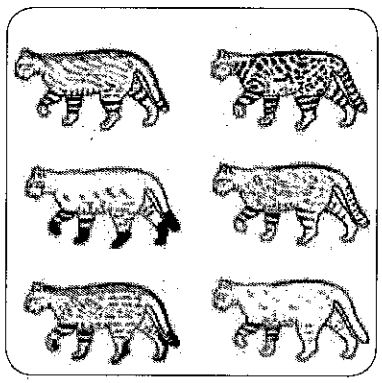
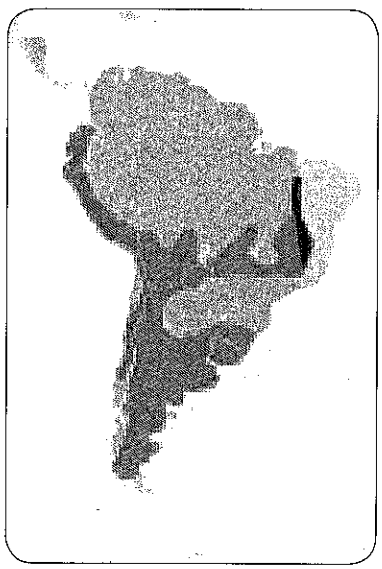
Pampas cat *Oncifelis colocolo* (Molina, 1782)

Pampas cats look like a house cats with long hair, a broad face and a pink nose, The back of the pointed ears are grey or black with a white spot. Two brown bars sometimes run from the eyes across the cheeks. The tail is only half of the head and body length and can be marked by dark rings. The coat colour and pattern show big variation across the cat's range. The colour is variable from yellowish white to greyish brown. Darker individuals with red areas or spots can occur, as well as almost unmarked forms with only a few stripes on the sides. On some animals the long hair (up to 7 cm) on the back forms a dorsal mane. On the basis of morphological variation in the skull and skeleton, it was suggested to divide the pampas cat into three species. But recent phylogenetic analysis confirms the unity of this species.



Different coat patterns of the pampas cat. Drawings from Garcia-Perea 1994 (American Museum Novitates 3096).



Habitat and Distribution

The Pampas cat lives in southern Colombia, Ecuador, Peru, Brazil, Bolivia, Chile, Paraguay, Uruguay and Argentina. It is associated with open habitat such as grasslands, but it also occurs in dry open woodland, swampy wetlands, scrubs of the chaco and xeric forests. In the Andes this cat is found at altitudes as high as 5000 m, but most records are from lower elevations.

Feeding Ecology

Pampas cats feed on a diversity of small mammals, especially small rodents, and ground-dwelling birds. They have been observed to raid penguin nest for eggs and chicks in Patagonia.

Behaviour

The Pampas cat is mainly nocturnal, but a recent study in Brazil has shown that cats are primarily diurnal with some crepuscular and occasionally nocturnal activity. A female in the high Andes of Bolivia did not show a clear activity pattern. The animal was active during all hours of the days. They mainly hunt on the ground, even though Pampas cat in captivity are quite adept at tree climbing and often rest on trees.

Threats and Conservation

There is very little information on the Pampas cat's status in the wild and on population estimates. Only recently field studies started with telemetry and camera trapping. It is believed that Pampas cats suffer from habitat loss and degradation, as well as retaliation killing for preying on poultry and hunting for cultural purposes in the high Andes. It used to be heavily hunted, especially in Argentina. Between 1976 and 1979, 78`000 specimens, with a value of US$ 1.8 million, were reported to have been in trade. The number of skins in trade decreased sharply in the 1980s, due to new conservation legislation prohibiting hunting, trade, and commercial export.



Pampas cat

Pampaskatze, chat des pampas

Weight	3–4 kg
Body length	42–79 cm
Tail length	22–33 cm
Longevity	9–18 years
Littersize	1–3 cubs

IUCN Red List: Near Threatened



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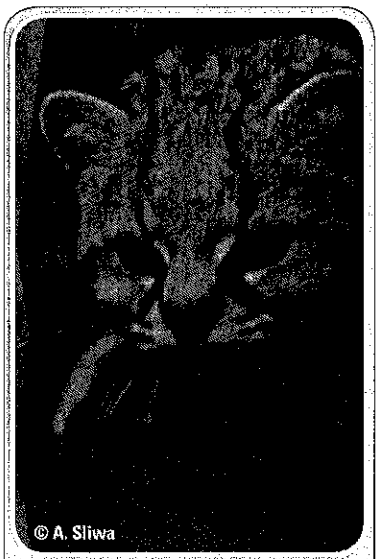
Guiña *Oncifelis guigna* (Molina, 1782)



Guiña
Kodkod, chat du Chili

Weight	1.5–3 kg
Body length	37–51 cm
Tail length	20–25 cm
Longevity	to 11 years
Litter size	1–4 cubs

IUCN Red List: Vulnerable

The guiña is the smallest cat in the Western Hemisphere. Males are larger than females, and there is a latitudinal gradient in body size: Individuals from lower latitudes are larger than individuals from higher latitudes. The guiña is quite similar in appearance to the closely related Geoffroy's cat but has a thicker tail and distinctive facial marking: from the inside corner of each eye a solid line of black crosses the cheek under the eye and another solid black stripe rises vertically on either side of the nose to the crown. The coat is buff or grey-brown, marked with small black spots. The belly is marked with black dots. The bushy, black ringed tail measures about half its head and body length. The backs of the low-set, rounded and small ears are black with a white central spot. Melanistic individuals are quite common in higher latitudes. The proportion varies from one region to another, e.g. 29% and 66% in two sites in southern Chile, respectively. In the northern part of their distribution range (30-38°S), there are no known melanistic individuals (n = 39).

Habitat and Distribution

The distribution of the guiña is limited to central and southern Chile, and a narrow strip of southwestern Argentina, including some offshore islands such as Isla Grande de Chiloé. It is the only endemic carnivore in the southern Andean forests. This small cat is considered to be associated mainly with *Nothofagus* dominated temperate forests in the southern part of its distribution range, and with sclerophic forest and thicket in the northern part. It is also known to utilise certain modified habitat that has replaced native forests, such as eucalyptus plantations, secondary forests and habitat bordering agricultural areas. It typically uses forest types with heavy understory, often with bamboo in the temperate forests, up to an elevation of 2500 m as well as deep ravines often along watercourses.

Feeding Ecology

Scat analysis from southern Chile revealed that rodents and the marsupial Monito del Monte dominated the diet. Opportunistically, they feed on carrion. They also take frequently birds, lizards, and occasionally domestic chickens and geese. Prey remains on Chiloé island included besides small rodents and a lizard, an austral thrush, two lapwings, a chucao tapaculo, a huet-huet, 16 chickens and one goose.

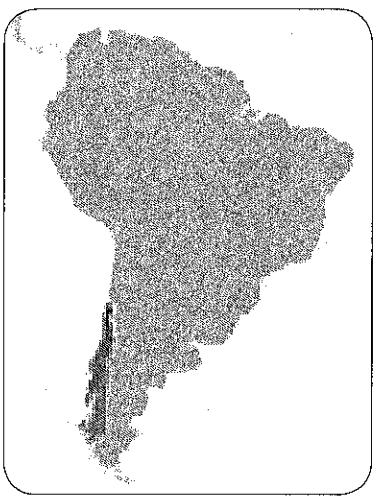
Behaviour

Guiñas are active day and night. This might vary between different regions in their range, as three quarter of camera trap pictures in southern Chile were made during the night and crepuscular hours. Some long-distance movements through their territories are made shortly before dawn or just after sunset with rest sites usually in dense cover near a waterway. Radiotracked guiña were relatively mobile and changed their spots from day to day. Daily distances were up to 1.80 km. But half of the dislocations were less than half a kilometer. Even though it is a good climber, the guiña usually hunts on the ground. Detailed studies of its ecology have been conducted on the island of Chiloé, in southern Chile and the Lanin National Park in Argentina.

Threats and Conservation

Population decline is caused by loss of prime habitat and reduction in prey base due to clearing forests for agriculture, leading to sever fragmentation of the population. The human pressure on the remnant temperate Valdivian rainforest in south-central Chile is particularly high, and some of the fragments in central Chile do hold very low numbers of animals. The status in southern Chile seems to be more stabel as lower human density and larger protected areas contribute to more favourable conditions for the guiña. The population in Argentina seems to be small. Unknown numbers of this cat are shot annually when they kill poultry. These illegal killings are quite frequent throughout the species range, supposing an additional threat for its populations. Though heavily overhunted in the past, the guiña is now fully protected in Argentina and Chile.





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Geoffroy's cat *Oncifelis geoffroyi* (d'Orbigny & Gervais, 1844)

About the size of a large housecat, Geoffroy's cat has a shorter tail and a somewhat flattened head. Four subspecies vary considerably in coat colour and in size, southern larger than northern animals. The coat is generally grey to tawny with a white belly and small regular black spots. On the limbs and the tail these spots tend to form bands. The cheeks are marked with two dark teardrop streaks with a small triangular dark undereye patch, and several dark longitudinal lines occur on the crown and neck. The backs of the ears are black with a central white spot. There is also a melanistic form found more often in the forested or wetland areas.

Habitat and Distribution

Geoffroy's cats are found in the Andes of southern Bolivia, southern Brazil, Paraguay, Argentina, Uruguay and southern Chile, from sea level up to an elevation of 3,300 m. They inhabit the pampas grasslands, marsh-grasslands, dry shrublands, arid woodlands and arid steppe uplands but prefer areas with dense vegetation.

Feeding Ecology

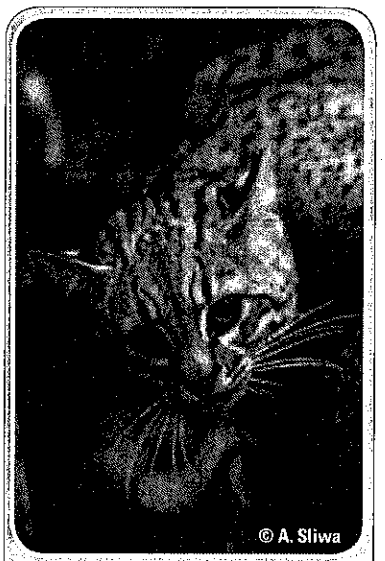
The Geoffroy's cat has been described as an opportunistic predator feeding mainly upon introduced brown hares and small rodents. In a study in central Argentina Geoffroy's cat diet was dominated by mammals throughout the year, with rodents as the most common prey group. Birds were well represented in the diet during spring and summer, whereas European hares made lesser contributions in all seasons. In southern Chile, however, hares composed the bulk of its diet. They are known to also occasionally take fogs and fish. They are more generalist predators when compared to the sympatric pampas cat. Geoffroy's cats tend to use habitats with dense vegetation and probably high prey density.

Behaviour

Geoffroy's cats spend most of their time on the ground, though they can climb well and spend some time in trees. They are predominantly nocturnal, resting during the daytime in thickets or in hollow trees. They are solitary and can disperse over long distances (>100 km).

Threats and Conservation

The fur trade has taken a heavy toll of Geoffroy's cat: theirs is the second most commonly sold cat pelt in the international market; only bobcat sells more. EU restrictions and some protective measures may have limited recent trade but lack of standardization in managing and reporting harvest activity throughout the various countries with Geoffroy's cat population makes it difficult to assess the current effect of ongoing hunting. In central Argentina human-related mortality made up 62% of the known cases, including poaching, killing by domestic dogs, and vehicle collisions. A recent threat comes from the exotic pet market: it is captured illegally and hybridised with the domestic cat to supply the pet market with a new "safari cat". Some animals are also shot for meat and when they kill domestic poultry.

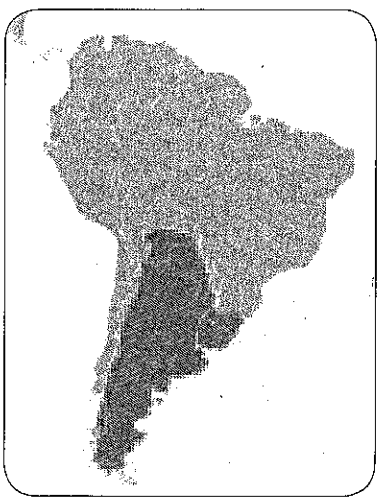


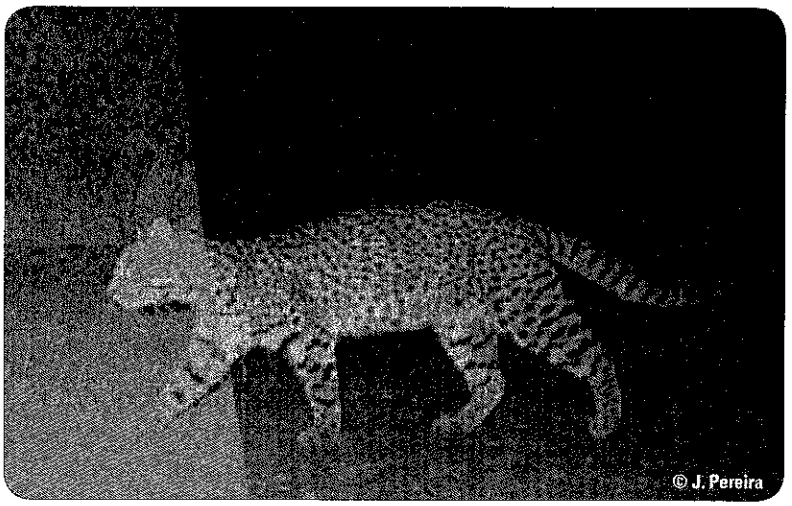
Geoffroy's cat
Salzkatze, chat de Geoffroy

Weight	3–6 kg
Body length	43–88 cm
Tail length	23–40 cm
Longevity	to 14 years
Littersize	1–3 cubs

IUCN Red List: Near Threatened

Crucial habitat is being lost over the range of this cat due to deforestation. However recent studies in Argentina indicate that this species may utilize the resulting open areas when plantations are created.





Oncilla (*Leopardus tigrinus*) Schreber, 1775



Oncilla
Onzilla, oncille

Weight	2–3 kg
Body length	38–59 cm
Tail length	20–42 cm
Longevity	15–21 years
Litter size	1–2 cubs

IUCN Red List: Vulnerable

The oncilla, also called little tiger cat or little spotted cat is with an average weight of 2.4 kg one of the smallest of the American cats and has a slender body. The ears are large and have black backsides with a central white spot. The fur colour is light to dark ochre, and the pelt is marked with black or dark brown spots and rosettes. The paler belly fur is covered with dark spots and large black spots form seven to thirteen irregular rings on the tail. The black-tipped tail measures about half the head and body length. The muzzle is narrow and the eye colour is light brown. Melanistic individuals are not uncommon. Hybridization with the closely related Geoffroy's cat in contact zones of the two species has been observed in southern Brazil. The ocelot lineage is the youngest of all cat lineages (see p. 34). The species of this lineage are all still very closely related and hybridization is common.

Habitat and Distribution

Oncillas are found from Central America into South America as far as northern Argentina. This small cat shows a widespread distribution but probably only at low densities. They inhabit savannas, tropical and subtropical forests and semiarid thorny shrubs but prefer mountainous evergreen cloud forests up to an elevation of 3,600 m. In Columbia, they only occur at elevations above 1,500 metres and have been found up to 4,500 metres. They have also been collected from the Andean highlands in Ecuador, where cougar and pampas cat live. They occur also in degraded habitat probably as a competitor avoidance strategy. Its use of altered habitat and corridors is under investigation. Occasionally they even show up in Sao Paulo.

Feeding Ecology

Oncillas feed on small vertebrates like mice, birds and lizards, most prey weighing less than 100g. They also eat small primates and insects. In the Catingaa, a dry area in northeaster Brazil, lizards were identified as an important prey, analysing scats and stomach content of dead animals. Oncillas there were more diurnal than in areas where the main prey were rodents.

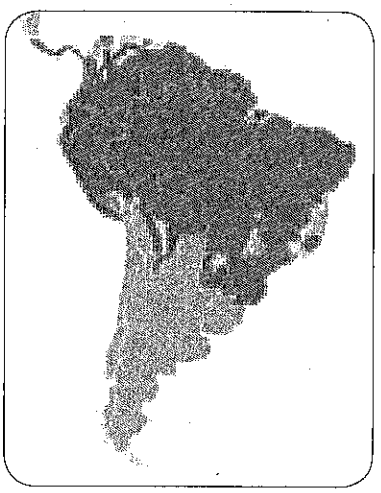
Behaviour

Even though the mainly nocturnal oncillas are excellent climbers, they spend most of the time on the ground, most of their prey being terrestrial. Thus they avoid conflicts with the closely related, sympatric and larger margay which hunts mainly in trees. This species can be active at anytime of the day as a strategy to compete with sympatric ocelot. Home ranges of oncillas are 2.5 times larger than would be expected based on body size. This could be a strategy to avoid larger guild-members.

Threats and Conservation

Deforestation and persecution by humans are considered to be the main threats to this felid species. The preferred habitat of cloud forests in Colombia and Brazil is being lost to coffee plantations or eucalyptus cultivation. An unknown level of illegal hunting occurs at a regional level despite protection from exploitation on the international fur market. The oncilla is poorly studied and not much is known about its status in the wild but observations of captive animals indicate that typically only a single kitten is produced making it quite vulnerable if numbers are declining. This cat has been heavily hunted in the past.





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Margay *Leopardus wiedi* **(Schinz, 1821)**

The margay is smaller than the ocelot and bigger than the oncilla. Sexual dimorphism is low - males and females weigh 3-4 kg. Its long tail measures about 70% of the head and body length which is typically long for an arboreal species and is marked with about twelve dark rings and a blackish tip. The head is more round than an ocelot's and margays' eyes are distinctly large. They have two cheeck stripes. The margay is slimly built and has a soft, thick and yellowish brown coat. The fur is marked with dark brown or black rosettes or elongated spots arranged in longitudinal rows. The undersides and belly are white and the back of the ears are black with central white spots.

Habitat and Distribution

The margay ranges from the lowlands of northern Mexico, into Central America and South America to Uruguay and northern Argentina. Habitats include tropical evergreen forests, premontane humid and very humid forests, montane cloud forests, gallery forests, and wet-swampy savannas.

Feeding Ecology

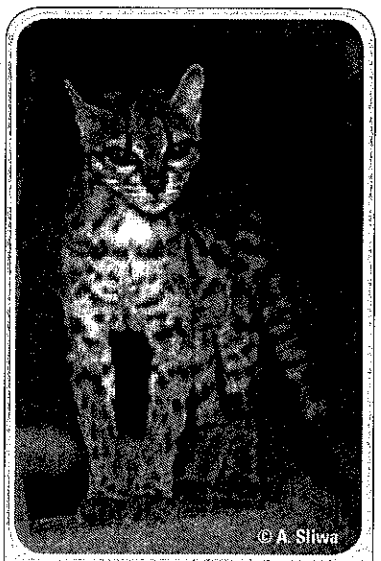
The margay feeds on small tree dwelling rodents, squirrels, sloths, oppossums, monkeys, porcupines, birds, insects and fruit occasionally. Most of the margay's prey are nocturnal and arboreal, but the margay can also hunt on the ground. The information about the margay's diet is from direct observations, the analysis of some stomach contents and one study in Belize, where scats were analysed. The climbing rat was the most frequent prey there. Some other arboreal species were also identified: mouse opossum, small birds and squirrels. One third of the scats contained insects, and fruits were found in every seventh scat.

Behaviour

Margays are mainly nocturnal. However, in southern Brazil there is no difference in activity levels between daytime and nightime, and between winter and other seasons combined They hunt and rest mainly in trees, making it the most arboreal of the new world felids. They may travel quite long distances. Margays are very agile and acrobatic climbers and are able to descend a tree head first - their hind feet can rotate 180 degrees, allowing them to grip equally well with the hindlimbs or forelimbs while the long tail and the wide paws help keep balance. The basal rate of metabolism is unusually low for such a carnivore and that may reflect its preference for arboreal habitat. Margays are solitary and territorial animals. Margay females have only two teats and the litter size is one, probably also an adaptation to their arboreal life, as the kittens can not clinge to their mother.

Threats and Conservation

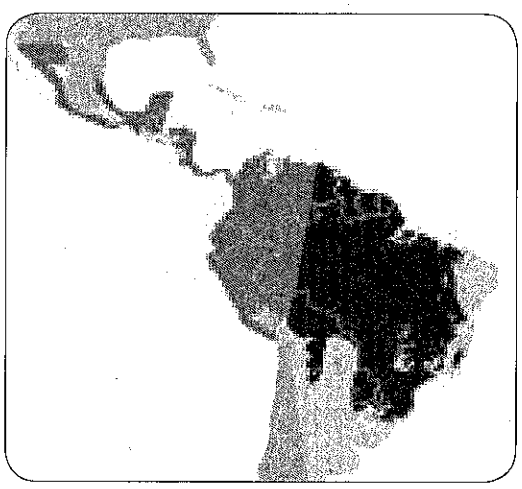
Deforestation and destruction of its habitats are considered to be the major threats to this forest dependent cat. It simply cannot tolerate degraded habitat resulting from rampant clearing of trees for agricultural use. They do not adapt readily to corridor use and are not found to use clearings for crossing. Being restricted to smaller patches of forest raises the risk of inbreeding. Combined with a low reproductive rate and presumed low abundance makes the status of the margay threatened. They were heavily exploited in the past. In peak years in the 1970s some 20,000 margay skins were traded. Today they are legally protected throughout most but not all of their current range.

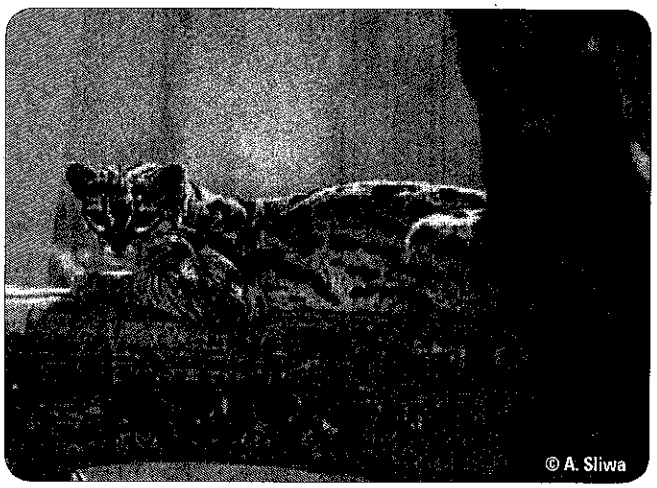


Margay
Marguay, margay

Weight	3–4 kg
Body length	48–79 cm
Tail length	23–52 cm
Longevity	up to 22 years
Littersize	1–2 cubs

IUCN Red List: Near threatened





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Ocelot *Leopardus pardalis* (Linnaeus, 1758)



Ocelot
Ozelot, ocelot

Weight	8–10 kg
Body length	40–50 cm
Tail length	50–100 cm
Longevity	16–20 years
Litter size	1–3 cubs

IUCN Red Liste: Least Concern

The ocelot is a mid sized cat with rounded ears, black on the backside with characteristic central white dots. It has relatively short stout legs with padded feet. The front paws are larger than the hind paws. Its coat is short, even and covered with spots and rosettes which are smaller on the limbs. The fur colour varies from white to tawny, reddish and grey. The dark markings occasionally form 4-5 lines along the back. The throat and belly are white. Its tail is short with black rings or bars on the top side.

Habitat and Distribution

Ocelots are found from southern Texas, along the coast of Mexico, in central America, and in South America to the north of Argentina. The biggest population lives in Peru and Venezuela. Ocelots inhabit evergreen forests, dry thorn forests, tropical forests, mangroves and seasonally flooded savannas. This cat seems very adaptable to a range of habitat types as long as there is dense cover and high rodent densities. They clearly avoid open areas.

Feeding Ecology

As a generalist carnivore ocelots feed on a variety of small to medium sized rodents like opossums, mice, rats and hares. Occasionally they hunt birds, fish, snakes, lizards, tortoises and insects. The Ocelot sometimes kills the young of bigger animals such as anteaters or agoutis.

Behaviour

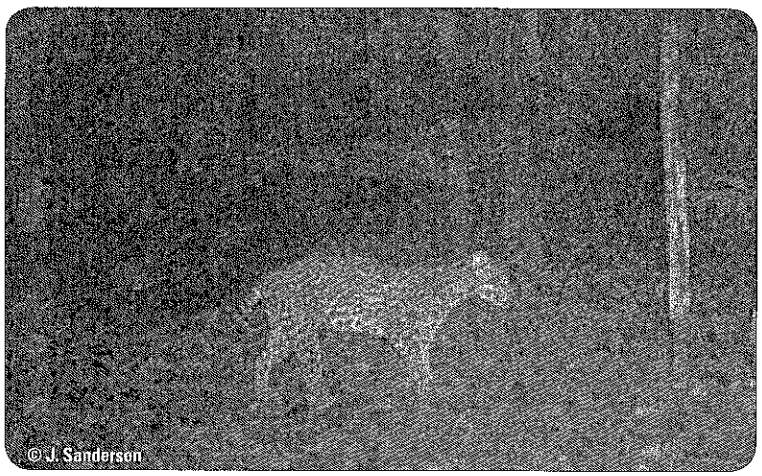
The Ocelot is the most abundant and best studied small felid in the new world. It is nocturnal resting during daytime in trees, bushes, or thickets and in ground depressions. Ocelots hunt generally on the ground and are solitary. At night they may travel from 3 to 7 km. Ocelots are excellent climbers and escape to trees when threatened. They are also very good swimmers. Male territories are bigger than those of the females and enclose 2-3 female territories.

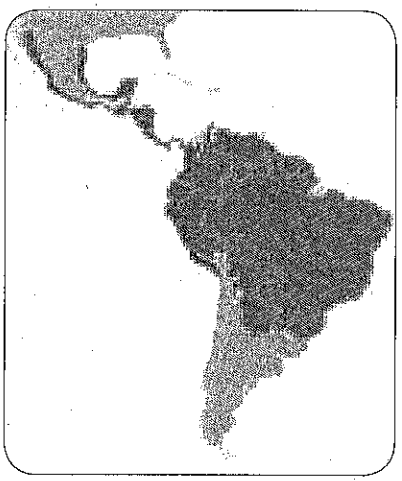
Threats and Conservation

The population is not known exactly but presumed to be declining over its range. Habitat destruction from deforestation is the primarily threat due to loss of prey base. The ocelot population was heavily decimated by fur trade, with hundreds of thousands taken, during the 1970's and 80's. Today, the ocelot is protected in most of its range, but hunting losses remain a problem. Some legal hunting combined with poaching and persecution after domestic animal attacks remove an unknown number of animals each year. Many ocelots are killed by vehicles in the Texas population and mitigations are now in place to decrease this effect.

The "ocelot effect"

Most of the neotropical small cats in South America overlap distribution zones. The ocelot as the largest, perhaps the most adaptable to habitat change, and as a generalist carnivore 'dominates' the guild. All records indicate that this species is the most abundant small cat, limited only by habitat that includes any dense cover and a relatively high prey density. Presumably the smaller Geoffroy's cat, oncilla, margay and jaguarundi must avoid the ocelot because of predation or the threat of predation since wherever these species are sympatric, ocelot numbers are high and the other small cats low.





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Jaguarundi *Herpailurus yaguarondi* (Saint-Hilaire, 1803)

The jaguarundi is an odd looking cat - its elongated, low-slung body somewhat resembles an otter and some behaviours are more similar to a puma than the other small sympatric species. The jaguarundi has short legs, a slender body and a long tail. Its small, slim head has short, rounded, widely separated ears. Their eyes are small and set closely together. Apart from a few faint markings on the face and belly, its short, sleek, black, greyish or red-brown fur is uniform in colour. The lighter colour phase is found in drier areas, the darker colour phase in more humid habitats such as rainforests. Phylogenetically the jaugarundi is placed close to the cheetah and the puma. Like the cheetah, the jaguarundi cannot completely retract the claws.

Habitat and Distribution

The jaguarundi's range extends from southern USA to Argentina. In Central and South America the jaguarundi is thought to be the most abundant felid species. Nevertheless its biology and behaviour is not well understood. Jaguarundis live in a wide variety of habitats from semiarid thorn forest to wet grasslands and from sea level to elevations as high as 3,200 m. They seem to use more open areas than the other small felids, but are most often seen in areas of dense cover. A radio-collared animal in Belize used old fields and second-growth forest. It preferred areas near streams

Feeding Ecology

Jaguarundis feed primarily on small prey weighing less than 1 kg. It hunts mainly rodents, birds and reptiles. Some slightly bigger prey such as rabbits, oppossums and armadillos are likely important opportunistically. Jaguarundis also ingest fruits and leaves. Like jaguarundi, most prey species identified have predominantly diurnal and terrestrial habits.

Behaviour

As a strictly diúrnal and ground based hunter, the jaguarundi is able to avoid competing with the sympatric nocturnal ocelot and arboreal margay. A radio telemetry study in Belize found the peak activity period to be from 1,400 to 1,600 hours, with only very little activity after sunset. A camera trap investigation in Argentina confirmed this pattern. Jaguarundis are agile climbers and good swimmers. They can jump up to 2 meters in the air to catch birds. They may travel up to 7 km per day and are solitary carnivores. Ranging behaviour is not well understood. Home range size of only few animals do not show a clear pattern. Individuals in captivity often mark their territories by scent marks. Jaguarundis have an unusual and wide vocalization with at least 13 distinct calls identified. They purr, whistle, chatter, yah and chirp like a bird.

Threats and Conservation

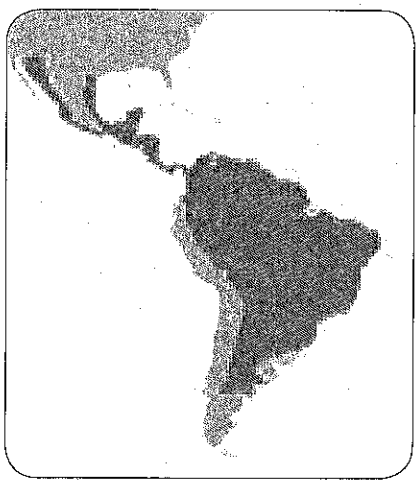
Since this species is not restricted in habitat use to primary forest, it may be more resilient to deforestation than the other felids. They were not hunted for fur on a large scale and even now they probably are killed only when they prey upon domestic animals. Still not much research has been conducted on jaguarundi ecology considering how ubiquitous it is. Probably the potential loss of habitat which decreases prey abundance remains a constant threat. Jaguarundis are thougth to be the most abundant felid of the region. This might be biased by the diurnal behaviour what makes it the most observed cat.



Jaguarundi
Jaguarundi, jaguarondi

Weight	4–7 kg
Body length	53–76 cm
Tail length	31–52 cm
Longevity	10–20 years
Littersize	1–4 cubs

IUCN Red List: Least Concern





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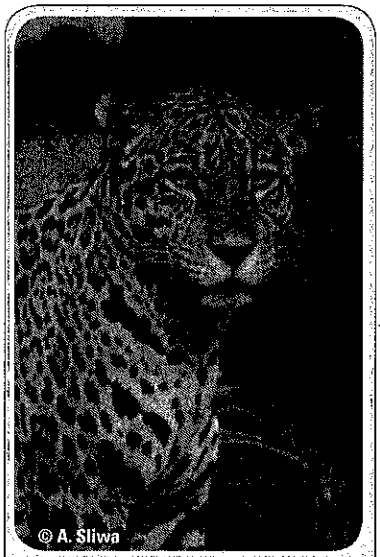
Jaguar *(Panthera onca)* (Linnaeus, 1758)



Jaguar
Jaguar, jaguar

Weight	36–121 kg
Body length	110–170 cm
Tail length	44–80 cm
Longevity	up to 26 years
Litter size	1–4 cubs

IUCN Red Liste: Near Threatened

The jaguar is the largest felid and the only Panthera species in the Americas. It has a rather stocky build with an unusually large head and relatively short legs. The jaguar has a distinctively powerful jaw and teeth structure when compared to other big cats. The coat is pale yellow or tawny and is covered with large black or dark brown rosettes with one or more black dots in their centre. The white belly, throat and insides of the limbs are marked with oval or irregular spots. The long tail has black spots and from the midpoint to the tip several black rings. The ears are short and rounded with black backs that have a buff central spot. Melanistic individuals appear to be more common among jaguars than any other large cats. The largest jaguars inhabit the Pantanal of Brazil and Venezuela. Jaguars living in the forests are much smaller overall.

Habitat and Distribution

Today the jaguar's range extends from the south of Arizona and the tropical forests in Mexico and central America to eastern Colombia, Venezuela, Surinam, French Guiana, Brazil, Peru, Bolivia, Paraguay, and northern Argentina. About 50% of the known population occurs in Brazil which has major implications for range wide conservation work. The jaguar inhabits tropical forests, swampy grasslands, evergreen forests, dry deciduous forests and mangrove swamps. The jaguar is strongly associated with watercourses.

Feeding Ecology

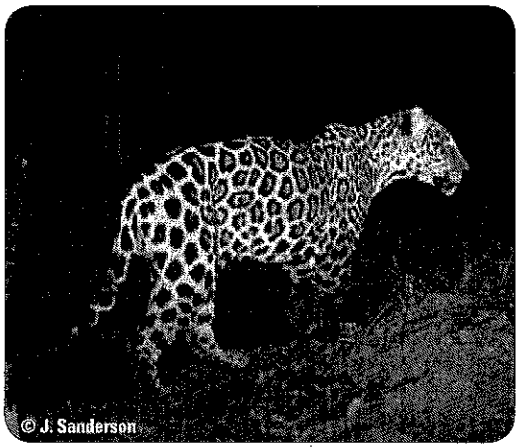
Jaguars are opportunistic generalist predators and more than 85 prey species are reported. Jaguars feed mainly on coatis, agoutis, lizards, opossums, armadillos, iguanas, and sloths. They also eat turtles and their eggs, caimans, capybaras, collared peccaries, deer, hares, fish and domestic animals up t the size of a cow.

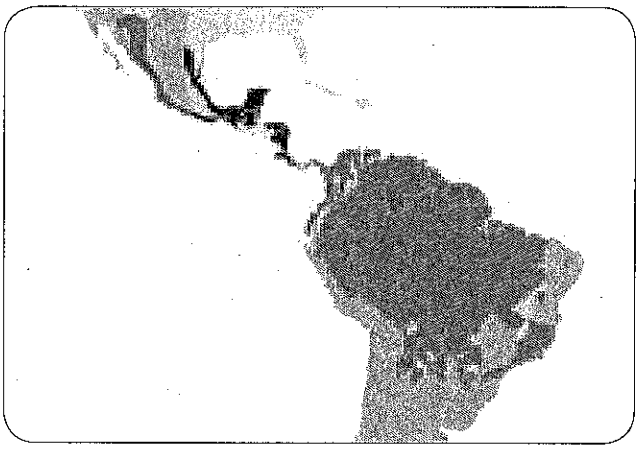
Behaviour

Jaguars are solitary and nocturnal. Home ranges of males enclose typically the territories of two females. Jaguars are excellent swimmers and are able to cross wide streams. They mark their territories with urine. Both males and females can roar.

Threats and Conservation

The jaguar represents a very important species in South American myths and culture: it is known as the master of animals and as a symbol of strength. Nonetheless farmers and ranchers kill them as a threat to their stock and the numbers of such losses are not exactly known. Clearly the number of these cats shot on sight and poisoned indiscriminately is large and could lead to its demise on a regional level with ultimate landscape scale repercussions, especially where such persecution overlaps with widespread habitat destruction. Protection measures in Brazil are key and they must be connected in the long term to range wide corridors. Considerable ecological research and international collaboration are being directed to the future of this large cat. Efforts to combat and manage human conflicts particularly in a locally relevant way are part of that ongoing program with creative work and meaningful community involvement schemes. Fighting the massive development of landscape for human economic benefit remains of course the ongoing battle. The major threat for the population generally comes from the constant deforestation practices throughout the range of this large cat. The jaguar is currently protected in about only 4-5% of its known range.





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Puma *Puma concolor* **(Linnaeus, 1771)**

The puma with its rounded head, slim body and long legs is very powerful. Pumas living in southern Chile and Canada weigh twice as much as pumas inhabiting the tropics where they have to compete with the bigger jaguars. Males weigh 40-60 % more and are larger than females. Its long spinal column provides increased lumbar flexion, similarly to the closely related cheetah. The puma's coat colour varies from greyish to dark brown and shows no markings. The chin, throat and belly are white. The sides of the white muzzle are framed in black. The ears are small, rounded, and black on the back. The long tail has a black tip.

Habitat and Distribution

The puma has the largest geographic range of any terrestrial mammal in the Western Hemisphere - from Alaska (rare) to southern Patagonia. In South America pumas are found almost everywhere except in a few densely populated coastal regions. In Canada and the USA it was historically widely distributed but was eradicated east of the Rocky Mountains but there is evidence of recent range extensions eastwards and northwards, Pumas inhabit tropical rain forests, seasonally flooded savannahs, semiarid brush lands and mountainous regions. Its preferred habitat includes dense stands of fir and open pine forests, cliffs, slopes and caves. They live in almost every type of habitat, as long as it offers cover for stalking prey.

Feeding Ecology

In North America, pumas typically feed on ungulates the size of mule deer or wapiti. Where the puma competes with the larger and stronger jaguar, the puma eats smaller prey, for example pikas, hares, marsupials, wild pigs, racoons and armadillos. Pumas also hunt domestic animals such as sheep or horses.

Behaviour

Pumas are solitary animals and mostly active around dawn and dusk. They rest in dense cover during the middle of the day. Even though they are good climbers and often have to escape to trees when hunted by dogs, they mostly live and hunt on the ground. Pumas travel extensively while hunting. They hunt by stalking and try to attack their prey from above. Females have lifelong territories, while males often loose theirs in fights to other males. Male home ranges enclose territories of one or more females. The young stay and hunt with their mothers up to two years. Pumas mark their territories with claw marks, urine and faeces.

Threats and Conservation

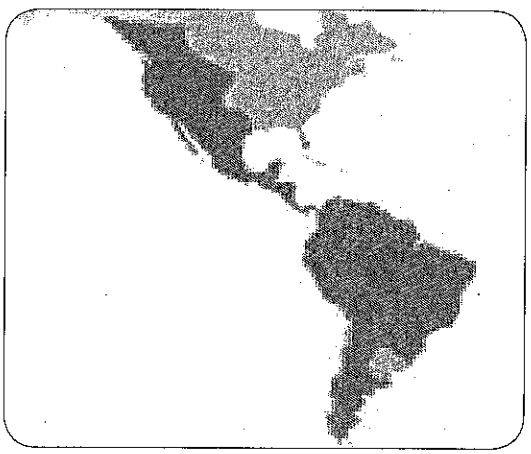
Pumas have been intensively hunted and persecuted particularly in the USA. In western USA the population recovered and their range has extended north and west. Status and trends of the South and Central American populations are poorly known. In some parts of North America people can legally hunt pumas for sport. Considerable annual human/puma conflict occurs when they prey on domestic animals and occasionally attack or kill people. Throughout the range of this species a few hotspots of such problems are well known – on Vancouver Island in Canada, for example, some sites in California and in other western states. Research and monitoring is extensive in the USA and Canada and becoming more important in the Latin American countries. A subpopulation in the state of Florida was nearly extirpated and despite conservation efforts suffered depression due to inbreeding. Recent re-introductions of individuals from Texas seem to be mitigating this status.



Puma
Puma, puma

Weight	30–70 kg
Body length	100–150 cm
Tail length	60–90 cm
Longevity	up to 23 years
Littersize	1–3 cubs

IUCN Red List: Least Concern





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Bobcat *Lynx rufus* (Schreber, 1777)



Bobcat
Rotluchs, lynx roux

Weight	6–20 kg
Body length	50–120 cm
Tail length	9–25 cm
Longevity	10–17 years
Litter size	2–4 cubs

IUCN Red Liste: Least Concern

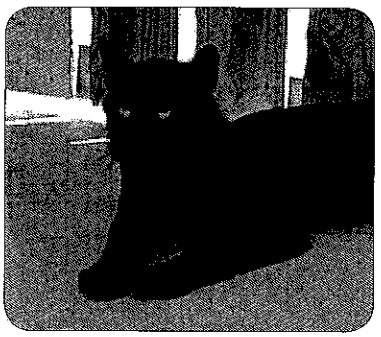
The name says it all – this cat is easily recognized by its short tail. Although it may resemble a Canada lynx, it has distinctly shorter legs and appears stockier. Males are 30-40% heavier than females and animals in the north are bigger than in the south. In comparison to the Canada lynx, with which it overlaps in some parts of its range, the bobcat has smaller paws without heavily furred foot pads. The head is small and wide, surrounded by a ruff of fur. The tail about 14 cm and is marked with black bars, but unlike in other lynx species, the underside is white. The ears have black backs marked with a white spot and are tipped with much shorter hair tufts than in the Canada lynx. The bobcat's fur is thick and soft, tawny, brown, reddish or light grey in colour and sometimes marked with brown or black spots and stripes. Bobcat coat patterns and colouring vary remarkably from one region to another. The belly and underparts of the legs are light with dark markings. Melanistic (black) individuals and albinos occur.

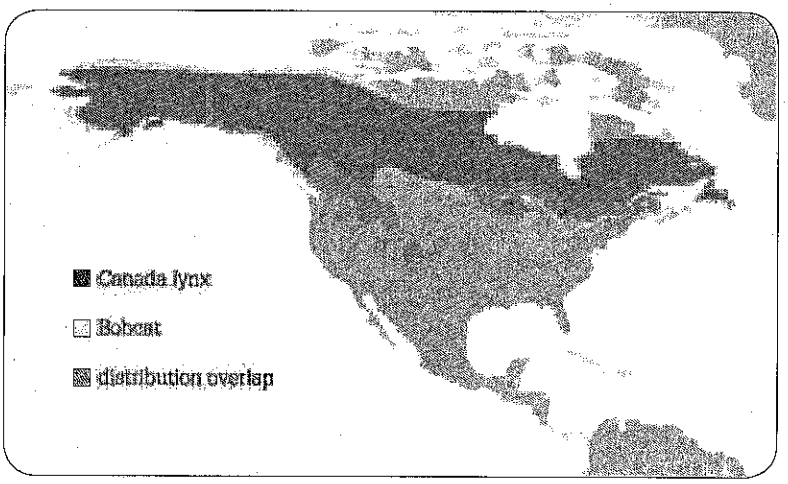
Habitat and Distribution
The bobcat is distributed from southern Canada down to central Mexico. In the north its distribution is probably limited by deep snow and cold temperatures, and in the south by intraspecific competition with South American cat species. There is some recent evidence that competition and predation from sympatric coyotes may become a limiting factor in the northeastern US. Toward the north their range is expanding with forest clearing and general warmer climate. Bobcat range is also expanding into the Midwest where populations have rebounded following harvest protection. Bobcats live in a variety of habitats, from boreal coniferous and mixed forests over bottomland hardwood forest and coastal swamp to desert and scrubland. The crucial requirements are adequate prey density, cover for its hunting and shelter for den sites. Intensively cultivated large tracts of land and intensively-developed urban settings are about the only habitat type this species does not occupy.

Feeding Ecology
Bobcats mainly feed on rabbits and hares. They also hunt small rodents, rats, squirrels, beavers, birds, opossums and occasionally small ungulates. Their prey mostly weigh less than 3 kg, but can be much heavier.

Behaviour
Bobcats are generally solitary and primarily crepuscular. Depending on environmental conditions, they may also be active at night or during the day. They are solitary hunters using dense vegetation as cover to ambush their prey. Bobcats live on the ground, but are good climbers and flee into trees or even cactuses when threatened. Home range size ranges from 6 km² for females in southern California to more than 300 km² for males in New York. Territories of males mostly enclose those of several females and female territories are generally exclusive.

Threats and Conservation
The bobcat is the most abundant and widely-distributed wild felid in North America. The bobcat provides the most commonly traded wild cat skins for the international fur trade industry. Today about 20'000-40'000 bobcats are harvested legally each year, which seems to be sustainable. Loss of habitat is the biggest threat for the bobcat, especially for the subspecies *L. r. escainapae* in Mexico. It gets locally persecuted as a pest when it opportunistically preys on domestic animals. The bobcat is the subject of many field studies, but monitoring is still not satisfactory in some of the United States and in Mexico. Bobcats were successfully reintroduced to Georgia and New Jersey.


Black bobcat in Florida .



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Canada Lynx Lynx canadensis **(Kerr, 1792)**

The Canada lynx is long-legged, with hind limbs much longer than the forelimbs and front paws much bigger than hind paws. There is less size variation than in the bobcat, but males are heavier than females. Canada lynx have big paws with very dense fur growing between the pads, which allow them to move in deep, soft snow more easily than bobcats or sympatric carnivores such as coyotes. Their fur is greyish-brown and spotted only on the light underside. The face is fringed by a ruff of fur and the black-backed ears tipped with hair tufts are characteristic for the lynx family. The tip of the short tail is completely black. Canada lynx are about half the weight of the related Eurasian lynx, probably resulting from an adaptation to smaller prey, but general overall body size is not that much different.


© U. Breitenmoser

Habitat and Distribution

The Canada lynx lives in the boreal forests (Taiga) covering most of Canada and Alaska. It depends on patches of successional growth with good habitat for snowshoe hares. In the contiguous US states, its distribution extends along the Rocky Mountains to Colorado. In the Maritime provinces, in Main, around the big lakes and in the Rocky Mountains, the distribution ranges of the Canada lynx and the bobcat overlap (see map), but the Canada lynx prefers higher altitudes with more snow.

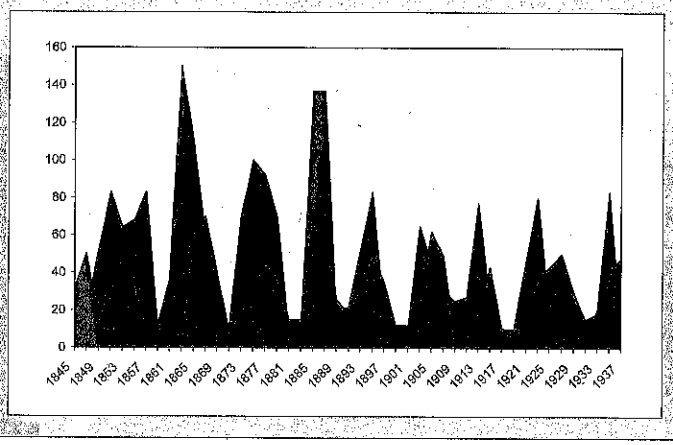
Feeding Ecology

The distribution of the Canada lynx is closely linked to the occurrence and density of snowshoe hares, which make up 60-97 % of the Canada lynx's diet depending on the state in the cycle (see box). In times of low snowshoe hare densities and in more southern areas, the Canada lynx also eats squirrels, grouse, mice, small birds, and occasionally young ungulates or carrion.

Behaviour

Canada lynx are solitary and occupy home ranges of 15-50 km² on average, but population densities and spatial organisation depend on the snowshoe hare cycle. Individual home ranges can vary in size from 3 to more than 500 km². When snowshoe hare densities crash, lynx may move hundreds of kilometres and have very low survival rates. When hare numbers are low, many females do not give birth. When prey abundance is high, litter size can average 4-5 kittens.

This is the famous hare-lynx-cycle from the trapping data of the fur trade company "Hudson's Bay Company". No other cat species is as closely related to its prey as the Canada lynx to the snowshoe hare. Hare population numbers fluctuate resulting in a regular cycle of 8-11 years (blue curve). The lynx population follows this cycle with a delay of 1-2 years (red curve).




© M. O'Donoghue

Canada Lynx
Kanadaluchs, lynx du Canada

Weight	8–12 kg
Body length	73–106 cm
Tail length	10–15 cm
Longevity	up to 14 years
Littersize	3–4 cubs

IUCN Red List: Least Concern

Threats and Conservation

There is a high demand for the thick winter fur of the Canada lynx in the fur industry. In Canada and Alaska, lynx have been trapped for centuries, but populations were overhunted in the 1980's. Today, the Canada lynx is one of the best studied and monitored cat species and hunting is managed sustainably. In the US, lynx are threatened by habitat fragmentation, logging practices and fire suppression and were listed as Threatened under the Endangered Species Act in 2000. Reintroductions to Colorado have been deemed successful enough to let the state consider the reintroduction of yet another carnivore, the wolverine.

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Eurasian Lynx *Lynx lynx* (Linnaeus, 1758)



Eurasian Lynx
Eurasischer Luchs, lynx

Weight	17–25 kg
Body length	90–120 cm
Tail length	18–23 cm
Longevity	17–24 years
Litter size	1–4 cubs

IUCN Red Liste: Least Concern

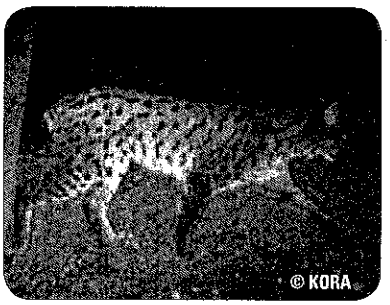
The Eurasian lynx is the tallest of the lynx family. It weighs about twice as much as the other three lynx species. Eurasian lynx in the northern and eastern regions are bigger than individuals from the south and west. Males are about 25-30 % heavier than females. The Eurasian lynx has long legs and in winter its large paws are covered with hair. The winter fur is long, very thick and mostly grey, but may vary from reddish to yellowish. There are four distinct coat patterns over its range with individually unique small to large spot or rosette markings. Eurasian lynx from northern areas and the subspecies *L. l. isabellinus* in Central Asia have a faint, mostly unmarked coat, whereas southern animals tend to be more spotted. The belly, chest and underparts of the legs are light coloured. Lynx have triangular ears with black backs and white centers tipped with 4-7 cm long, black hair tufts. Their short tail is also tipped black. Their head is rounded with a conspicuous facial ruff.

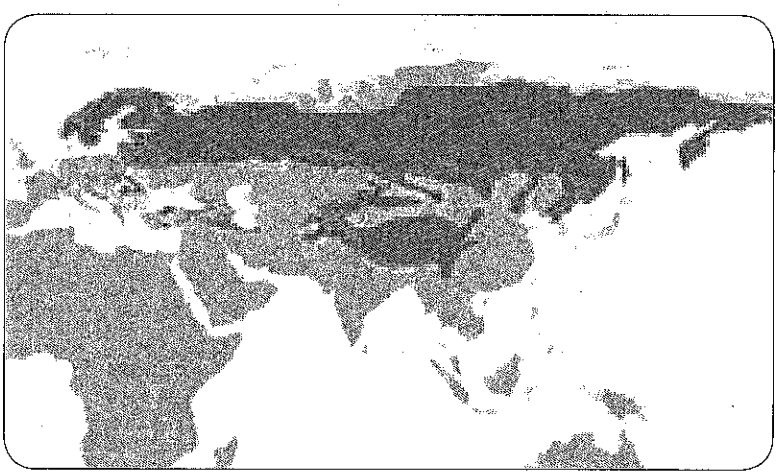
Habitat and Distribution
The Eurasian lynx is an inhabitant of the extended, temperate and boreal forests from the Atlantic in western Europe to the Pacific coast in the East. In Europe it is found from Mediterranean forests to the transition zone of taiga to tundra. It lives from sea level up to treeline. In Central Asia, lynx also occur in steppe habitat and the subspecies *L. l. isabellinus* is found in mountainous, treeless areas in the north part of the Himalaya and of Pamir. Lynx have been observed in this region up to 5,100m

Feeding Ecology
The other three species of the Lynx family hunt mainly middle sized mammals, especially lagomorphs. The main prey species of the Eurasian lynx are small ungulates like roe deer, chamois, reindeer and musk deer. Sometimes they also hunt foxes, red deer, wild pigs, beavers, birds or domestic animals such as sheep and goats, or in Scandinavia on semi-domestic reindeer. In northeastern Europe and in northern Siberia where there are no roe deer Eurasian lynx feed on arcitc hares. Preliminary diet analyses of *L. l. isabellinus* showed that in this treeless habitat hares from the staple food, followed by marmots.

Behaviour
Eurasian lynx are territorial and solitary. They are mostly active at dawn and dusk. Lynx hunt by stalking and ambush. They use their excellent sense of hearing and eyesight to find prey. The home range of a male measures, depending on the prey base and on the degree of latitude, 100-1000 km² and mostly encloses territories of 1-2 females. Eurasian lynx communicate by scent-marks and calls.

Threats and Conservation
In the European Union the Eurasian lynx is protected by law. In most countries, hunting is allowed under special management. In Russia the Eurasian lynx is important for skin market and pelt industry. Illegal killing of lynx results from conflicts between lynx and hunters who see the lynx as a competitor in game hunting and from lynx killing domestic animals such as sheep, goats or reindeer. In western Europe lynx lost their original habitat through deforestation. Since 1900 lynx in Europe have been endangered, but in the last 50 years its population has recovered due to reintroductions in west and central Europe. The populations in Europe are very well monitored while the status and trend of the Asiatic populations remain unknown. In Central Asia, lynx live mainly in cold desert habitat where vegetation is scarce, haborign important prey species. The shrubs are often the main source of fuel wood, a single house hold collects around the 600-700 kg of wood per month.





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Iberian Lynx *Lynx pardinus* (Temminck, 1827)

The Iberian lynx is closer in overall size to the Canada lynx and the bobcat and weighs about half as much as the Eurasian lynx. Males are heavier than females. The Iberian lynx has a small head, a short body and long legs, the characteristic short tail with a black tip, black hair tuffs on the ears and a conspicuous facial ruff. The facial ruff of adults is more distinct than that of other adult lynx species. The fur is yellowish, reddish or brownish and marked with dark brown or black spots of varying size. From shoulder to the groin the spots merge into several parallel lines. The belly fur is lightly coloured. There are three distinct individual coat patterns.

Habitat and Distribution

Originally the Iberian lynx was found in all parts of the Iberian Peninsula. It evolved on the peninsula from a relict population from a glacial period about 1.6 M years ago. Today its distribution has shrunk to two small populations: in Andalusia with about 250 individuals in the eastern Sierra Morena and in the Doñana Natural Space and surroundings. Iberian lynx typically inhabit Mediterranean forests composed of native oaks and abundant undergrowth, scrubby swamps and rocky areas.

Feeding Ecology

The Iberian lynx feeds primarily on wild rabbits with a dependency similar to that relationship between the Canadian lynx and snowshoe hares. Alternative prey species are rodents, partridges, hares, ducks, ungulates, and occasionally reptiles.

Behaviour

Iberian lynx are mainly crepuscular and nocturnal but sometimes also active during the day. They are territorial with male territories enclosing those of several females. They communicate by marking with urine and faeces. Mating occurs in December-February.

Threats and Conservation

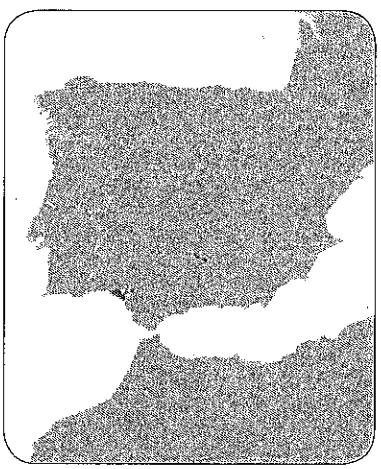
The Iberian lynx is the most threatened cat species in the world: its population declined because of loss of habitat due to the destruction of Mediterranean scrub forests, habitat fragmentation, direct persecution, reduction of the rabbit population due to over hunting and epidemics, illnesses and today possibly also because of intrinsic factors. There are presently only two isolated populations in the wild: 70-80 animals live in the south of Andalusia in Doñana-Aljarafe and 170-180 individuals in the Sierra Morena. The genetic variability is very low, especially in the Doñana population. The Iberian lynx is therefore vulnerable to disease outbreaks. In 2007, a Feline Leukemia Virus epidemic killed 35% of the adult males in Doñana-Aljarafe. Since 2002, a much extended recovery program is trying to save the species from going extinct. With support of the EU, habitat and rabbit populations are being restored, and in 2009 the first lynx have been reintroduced in a new area in Andalusia. Both populations have been increasing over the past few years thanks to these conservation efforts. Portugal has joined the recovery program, which is in both countries also supported by various nature organizations. In parallel a conservation breeding program has been established with animals from both populations as founders in today four breeding centres in Spain and Portugal with the goal of providing animals for reintroduction. Since 2002, 46 cubs have been born, and as of 2010 the captive population numbers 78 animals.



Iberian Lynx
Pardelluchs, lynx d'Espagne

Weight	8–16 kg
Body length	65–92 cm
Tail length	11–16 cm
Longevity	up to 14 years
Littersize	1–4 cubs

IUCN Red List: Critically Endangered





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Black-footed Cat *Felis nigripes* (Burchell, 1824)



Black-footed Cat
Schwarzfusskatze, chat à pieds noirs

Weight	1–2,5 kg
Body length	50–63 cm
Tail length	14–18 cm
Longevity	13 years
Litter size	1–4 cubs

IUCN Red Liste: Vulnerable

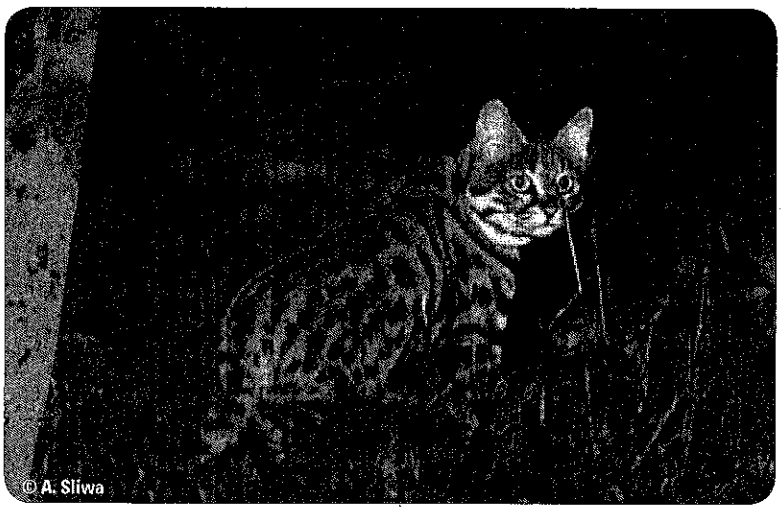
The black-footed cat is the smallest African felid and weighs about 1-2.5 kg, males being heavier than females. It is named after its black pads and black underparts of its feet. Its tawny fur is marked with black and brown spots, which merge into broad bands on its neck, legs and tail. It has a rounded head similar to a domestic cat with large ears and eyes. The black-footed cat has a short tail, which measures less than half of its head and body length and is marked with a black tip.

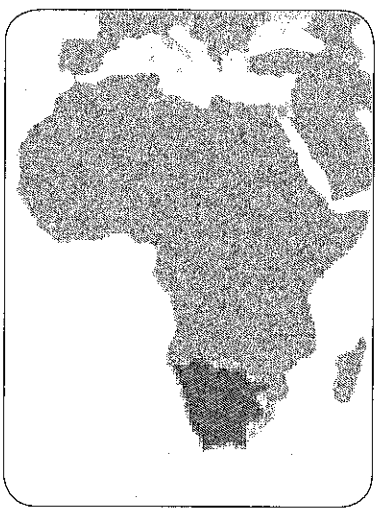
Habitat and Distribution
The black-footed cat is endemic to southern Africa. It is found in South Africa, Namibia and Botswana, marginally in western Zimbabwe and southern Angola. It mainly inhabits dry regions and prefers open, sparsely vegetated habitat, such as savannah or short-grass steppe called 'Karoo', where it finds enough cover for hunting.

Feeding Ecology
This grassland and semi-desert specialist has a broad diet but feeds mainly on rodents, birds and invertebrates weighing less than 30-40 g. Every night it may kill up to 10-14 small rodents. During an intense study in South Africa, around 2000 kills of black-footed cats could be directly observed and more than 50 different prey species identified. Three quarters of the prey items were small mammals such as mice and gerbils, which made up 40% of the ingested biomass. Second most frequent prey were small birds. Occasionally, black-footed cats also hunt bustards and hares. When feeding on these larger species, they cache parts of their prey. They are also known to readily scavenge. Black-footed cats are well adapted to arid conditions and get all the moisture they need from their food.

Behaviour
Black-footed cats are nocturnal and solitary. During the day they rest in abandoned burrows of springhares or porcupines and are rarely seen. They stalk their prey on the ground and make use of every hiding place they find. They can also flush birds as they trott fast through grassland. As a desert dweller with its scarcity of high prey densities, the black-footed cat occupies rather large annual home ranges averaging 10km2 for females and 20km2 for males. Male home ranges overlap the ranges of several females. Scent-marking by spraying urine to tufts of grass and shrubs is thought to play an important role in reproduction and social organisation.

Threats and Conservation
The Black-footed cat is the rarest of the African cat species. From the small felids it is one of the best studied ones. Radio-collared animals have been observed over many years near Kimberley in South Africa, so a lot is known about its ecology and behaviour, but as it is hard to observe, we have very little information about its distribution and conservation status. The black-footed cat is threatened by the use of poison and other methods of indiscriminate pest control and overgrazing may lead to a loss of its prey base. Since it occupies such open areas, the black-footed cat is subject to predation from snakes, jackals and owls. Dogs used for jackal hunting also take this small cat opportunistically. Disease transmission from domestic cats may pose a threat to the black-footed cat.





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African Golden Cat *Profelis aurata* (Temminck, 1827)

The African golden cat is solidly built with stout, relatively short legs. It has two different fur colour phases – red and grey. The colour varies from chestnut to silver and grey. While the throat, chest and undersides are white with large dark spots on the belly, the upper side of both, red and grey morphs, can either be plain or spotted all over. East of the river Congo, the plain red phase becomes more dominant over the grey spotted one. About 5% of all individuals are melanistic. The head with the heavy muzzle is small compared to the body size. The backsides of the rounded, untufted ears are black and some individuals have white patches around the eyes and cheeks. The tail is about one third of the head-body length.

Habitat and Distribution

The golden cat is Africa's least known felid. Most of the information comes from two studies on the cat's diet and opportunistic sightings and museum records. It is endemic to Africa's tropical forest and occurs throughout equatorial Africa, from Senegal throughout the Congo Basin over to the Albertine Rift in Uganda. It was thought to occur in Kenya, but there is no confirmed recent data from there. Although primary moist forest is its main habitat, it seems to be quite adaptable and also occurs in montane, bamboo, and secondary forests. The periphery of its range even stretches into savannah regions along riverine forests.

Feeding Ecology

In Congo and the Central African Republic, studies of African golden cat scats have revealed that rodents and squirrels were the main prey items, followed by duikers (small antelopes). Primates made up 5% of the prey items in both studies, and yet golden cat hunting appears to be restricted to the ground. There is a record from western Uganda of a golden cat killing a red colobus monkey and of an individual stalking Talapoin monkey on the ground at night in Gabon. Birds, hyraxes and bats are also occasionally taken. The so far biggest study from the Democratic Republic of Congo has shown that the mean weight of the African golden cat's prey is 1.4 kg. There is some overlap with the diet of the leopard.

Behaviour

The solitary African golden cat is thought to be crepuscular and nocturnal, but is sometimes observed hunting by day. In a recent camera trap study in Gabon the majority of the pictures were taken during the day time. Although the species has been known for nearly 200 years, nothing more is known about its behaviour and social organization, and it took until 2002 for a first specimen to be photographed in the wild in Gabon.

Threats and Conservation

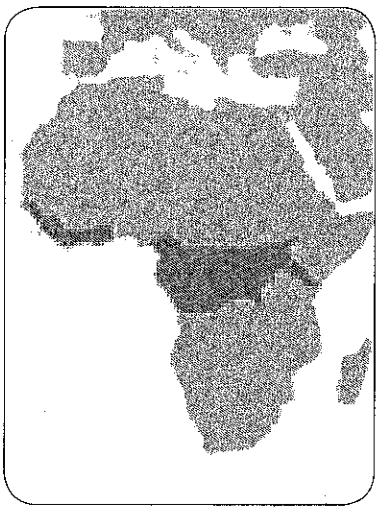
Loss of habitat is the main threat to the forest dependent African golden cat. It has lost about 44% of its former known range. However, due to its high adaptability, the species is not restricted to primary forests and also does well in secondary forests. There seems to be little direct hunting of African golden cats, but some skins are sold for ritual purposes and can be found on local markets. Another threat is incidental snaring and probably overhunting of prey species for the bush-meat trade. African golden cats sometimes also get killed by leopards.



African Golden Cat
Afr. Goldkatze, chat doré africain

Weight	7–16 kg
Body length	65–90 cm
Tail length	28–35 cm
Longevity	to 12 years
Littersize	1–2 cubs

IUCN Red List: Near threatened





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Serval *Leptailurus serval* (Schreber, 1776)



Serval
Serval, serval

Weight	7–14 kg
Body length	59–92 cm
Tail length	20–38 cm
Longevity	up tp 22 years
Litter size	2–4 years

IUCN Red Liste: Least Concern

The serval is tall and proportionately has the longest legs of any other cat species. The head is small but the ears are conspicuously very large and marked with a distinct white bar on the otherwise black backside. The tail is relatively short. The fur is a tawny background for the black spot patterns similar to a cheetah's but varying from freckle-size to large single spots. The small spot pattern is referred to as the servaline morph and is very rare – it showed up in a photo trap only once and that site was in the Congo in 2007. It has been found that the servaline form occurs in dense vegetation and secondary forests, while the large spotted serval inhabits grasslands and open savannahs. Sometimes these spots merge into stripes on the neck and back. Black individuals occur quite frequently in the highland areas of eastern Africa. The serval has long, mobile feet and strong curved claws that are helpful to capture mice and rats. The serval is able to jump up to 3.6 meters in length and 2-3 meters in height.

Habitat and Distribution

The serval lives in Africa, and south of the Sahara it is widely distributed. It inhabits a variety of grassland types such as reed beds, grass savannahs or marshes. It prefers rather moist habitats, often along rivers. In eastern Africa the serval is found up to an elevation of 3800 m. In northern Africa it may be present in small relict populations in Morocco and Algeria as pelts still show up on local markets.

Feeding Ecology

The serval is a specialist for hunting small mammals with its exceptional hearing, long legs and relatively small jaw. Rodents are especially important for the serval's diet; but it also feeds on frogs, lizards, snakes, insects and waterfowl. Annually in the Serengeti, each serval eats about 4,000 rodents, 260 snakes and 130 birds.

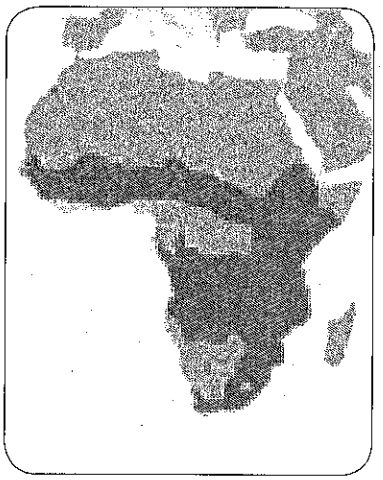
Behaviour

Servals are solitary and territorial with males occupying larger home ranges than females. The serval is crepuscular and nocturnal, but will also hunt in the day during the wet season. It rests during the day in the shade to avoid the heat of the sun. The serval uses its long legs and its large ears to find small mammals in tall grass. It also grubs in holes and crevices to dig out prey. When servals cannot catch its prey in the first attempt, they repeatedly jump up and down on the spot. Servals can also catch airborne prey by grabbing birds with their front paws while jumping off all four feet into the air. This characteristic hunting technique enables the serval to catch some species that would otherwise not be available,

Threats and Conservation

In southern Africa, the serval is intensively hunted because it is thought to be responsible for attacks on domestic sheep, goats and poultry. Trade in serval skins is known to occur in many countries. Skins are sold only at local markets, therefore the extent of the serval skin trade is unknown. Serval skins are often traded as leopard skins and they are taken for medical use and ritual activities. In northern Africa the serval's distribution and status remains undocumented. Most data are derived from bycatches from camera trap projects. Wetland conservation is key to serval conservation. These areas harbour high rodent densities, and form the core area of serval home ranges. Of secondary importance is degradation of grasslands through annual burning, followed by over grazing.





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Cheetah *Acinonyx jubatus* (Schreber, 1775)

The cheetah doesn't have the stout and muscular appearance of other large cats, but has a slender, elongated body with long legs. Its coat colour is yellow or tan with small black dots and the undersides of the belly and throat are white. A rare but interesting variation in coat pattern is called the king cheetah. It has mottled markings rather than distinct spots which result from a recessive mutation. The backs of the ears are black and a black line runs from the inner corner of the eyes to the upper lip. The white-tipped tail is about half the head body length and has black stripes on its distal third. Cheetahs have large thigh muscles and a very flexible spine, which enables them to take strides up to 7 m and cover about 29 m/s. Their lungs, heart and nasal passages are enlarged. Cheetahs cannot completely retract their claws, which provides extra grip during fast turns. All these adaptations make them the fastest land mammals, able to reach top speeds of 100 km/h.

Habitat and Distribution

The cheetah was once distributed from South Africa to India, but it has disappeared from most of its range in Asia. Iran is the only country where a small population of Asiatic cheetah persists. Cheetahs are still widely distributed in southern and eastern Africa, although the range is increasingly fragmented. Their range in northern and western Africa has been highly restricted and fragmented. Population numbers are small or unknown for many countries. Cheetahs occur in open grassland and savanna, as well as in dry forest, semi-desert and shrubland.

Feeding Ecology

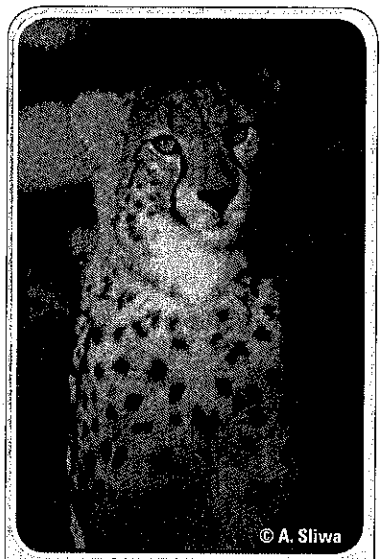
Cheetahs feed mainly on small to medium-sized ungulates like impalas, gazelles, and other antelopes. In Iran, they take wild sheep and Persian ibex. Cheetahs also hunt young of larger prey animals, small mammals like hares, and livestock. Their kills can be appropriated by lions and hyaenas.

Behaviour

Cheetahs typically stalk their prey and rush at it at full speed over short distances. They are thought to hunt mainly by day to avoid competition with stronger carnivores like lions, but kills are also made at night. The social organisation of cheetahs is unique among felids. Females are solitary, while males often live in groups of two or three. Such coalitions often consist of brothers. Female home ranges can overlap home ranges of several male coalitions. Both sexes try to mate with several partners. Therefore, young of a litter can have different fathers.

Threats and Conservation

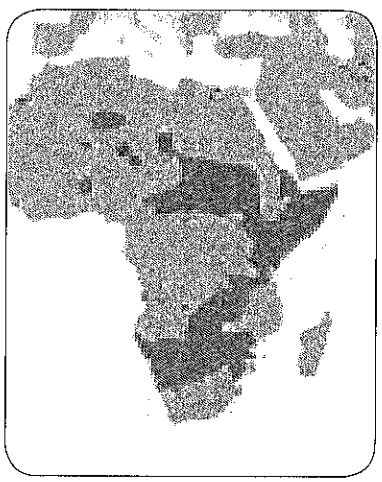
Cheetahs are wide-ranging and occur at very low densities. Therefore, most protected areas are not large enough to sustain viable populations and many cheetahs live on farmland. Habitat loss is the primary threat followed by depletion of prey base, which leads to predation on livestock and increases conflicts with farmers. Another problem for cheetah populations comes when protected areas support relatively high lion densities. This species needs protection status outside of parks wherever it occurs. The illegal market for live animals poses a very serious threat, since the common technique is to shoot a mother and take the cubs for selling on the black market. Quotas for trophy hunting are issued in some African countries. Several conservation strategies for cheetahs have recently been developed.

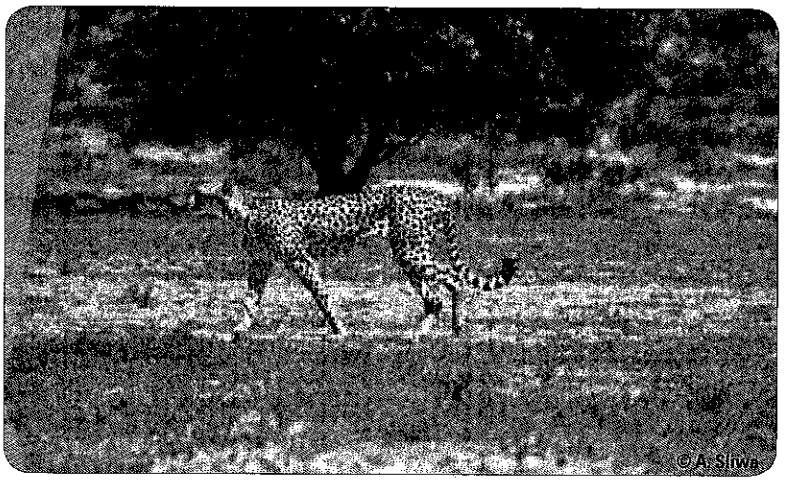


Cheetah
Gepard, guépard

Weight	21–65 kg
Body length	113–140 cm
Tail length	60–84 cm
Longevity	up to 20 years
Littersize	3–4 cubs

IUCN Red List: Vulnerable





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Lion *Panthera leo* (Linnaeus, 1758)



Lion
Löwe, lion

Weight	110–272kg
Body length	137–220 cm
Tail length	79–100 cm
Longevity	16–18 years
Litter size	1–7 cubs

IUCN Red List: Vulnerable

Lions are very muscular, physically very powerful with the body type designed for strength not speed. The unusually strong front paws help in overtaking large prey. The uniform colouring of the lion's fur ranges from tawny and grey to yellowish red and dark brown. Males after 3½ years grow impressive manes for display as well as protection during fights with rival males. The colour of the nose changes with age for both sexes and manes become even more prominent and dark. The Asian lion has a distinctive fold of belly skin, thicker fur, longer tail tassel and a smaller mane than the African lion.

Habitat and Distribution

The African Lion is found south of the Sahara. Asiatic lions live only in the Gir forests of northwest India. Lions inhabit forested areas, dry forests, bushlands and deserts with a preference for open country. Their characteristic stalk and ambush hunting method requires shelter or cover but with a panoramic view.

Feeding Ecology

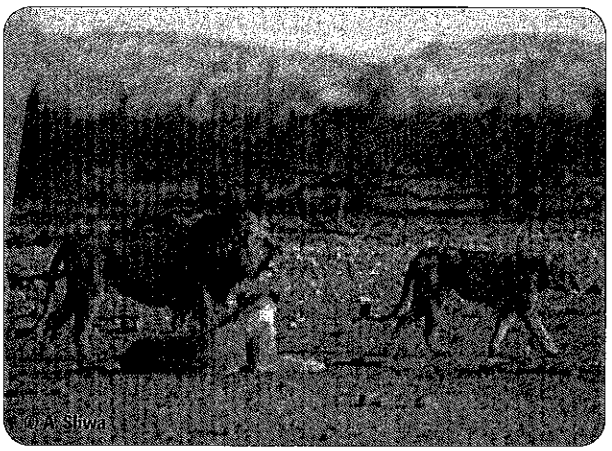
Gazelles, wildebeests, zebras or antelopes are the main prey, but lions can also hunt buffalo, giraffe and small elephants. In India, the diet includes sambar and chital. They feed also on birds, hares, ostrich eggs, fish, baboons and warthogs. The diet is normally dominated by 3-5 ungulates. Lions hunt in groups and have a relatively high success rate for kills. They kill unattended livestock and occasionally humans. Females do most of the hunting. Lions to frequently steal kills from other carnivore species. They regularly scavenge.

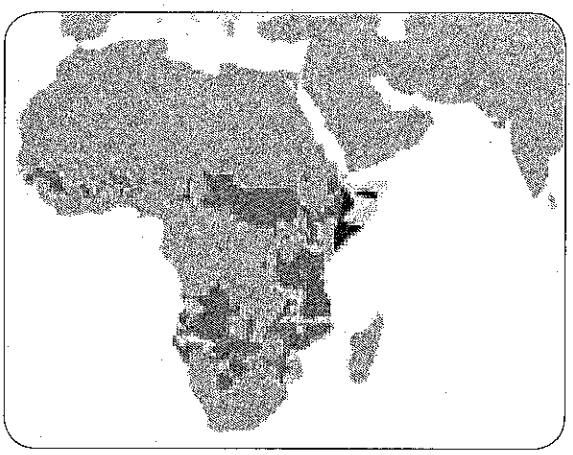
Behaviour

Lions are mainly nocturnal and crepuscular, spending large parts of the day resting. Lions live in a very complex social system. The pride structure varies between the African and Asian populations and may vary locally according to conditions of extreme weather and prey base. In the Gir forest of India 4 to 5 related females form prides and hunt in smaller territories than the males who form groups of 2 to 6 individuals. In the African population, prides may be 2 to 18 adult related females with their offspring with 1 to 7 males. The core of females tends to stay relatively stable while young males may disperse and adult males may shift pride status under competition. The normally stay with a pride for 2-4 years. The abundance of the main prey base determines the size of a pride's territory. Both sexes scent mark and this species is vocal with their roaring audible over several kilometres.

Threats and Conservation

In many parts of their range lions continue to be killed because they prey on domestic livestock, they are a trophy animal for sports hunters, and because they sometimes kill people. Up to 200 people per year are killed by lions in Tanzania, for example. Lions may be taken illegally as trophies or for cultural rights. As regular scavengers they are very vulnerable to poisoning. The biggest ongoing threat in general results from habitat loss and fragmentation as in the Gir Forest. Conservation efforts continue throughout their range to alleviate the human/lion conflicts, to promote sustainable practices for trophy hunting and to reintroduce and relocate animals where appropriate. The hunting of lions in some places could be sustainable if carefully managed to ensure that only males older than 6 years are shot. Lion bone trade for Asian medicine becomes increasingly a problem as the high prices on the black market makes them additionally vulnerable to poaching.





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Caracal *Caracal caracal* **(Schreber, 1776)**

The caracal has conspicuously tall, triangular ears tipped with 4-5 cm long black hair tufts similar to lynx; but the two species are unrelated. The common name derives from these extraordinary ears and means "black ears" in Turkish. The caracal's fur is short and tawny to brick-red coloured without any markings. The underparts are whitish. Melanistic animals also occur. This mid sized cat has a slender body and long legs. It can jump two meters or more into the air. The caracal is not as long-legged as the serval and is more sturdily built. Its tail is short and measures about a third of head and body length. Stiff hairs grow between the pads as an adaptation to travelling over sand. As with other desert species, caracal have excellent sight and hearing. Near the nose and the eyes the face is marked with dark lines and white spots. Females are smaller and lighter than males.

Habitat and Distribution

The caracal lives in all kinds of dry habitats such as semi deserts, steppes and dry forests, however not true deserts. The caracal has a wide geographic range but occurs only at low densities. Its range extends from northern Africa and Turkey through the Arabian Peninsula and the Middle East to Turkmenistan and northwestern India. The caracal is also found throughout Africa except the deserts of the Sahara and Namib and the tropical forests of western and central Africa. The biggest caracal population lives in South Africa and Namibia. In the north it is considered rare.

Feeding Ecology

Despite being an adept climber, the caracal hunts on the ground. It usually catches prey weighing less than 5 kg, such as young antelopes, hares, rodents, hyraxes, birds, mice and sometimes also invertebrates and reptiles. This cat makes use of edge habitat when seeking prey. The caracal is sometimes able to kill prey that measures 2-3 times its own body size such as adult springboks or young kudus. It preys also on domestic animals such as sheep and goats.

Behaviour

The caracal is solitary and not strictly nocturnal – they are known to be active during the day in some habitats. It prefers open terrain and it can tolerate much drier conditions than the serval. Known for its extraordinary jumping, the caracal often stalks birds and is then able to spring up and grab them when they flush. Traditionally people in India and Iran tamed and used them for sport to watch contests with fenced caracals taking pigeons in this way. Male territories are larger than those of the females. Territories may overlap and are marked with urine, faeces and claw marks.

Threats and Conservation

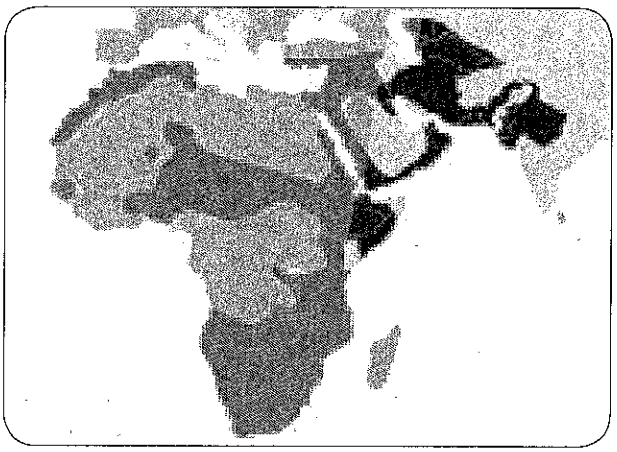
This is one of the few cats that are not endangered but its status does vary over its range: caracal may be rare in parts of Asia and north Africa but is common in South Africa and Israel for example. In South Africa and in Namibia the caracal is often killed because it hunts domestic sheep and goats. In many parts of its range the caracal is threatened by habitat destruction. In northern Africa and Asia not much is known about the ecology and status of the caracal. In South Africa and in Namibia the caracal is often killed because it hunts domestic sheep and goats. In many parts of its range the caracal is threatened by habitat destruction. In northern Africa and Asia not much is known about the ecology and status of the caracal population. In Africa the caracal shares its habitat with lions, hyaenas and leopards by whom it sometimes gets killed.



Caracal
Karakal, caracal

Weight	6–18 kg
Body length	80–100 cm
Tail length	20–34 cm
Longevity	16–19 years
Litter size	1–6 cubs

IUCN Red Liste: Least Concern





Leopard *Panthera pardus* (Linnaeus, 1758)



Leopard
Leopard, léopard

Weight	17–71 kg
Body length	92–137 cm
Tail length	51–91 cm
Longevity	13–21 years
Littersize	1–4 cubs

IUCN Red List: Near threatened

The leopard like the jaguar is a powerfully built cat: its relatively short legs and broad paws are distinctive and muscular, advantages when attacking large prey. Yet a long body and tail add a graceful look and aid in tree climbing at which leopards excel. With a huge geographic spread comes much variation in size and colouring; and there is also a marked difference in size and other physical features between the sexes, indicative of different feeding ecology. Largest cats tend to be from Africa and weigh in at about 90 kg while the Arabian leopard tops 25 kg. Fur varies in texture and colour though leopards generally are spotted overall with individually unique patterns on a background ranging from yellowish to olive. Melanistic individuals are rare in Africa but are more common in Java and Malaysia.

Habitat and Distribution

The distribution of leopards represents a remarkable geographic spread, possibly the biggest for any felid – from the Russian Far East to the south of Africa, a huge belt with extreme variation in conditions and habitat types from tropical rainforest to high mountain slopes with all forest types and savannahs and bushland in between. From snow to sand, from subarctic to sub-Saharan habitat use, leopards seem only absent in the true desert zones. There is a small population in the western part of Africa about which not much scientific detail is known.

Feeding Ecology

Some particular feeding habits enable this species to use such a vast range – leopards generally prey opportunistically on a variety of prey from large ungulates to invertebrates. Capable of killing prey up to 2 or 3 times their own body weight, they prefer medium sizeed ungulates in any given habitat. Primates, hares, rodents, large birds and small carnivores can form an important part of their diet. As such generalists they may be more capable than similar size large cat species to withstand losses or sharp declines in ungulate populations. Their ability to use trees for caching surplus meat enables them to live close to lions and tigers and to withstand pressure from scavengers.

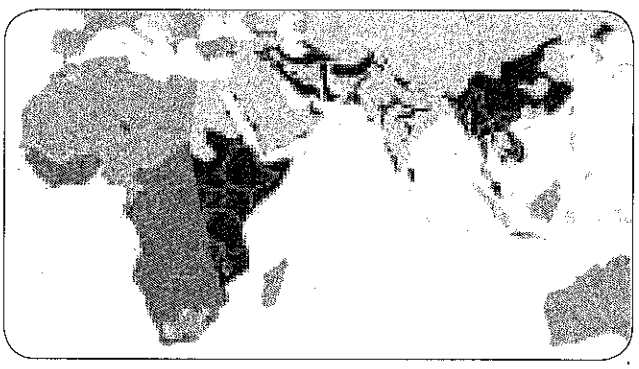
Behaviour

Their particular hunting style involves stalking from a very low position with longs periods of time motionless if need be: they attack from very close range with a short burst of speed and a powerful strike of the front paw. Small prey are taken opportunistically without much chase. Prey are often dragged up trees for eating and caching. They are visual hunters using trees and other high points to locate prey from a distance. Leopards are solitary and territorial.They scent mark and use much vocalization. Despite such a wide distribution there are not many detailed studies available for this species.

Threats and Conservation

Although critically endangered in some parts of its range, the leopard is abundant enough to be legally hunted as a trophy in others. The hunting of this species may not be sustainable since probably too many young animals are removed from the population. Poaching takes a large number of animals throughout the vast range. The greatest threat generally comes from the expansion of ranchland for livestock breeding which tends to depress the populations of wild ungulates on which leopards depend. Leopards are persecuted when they prey on domestic livestock and when they turn to killing people. Especially in India effort is being applied to alleviate the human toll. Historically leopard numbers have drastically declined with human population expansion. Females can reproduce at about 2 ½ years and usually produce about 3 cubs, so leopards could recover under favourable conditions from depressions. Some conservation plans are underway in the most critically affected areas such as the Arabian Peninsula and the Caucasus.





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Jungle Cat *Felis chaus* (Schreber, 1777)

The jungle cat, like the serval, has distinctly long legs with conspicuous stripes at the top. Its unspotted coat varies from reddish to sandy brown. The tail measures one third of the cat's head and body length and has usually dark stripes near the end, as at the tops of the legs. The jungle cat has a long, slim face with especially tall ears that are set relatively close together, reddish on the backs and tipped with small black tufts. The jungle cat has a white facial ruff with a light coloured throat and belly. Melanistic jungle cats often occur in south-eastern Pakistan and in India.

Habitat and Distribution

The jungle cat is distributed from Egypt across central and South Asia through southeast China, Myanmar, Thailand, Cambodia and, marginally, Lao PDR and Vietnam. It inhabits swamps but also dry, sandy deserts and sparsely vegetated steppes, a remarkable spread of habitat zones. It prefers moist habitats with tall grass or reeds to hide in. It does not occur in cold climates, where snowfall is common, or in thick forest. Most of its range is under 1,000 m, but in the Himalaya jungle cats live up to 2,400 m. It uses agricultural habitats, including around human settlements. The species has been considered common in India, but in most other regions its status is poorly known. There is only one historical specimen from Indochina, and very few recent records from there outside Cambodia, where it remains locally common in the shrinking, large tracts of open deciduous forest interspersed with grassland.


© K. Shekhar

Feeding Ecology

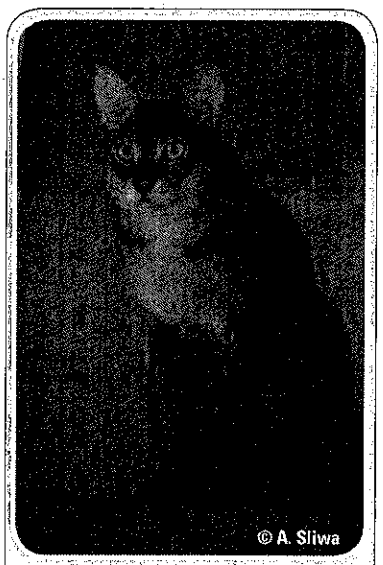
The jungle cat's prey varies across its broad range and consists commonly of rats, hares and mice all of which weigh less than 1 kg. It also feeds on squirrels, frogs, birds, lizards, small snakes, insects and eggs of birds and even fruits. Occasionally it hunts bigger prey such as young wild pigs or gazelles. The jungle cat is an adept swimmer and even dives into pools to catch fish. Close to villages jungle cats catch domestic animals such as chickens, ducks and geese.

Behaviour

The jungle cat is solitary and active during day and night. The jungle cat rests under bushes, in caves, in the thicket or in reeds. It stalks its prey on the ground and attacks from behind, but can also jump high into the air to catch birds. It communicates via scent-markings but little is known about its social organization.

Threats and Conservation

There are no recent studies of exact population trends; it seems common in some parts of its range but rare in others. The jungle cat adapts more readily to agricultural development than most small felids but clearing of uncultivated vegetation along rivers and in wetlands poses serious threats regionally.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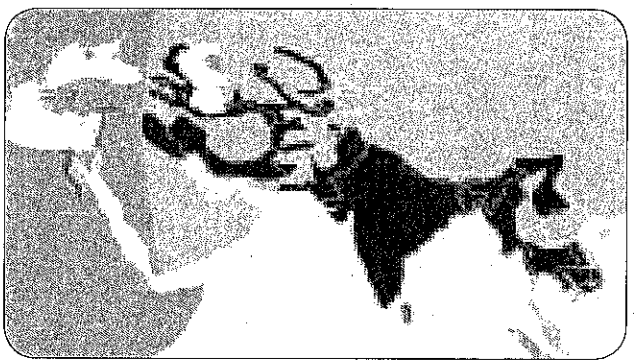
Jungle Cat
Rohrkatze, chat de jungle

Weight	5–9 kg
Body length	58–76 cm
Tail length	21–27 cm
Longevity	9–10 years
Littersize	3–4 cubs

IUCN Red List: Least Concern

Loss of riparian zones means loss of prey base, and in cultivated landscape the jungle cat is at high risk for human conflicts. People kill jungle cats when they attack their domestic animals and some level of illegal poaching for fur trade exists. It showed up on markets in Myanmar during surveys 1998-2006. They are sometimes also killed by larger predators such as leopards and big snakes.

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Sand Cat *Felis margarita* (Loche, 1858)


© A. Sliwa

Sand Cat
Sandkatze, chat de sable

Weight	1–3 kg
Body length	39–52 cm
Tail length	22–32 cm
Longevity	up to 14 years
Litter size	2–8 cubs

IUCN Red Liste: Near Threatened

The sand cat is one the smallest of the wild felids at about the size of a small domestic cat. It has a longish tail with 2-6 black rings and a black tip. It has very large ears set low on the sides of the broad, flattened head and a white muzzle and well-developed cheek hair. The ears have black tips with the insides covered in thick white hair. The large greenish-yellow eyes are surrounded by a white ring and a reddish line runs over the cheeks down the throat. The coat of the sand cat is a pale yellow or grey-brown colour, without spots or stripes. Some animals do have black markings on the legs. The belly and throat are white. In northern regions the sand cat's winter coat can be up to 6 cm long and very dense so that it can appear much larger. This thick coat and the dense dark hair growing between the toes and on the foot soles insulate against the extremes of hot desert sand and seasonal cold.

Habitat and Distribution
The sand cat lives in central and northeastern Karakum, the countries of Kazakhstan, Turkmenistan, Usbekistan, Iran, Pakistan, on the Arabian Peninsula, in Morocco, Western Sahara, Algeria, Mauritania, Niger, Egypt, and Israel. The sand cat occurs in sandy and rocky deserts so the distribution range probably contains only pockets with low densities of these small cats. It prefers to be near rocks, sparsely covered terrain and small sandy hills. It inhabits abandoned burrows of red foxes or porcupines beneath bushes and shrubs.

Feeding Ecology
Sand cats feed on gerbils, hamsters, grouse, larks, partridges and lizards. Sand cats obtain sufficient moisture from their prey since they generally occupy waterless terrain. Nomads know them as snake hunters – preying on two viper species by hitting them hard on the head and then biting on the back of the neck for the kill. When there is surplus meat from larger prey, this small desert dweller caches it under an insulating layer of sand for later consumption.

Behaviour
Sand cats are mainly nocturnal. At day they rest in their burrows to minimize the fluid loss. If threatened, sand cats crouch beside rocks or tussocks, do not move and are hardly visible. Sand cats are not good in climbing or jumping but excel in digging which is necessary for maintaining dens and for hunting small prey. With its exceptionally keen sense of hearing it can detect prey under the sand cover and then dig it out. Sand cats occupy large home ranges – the first studies which were done in Israel indicate that males maintain overlapping territories of about 16 km². Scent marking and vocalizations are used by both sexes to maintain social organization.

Threats and Conservation
Only a few field studies of this species have been carried out and the trends in its status and distribution are not well known. However, this is one cat which is not losing its preferred habitat – desertification is spreading across its range. The sand cat faces considerable other predictable threats: natural enemies can be locally abundant (snakes, large owls, jackals and red fox) and there may be disease transmission from domestic carnivores. They may also be killed when they prey on domestic animals and they can be a local target for the wild pet trade. On the other hand, in some places nomads consider them with respect because of their role in religious stories. Officially they are protected in only 8 countries while in 18 range countries little information is available and hunting may be allowed in some places.


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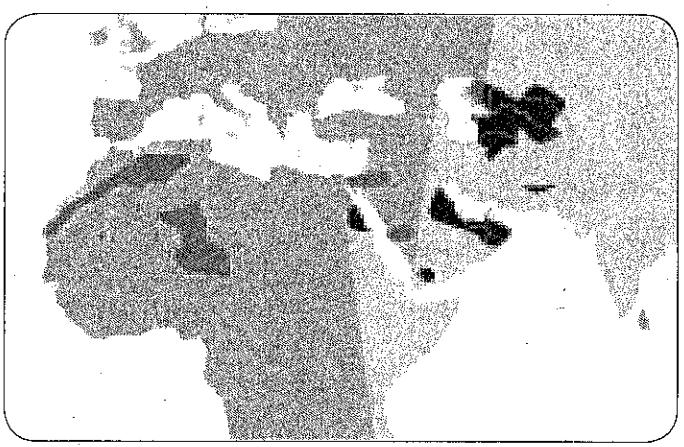


Cat News SI 5 Cats of the World_Final_2.indd 26 18.02.2011 15:08:30

Wildcat *Felis silvestris* (Schreber, 1777)

Debate continues about the genetic differences of wildcats and wild cats or feral domestic cats and the very different looking types of this species whether it lives in Mongolia or South Africa. They are all simply closely related. It is difficult to describe common features except perhaps at a regional level. The main factor that is common relates to the species' universal dependence on small rodents. Such prey typically undergo large cyclic changes in population and this cat must be able to produce large litters frequently to withstand the fluctuations in prey base. The size of the wildcat is that of a large housecat but colour and fur vary with local conditions. The African wildcat's (botton right) fur is short, reddish, tawny, sandy coloured or greyish, and marked with faint, unremarkable vertical lines and spots on the body and sides. It has long legs. The paw pads are black like those of the black-footed cat. Small hair tufts grow from the tip of each ear. The fur of the Asiatic wildcat is short, greyish or reddish and conspicuously marked with small, black or reddish-brown spots (below). The slightly paler forms live in dryer areas and the darker, more heavily spotted and striped forms occur in more humid areas. The thick, long coat of the European wildcat (top right) is grey-brown with dark stripes on the head, neck, limbs, and along the back. Its legs are short and the tail is bushy and marked with dark rings and a black tip.



Habitat and Distribution

The European wildcat inhabits parts of Europe and parts of the adjoining Russia into central Asia. It lives mainly in forests but can also inhabit moorlands, swamps and steppe habitat. The Asiatic wildcat is found from Iran to India, the African wildcat in almost all of Africa and the Arabian Peninsula. There it also inhabits deserts, semi deserts, savannahs and open forests in hilly and rocky terrain.

Feeding Ecology

The wildcat feeds on rodents such as rats and mice. Occasionally it also hunts hares, rabbits, birds, insects, frogs, fish, martens, weasels, polecats, and rarely poultry.

Behaviour

The wildcat is nocturnal and hunts on the ground although it is an excellent climber. This small cat primarily gets its prey by stalking followed by a quick attack. The wildcat is solitary and territorial using scent marks for communication.

Threats and Conservation

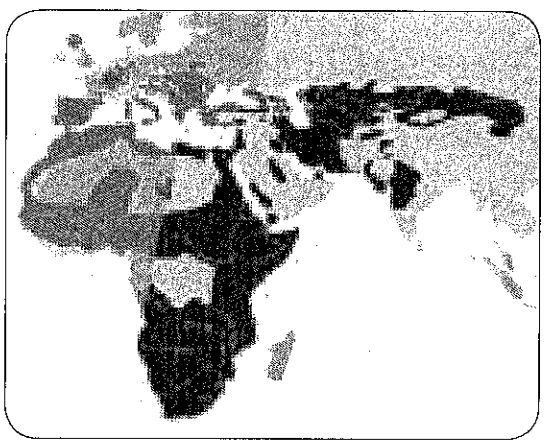
The African wildcat was long thought to be the ancestor of our domestic cat (Felis silvestris catus). 4000 years ago, wildcats lived with humans as shown in artworks of ancient Egypt. Recent investigation indicate that the origin of the domestic cat is Mesopotamia where the first grains were cultivated – people needed a hunter to keep rats and mice from destroying the crops. The wildcat is barely at risk but it interbreeds with domestic cats and precious genetic information gets lost. Wildcats also suffer from diseases transmitted from domestic cats and from the loss of habitat in favour of agriculture. Many cats are killed by vehicles in the more settled parts of their range.

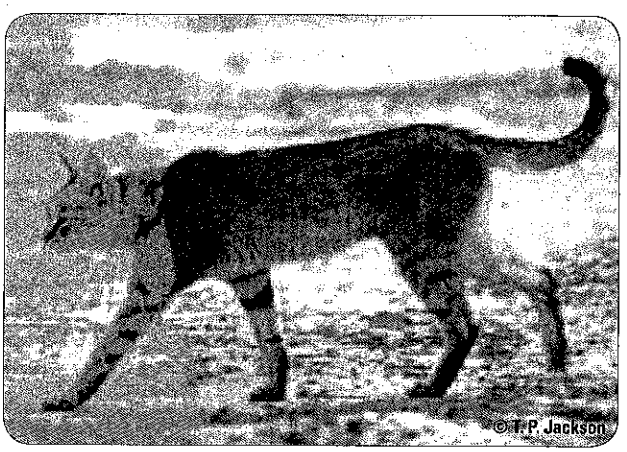


Wild Cat
Wildkatze, chat sauvage

Weight	3–6 kg
Body length	45–80 cmv
Tail length	ca. 30 cm
Longevity	to 16 years
Littersize	1–6 cubs

IUCN Red List: Least Concern





Chinese Mountain Cat *Felis bieti* (Milne-Edwards, 1892)



Chinese Mountain Cat
Chinesische Bergkatze, chat de Biet

Weight	5,5–9 kg
Body length	60–85 cm
Tail length	29–35 cm
Longevity	unknown
Litter size	2–4 cubs

IUCN Red List: Vulnerable

The Chinese mountain cat or Chinese desert cat is the only endemic cat species in the vast country of China and the first photo record of this cat in the wild is from a camera trap in 2007 at 3750m. The ecology, population status and distribution are not well known. . It is closely related to and easily mistaken for the wildcat. In winter the fur is greyish and in summer it is dark brown. In Tibetan highlands local people refer to it as the "grass cat", the fur matching dry grass stalks so exactly. Faint horizontal brown lines run across the sides, the short legs and the cheeks. The lower lips, chin and belly are white and the throat appears pale yellowish-brown. The backs of the ears are also pale yellowish-brown and the ears are tipped with tufts of dark fur. The tail measures about 40 % of the cat's head and body length. The last part of the tail is encircled by three or four dark rings and the tip of the tail is black.

Habitat and Distribution

Despite reports from many parts of western China the only confirmed locations for this small mountain cat are in east and northeastern edge of the Tibetan Plateau in the provinces Quighai and Sichuan. This limited range means that this small cat has adapted to the harsh climatic extremes that occur seasonally and with altitude: open, dry, windy and very hot as well as very cold. It inhabits steppe grasslands at high elevations, alpine meadows and alpine shrubland and sometimes edges of coniferous forests; it has not been found in true desert or dense forests.

Feeding Ecology

No ecological studies have been conducted on this species in the wild but considerable knowledge comes from local herders and from work done in the Xining Zoo. In their mountainous habitat this cat hunts mainly local rodents, lagomorphs and birds in the size range of pheasants and partridges. The importance of pikas as an important prey ties the fate of this cat to human interactions: when local irruptions of voles and pikas lead governments to supply poison for pest control, this carnivore no doubt suffers the consequences. No longer widespread, the practice still occurs on a smaller scale.

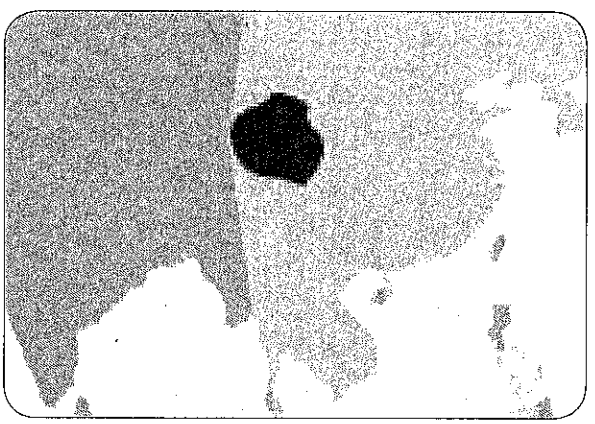
Behaviour

Interviews with local people and observations at the zoo indicate that this cat is primarily nocturnal and crepuscular, resting in burrows during the day. Most burrows have been found on south-facing slopes and some as high as 3600m. The Chinese mountain cat is solitary and not much is known of its reproductive activity in the wild.

Threats and Conservation

Population status and trends are unknown. It is clear that serious threats continue from the results of poisoning programs and from hunting for fur. In regard to the poisoning: recent work indicates that the problem of pest outbreaks result from overgrazing and by addressing this problem poison use could be eliminated with direct benefit to this carnivore. Direct loss by hunting results from the fur having value mostly locally for such products as hats and clothing but also on the market generally where furs are sold. The large scale open trade is closed but it still occurs at an unknown and unregulated level. The Chinese mountain cat is not protected over most of its range so effort is needed to monitor its status and secure conservation measures for guarding this unique species. One conservation group in China is currently planning a monitoring and survey program for this species.





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Pallas's Cat *Otocolobus manul* (Pallas, 1776)

Its short legs, stocky built and long fur give the Pallas's cat a very distinctive look and make it appear bigger than it really is. It has a broad, rather flat face with the small ears set low on the head. Likely these adaptations result from having to stalk its prey in open terrain without much cover. Its large eyes are bordered with white and black lines and feature a unique third eyelid which functions as protection against the high cold winds and the dust storms common over its habitat. The bushy tail is about half as long as the body and is marked with several narrow black rings and a black tip. The thick fur is grey, tawny or reddish. The only markings are dark spots on the forehead, dark and white stripes on the cheeks and a few faint stripes on the legs. The chin and the throat are white.

Habitat and Distribution

The Pallas's cat is found from Iran throughout central Asia. The largest populations are thought to exist in Mongolia and China. In the western part of its range, its habitat is strongly fragmented. Little is known about the status of the Pallas's cat; it seems to be rather widespread but rare. It occurs in hilly areas, montane grass and shrub steppes and semi-deserts. In Mongolia, Pallas's cats prefer steep, rocky hill slopes where they can hide from predators. They are well adapted to cold and arid climate, but a permanent snow cover of more than 15 cm seems to limit their distribution.

Feeding Ecology

The Palla`s cat feeds mainly on pikas and small rodents such as gerbils, voles and jerboas. It occasionally hunts partridge, hares or young marmots. Its prey typically weighs 100-400 grams. In spring manul, as they are known in Mongolia, may sometimes prey on lambs of Argali sheep as revealed in a recent study of scat analysis.

Behaviour

The Palla`s cat can be active at any time of the day, although it is primarily crepuscular. It uses caves, rock crevices or abandoned burrows of other animals to protect itself from bad weather conditions, birds of prey and other carnivores. If it cannot flee for shelter, another anti-predator strategy is to remain still and count on its amazing camouflage. Pallas's cats are solitary and occupy very large homeranges in some parts of their range - up to 100 km² for males and 23 km² for females. The homeranges of several males overlap with several females.

Threats and Conservation

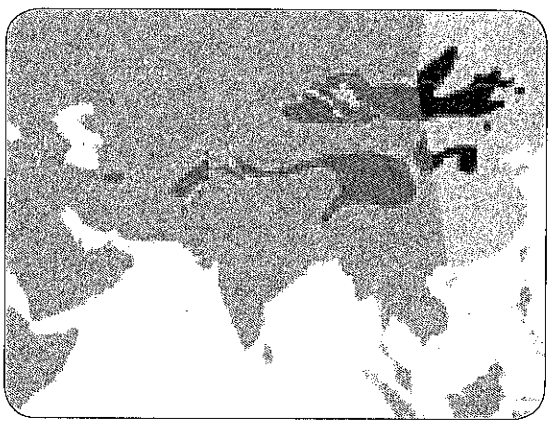
Hunting Pallas's cats is still allowed in Mongolia and every year an estimated 2000 animals are harvested. The fur is highly valued for local use since the hairs are both thick and strong and there is also a market in Russia and China for such fur. The cat serves as a control for the local pest rodents and as such has a measure of protection from overhunting by limiting the fur use to individual family subsistence purposes. Unfortunately the regulations are not enforced and Pallas's cats are vulnerable to overexploitation. The exotic pet market seeks live samples and high prices give local herders incentive to supply this illegal activity. The traditional medicine market offers even further motives for harvesting these small cats. One of the biggest threats is the loss of their prey base because of poisoning programs against pikas and degradation of habitat through overgrazing by livestock. Ongoing studies in Mongolia and Russia increase the knowledge base of Pallas's cat ecology. these studies have shown that Pallas's cats are often killed by domestic dogs.

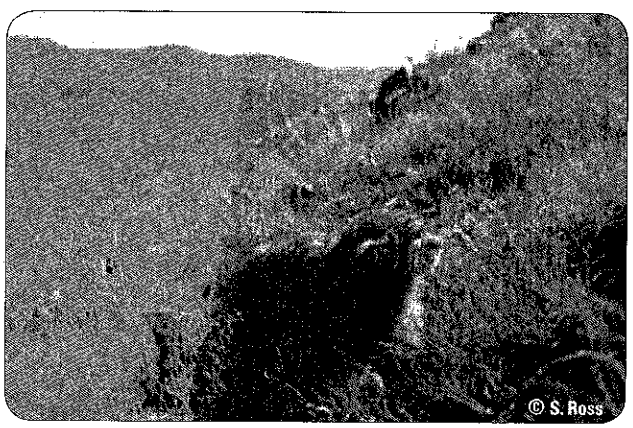


Pallas's Cat
Manul, chat manul

Weight	3–5 kg
Body length	46–65 cm
Tail length	21–31 cm
Longevity	8–10 years
Littersize	2–6 cubs

IUCN Red List: Near threatened





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Snow Leopard *Panthera uncia* (Schreber, 1775)



Snow Leopard
Schneeleopard, panthère de neige

Weight	30–50 kg
Body length	90–120 cm
Tail length	80–100 cm
Longevity	10–20 years
Litter size	1–5 cubs

IUCN Red List: Endangered

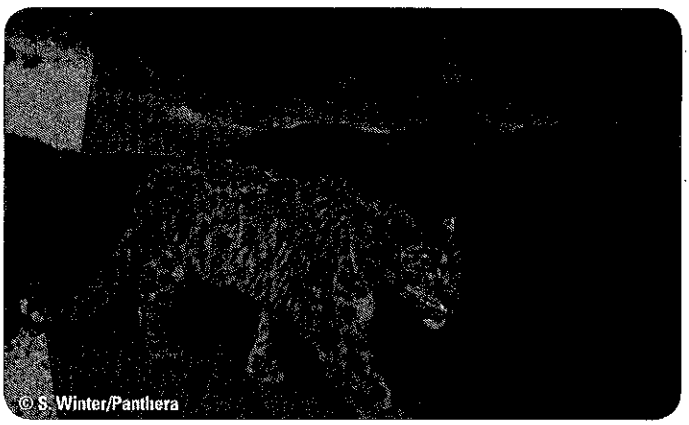
With thick fur, an extraordinary long bushy tail and the light green or grey eyes, the snow leopard is one of the most beautiful of the big cats. This strong and muscularly built cat has massive front paws and long legs that help them move in deep snow. The short, rounded ears are set wide apart, and the backs of the ears are black with a light centre. The colour of the fur is grey-brown and the underparts of the body are whitish. In the winter the fur is long and thick and protects against the cold. Black spots mark the head, neck, and limbs. The patches on the back, flanks and tail form large, dark rosettes with pale centres . The markings coalesce along the back to form two dark lines that extend from the neck to the base of the tail.

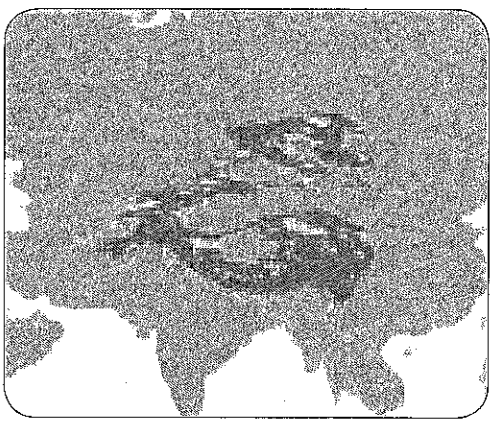
Habitat and Distribution
Snow leopards are found in the high mountains of 12 central Asian countries. They prefer rocky areas where the terrain is broken by cliffs, ridges, steep slopes and ravines. They inhabit dry alpine steppe, usually above tree line, up to an elevation of 6,000 m.

Feeding Ecology
Snow leopards primarily prey on wild sheep and goats (blue sheep, ibex, markhor, and argali). Additionally they take small prey such as marmot, pika, hare, snowcock and partridge. Domestic livestock frequently appear in their diet.

Behaviour
Snow leopards are solitary and may occupy very large territories. Recent data from South Gobi, Mongolia, show subadult males using home ranges of about 480 km². One GPS collared female in Pakistan was found to have a home range exceeding 1,000 km². Snow leopards are most active at dusk and dawn. They stalk prey from above, chasing them down steep slopes. Snow leopards are adept climbers. They communicate most often using scent-marks and scrapes.

Threats and Conservation
Snow leopards are thought to have been extirpated from relatively little of their extensive but highly fragmented range. Major threats include serious declines in their primary prey and persecution by humans. The mountain ungulates upon which this species depend are being negatively impacted by overhunting and in some areas by competition for forage with expanding domestic herds. Poaching for trade has increased in recent years because the market now includes demand for bones and other body parts used in Chinese traditional medicine as well as the valuable pelts that show up everywhere, e.g. in the Middle East or on international military bases and at tourist bazaars in Kabul, Afghanistan. For a species that requires such a large home range, and in which the young stay with their mother for up to 2 years, a decrease in numbers can be devastating on a local scale, especially when females are removed. Additional losses in snow leopard numbers arise from the demand for live animals. The extent of the illegal taking of snow leopards is not known. Several international groups are now working with local herders to address both poaching and conflict issues. Community-based initiatives seek to improve local livelihoods, offset the economic losses of livestock depredation and thereby reduce poaching and retaliatory killing of snow leopards. An innovative collaborative (Mongolian/international) program to research the ecology, including the human dimension, of this cat in South Gobi of Mongolia addresses for the first time the long-term status and condition of snow leopards where they share landscape with people.





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Tiger *Panthera tigris* (Linnaeus, 1758)

As the largest cat and the only one with stripes, tigers are universally recognized as unique and intriguing: from symbols of great power in traditional settings to a trendy contemporary advertising figure. With a large geographic spread the variation in size can be considerable from 75 kg in the tropics to 325 kg in the Sikhote-Alin region. The characteristic striped pattern of the fur makes extreme camouflage possible for the stalking technique used in hunting. Physically designed for hunting and killing large ungulates, tigers have relatively large skulls with extraordinary canines and a powerful overall build that features a massive front end with legs higher at the shoulders than in the back.

Habitat and Distribution

With 6 subspecies spread over 13 range countries from Sumatra to Siberia habitat use by tigers varies from tropical forest types to high latitude taiga in the Far East and even to dry high altitude areas such as the recently phototrap-confirmed tigers in Bhutan at 4,000m. Consider the variation in just one parameter – temperatures cover the plus 40 to minus 40 range. Some basic habitat needs remain constant: all tigers require high densities of the local large ungulates, dense cover for stalking and typically a source of water.

Feeding Ecology

Tigers clearly rely primarily upon large ungulate prey. Kills are often taken to nearby cover to be eaten, with some legendary distances and weights observed. Usually tigers alternate eating and resting, caching any unconsumed meat. They usually return until all is eaten even in places where decomposition occurs.

Behaviour

Tigers hunt and live as individuals except that cubs stay with their mother for 18 to 28 months. Females require and maintain individual territories. Males disperse sometimes long distances and their territories often overlap. The size of individual home ranges can be large and females must aggressively defend the resources within their home range while males have to search extensively and compete for available mates. Tigers do reproduce well under favourable conditions. The use of scent marking, vocalizations and visual signalling for communication.

Threats and Conservation

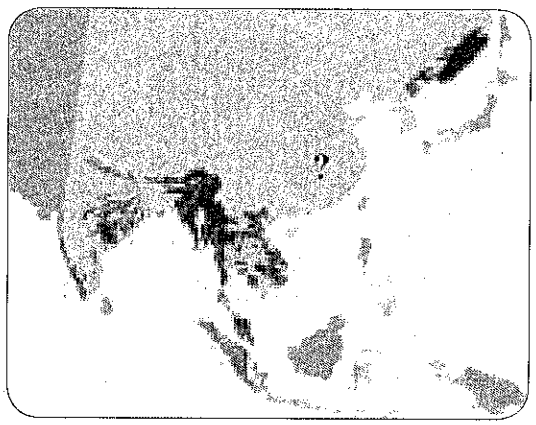
The demise of tiger populations has been roared around the world: it is known that only about 3200-3500 individuals exist today whereas as recently as 1900 there were around 100,000. The alarm triggered governments and conservation organizations to commit to unprecedented actions to reverse this trend: ongoing work by international conservation NGOs coupled with the goals established by the 2010 "Tiger Summit" will commit impressive resources to stabilizing and increasing tiger numbers over their range in the next several years. Landscape analyses showed that known tiger reserves could support more than double today's numbers but that an international landscape-scale approach at many political levels is the crucial factor for success. There are only so many potential "source" populations among the protected tiger areas and they are unevenly and distantly spread. Those areas represent only 6% of current tiger range when reproductive viability is investigated. Protecting and monitoring these remaining breeding populations is the first step. Establishing ecosystem-wide connecting corridors along with regionally relevant sustainable resource management must happen sooner than later. Yet all of this is possible only if the overhunting and poaching are stopped and in local communities people can live valuing the presence of tigers in their shared landscape.



Tiger
Tiger, tigre

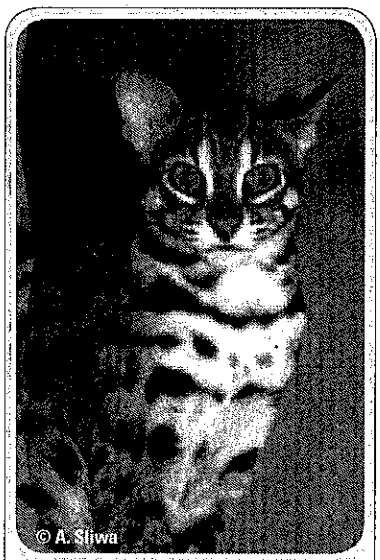
Weight	75–325 kg
Body length	150–230 cm
Tail length	90–110 cm
Longevity	12–15 years
Littersize	1–7 cubs

IUCN Red List: Endangered





Leopard Cat *Prionailurus bengalensis* (Kerr, 1792)



Leopard Cat
Bengalkatze, chat léopard du Bengale

Weight	1.6–8 kg
Body length	45–65 cm
Tail length	20–30 cm
Longevity	to 13 years
Litter size	2–3 cubs

IUCN Red List: Least Concern

The leopard cat looks like a miniature, long-legged and more slender version of a leopard. It has a round head, a short narrow muzzle and big rounded ears. Leopard cats in the north of their range are larger and heavier with a pale greyish colour and a thick fur. The smaller cats from the south have ochre, yellow or brownish fur with white underparts. The size and shape of the black markings covering the body and limbs are also highly variable. Sometimes the spots form lines along the neck and back. The tail is about half as long as the body, spotted and can bear a few rings near the black tip. The ears have black backs with a white central spot and the face is marked with two dark stripes on the forehead. The cat has two narrow black cheek stripes enclosing a white spot. The largest cats are found in northern regions, they are also known as Amur cat.

Habitat and Distribution

The leopard cat is widespread throughout southeast Asia. It occurs from tropical rainforests to temperate broadleaf and dry coniferous forests, as well as in shrub and grasslands up to 3,000 m. It also thrives in disturbed habitats such as secondary forests or oil palm plantations. Leopard cats probably depend on areas with enough cover and proximity to water. In the north, their distribution is limited by snow cover.

Feeding Ecology

The leopard cat feeds mainly on small mammals, especially rats and mice. In a study in Thailand and Borneo, murids dominated the diet. It also takes lizards, amphibians, birds and insects. They are sometimes viewed as poultry pests.

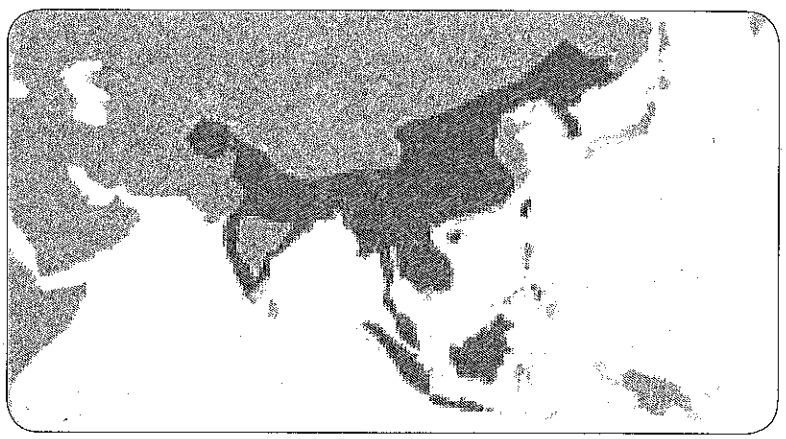
Behaviour

Leopard cats are mainly nocturnal, although they can also be active during the day. They are solitary but can sometimes be seen in pairs and with dependent young. Home range size varies from 3 to 14 km² depending on the region. They tend to use larger home ranges during the wet season than the dry season. They are mainly nocturnal and crepuscular. However, males show more diurnal activity than females. Leopard cats use forest and understorey for resting and breeding. They are adept climbers and good swimmers.

Threats and Conservation

Many felids in southeast Asia suffer from habitat loss through deforestation. The leopard cat seems to be less threatened by habitat alteration, since it can also live in cultivated areas and it remains the most common wild cat in south Asia. They have been heavily exploited in the past – up to 400,000 skins per year are reported sold for the fur industry during the 1980s in China, the country with the biggest population. The harvest of leopard cats for fur and in some places for meat continues but it is not closely monitored or managed for sustainability. This cat is protected in some parts of its range. Leopard cats can interbreed with domestic cats and hybrids are sold as pets under the name of "bengal cat" or "safari cat". This increasing trend puts pressure on local populations but the numbers are not known. Population status and trend of the leopard cat are generally unknown but estimated to be stable. They show up frequently as by-catch in many Asian photo trap sessions. The subspecies P. b. rabori of the Philippines is Vulnerable and the Iriomote cat P. b. Iriomotensis, living only on the island of Iriomote, is even listed as Critically Endangered in the IUCN Red List. The latter is very well studied and a lot of conservation efforts have been made for years.





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Fishing cat *Prionailurus viverrinus* (Bennett, 1833)

The fishing cat is a middle sized cat. The fur is short, coarse and grey or olive brown. The head and body are conspicuously marked with small black spots and stripes. On the face, back and neck the spots merge into short lines. Its belly is white and there are two dark collars on the throat. The head is relatively big and broad with ears are small and also rounded ears. The backs of the ears are black with white central spots. The thick tail measures about one-third of the head and body length and is muscular near the body. It is marked with 5-6 black rings and a black tip. The claws have incomplete sheaths and the hind feet are webbed. It is often confused with the leopard cat.

Habitat and Distribution

The fishing cat inhabits much of mainland tropical Asia and the large islands of Sri Lanka and Java. Its presence on Sumatra is disputed as there are no confirmed records, and photos first identified as fishing cat all turned out to be leopard cat on a second look. Its actual distribution and also the phylogenetic relation between isolated populations require further investigation. The fishing cat lives near water and thick cover in habitats such as mangroves, marshes and along watercourses. In Sri Lanka, India and Nepal they live in forests, shrubs, reed beds and tall grass areas. It might have disappeared from Java as there are no recent confirmed records.

Feeding Ecology

The fishing cat takes a wide range of mostly aquatic prey. It dives into water to catch fish, ducks or coots. It also feeds on frogs, small mammals, snakes, snails, crustaceans, and is known to sometimes take young deer and carrion. The fishing cat travels along rivers and changes its hunting site about every fifteen minutes. Occasionally it kills dogs and domestic animals up to the size of calves.

Behaviour

The fishing cat is nocturnal and spends most of its time in dense cover. It is an excellent swimmer and diver over long distances. The fishing cat hunts alone. It has been observed hunting mostly in shallow water where it uses the webbed feet to push itself along leaving the front feet ready to grab fish. Territories of males enclose several female home ranges and both sexes use scent for marking.

Threats and Conservation

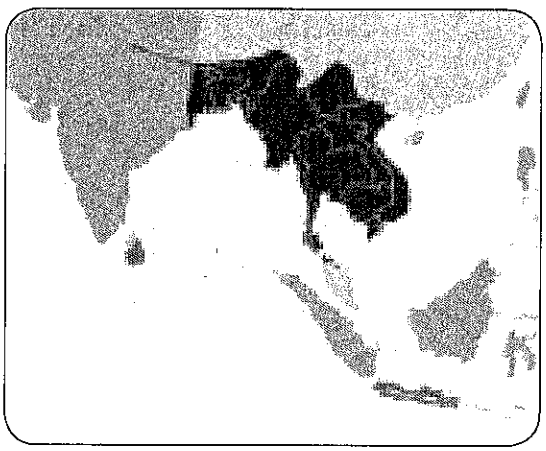
Wetland, marshes and grasslands are increasingly lost to agricultural land development. Thus the fishing cat loses crucial habitat. Increasingly pollution in the waterways of Asia pose an obvious indirect threat as it consumes lethally contaminated prey. It is killed both for its fur as well as the meat which is locally considered a delicacy. Unknown numbers of live fishing cats are exported into western countries for the exotic pet market. Fishing cats which hunt domestic animals are also killed, poisoned, and snared. In Thailand a current conservation project includes a strong public education feature as it attempts to reverse the trend of persecution of this unusual felid. An Indian conservation organisation also recently started a public fishing cat survey and an education program to promote conservation awareness. The regular confusion with the leopard cat has led to an overestimation of its range, and the species might be a lot less common than formerly thought. A survey in Thailand only identified two sites with confirmed fishing cat presence.



Fishing Cat
Fischkatze, chat pêcheur

Weight	7–16 kg
Body length	65–85 cm
Tail length	25–30 cm
Longevity	to 10 years
Littersize	2–3 cubs

IUCN Red List: Endangered





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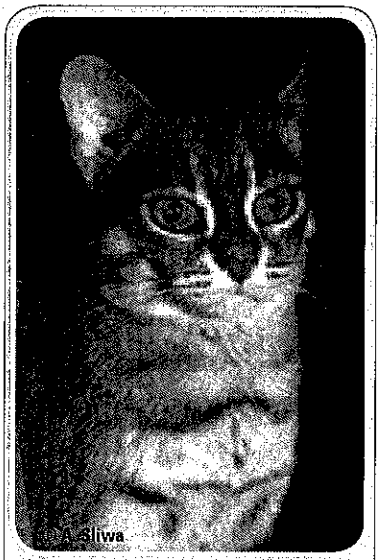
Rusty-spotted Cat *Prionailurus rubiginosus* (Saint-Hilaire, 1831)



Rusty-spotted Cat
Rostkatze, chat rougeâtre

Weight	1–2 kg
Body length	35–48 cm
Tail length	20–25 cm
Longevity	up to 18 years
Litter size	2–3 cubs

IUCN Red List: Vulnerable

The rusty-spotted cat is the smallest wild felid of Asia and about half the size of a domestic cat. The ears are rounded and small and the tail is about half the length of the head and body. The brownish grey fur tinged with a rufous colour is short and soft. There are horizontal bars on legs and chest. The head is rounded and their relatively large eyes are marked with a white streak along the inside edge. Each cheek is marked with two dark streaks and four dark stripes extend from above the eyes backward over the head and to the neck. The back and sides are marked with red-brown blotches, which merge into lines. The belly, chest and throat are white and covered with large dark spots and bars.

Habitat and Distribution

Rusty-spotted cats are limited to India and Sri Lanka. Presence of this small cat is confirmed as far northwest as the Gir Forest and recently also in the Terai. Preliminary observations from a study in western India show a new distribution record for this small cat - it was detected in a forest region of eastern Gujarat. The rusty-spotted cat uses dry forests, tropical thorn forests, scrub forests, grasslands and rocky areas. In Sri Lanka the rusty-spotted cat is also found in humid forests and in arid coastal belts.

Feeding Ecology

The main prey for this small cat is likely birds and small mammals with opportunistic hunts on insects, lizards and frogs and occasionally poultry. In the Gujarat area rodents were recorded as the main prey.

Behaviour

The rusty-spotted cat is mainly nocturnal, resting during the day in hollow tree trunks or in thickets. It is said that the rusty-spotted cat is extremely agile and active. Even though it is a good climber, it probably hunts mainly on the ground but sometimes in trees as well. This arboreal activity was confirmed recently by a study in western India. It flees when threatened into the trees. The rusty-spotted cat has many enemies such as jackals, foxes and other cat species.

Threats and Conservation

Population densities and dynamics are poorly known. Rusty-spotted cats are described as rare. Recent observations lead to the assumption that this small cat is not that uncommon and is able to survive close to villages. In W. Maharashtra, rusty-spotted cat cubs were found in sugarcane fields during harvest. Future studies should also look at the agricultural landscape. It probably suffers from loss of natural habitat and from a decline of its prey base, as with most wild animals in India. However, it may also benefits from clearing and low intensity agriculture, when this promotes high rodent populations. This type of ecological question needs further investigation. Although a many point observations have been reported, there is no clear picture yet in regard to details of the ecology and behaviour of the species. Rusty-spotted cats are frequently killed for meat which is sold as a delicacy in some parts of India. In Sri Lanka rusty-spotted cats are regularly shot because they are mistaken for small leopards. The rusty-spotted cat does not fare well in captivity and only a few are held in European zoos outside its natural distribution.

The 8 cat lineages
Based on genetic research cats today are classified into 8 lineages:

Panthera lineage: lion, tiger, jaguar, leopard, snow leopard, clouded leopard

Borneo Bay cat lineage: Borneo Bay cat, Asiatic golden cat, marbled cat

Caracal lineage: caracal, Africal golden cat, serval

Ocelot lineage: ocelot, margay, Andean cat, Pampas cat, Geoffroy's cat, guiña, oncilla

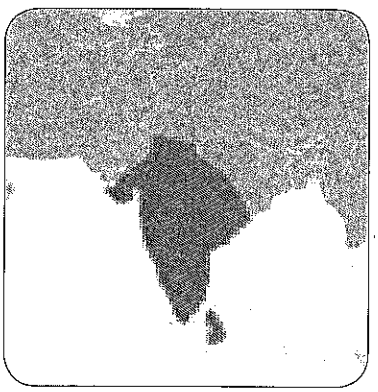
Lynx lineage: Iberian lynx, Eurasian lynx, Canada lynx, bobcat

Puma lineage: Puma, jaguarundi, cheetah

Leopard cat lineage: Pallas's cat, rusty-spotted cat, leopard cat, fishing cat, flat headed cat

Domestic cat lineage: domestic cat, wildcat, Chinese mountain cat, sand cat, black-footed cat, jungle cat





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Asiatic Golden Cat *Pardofelis temminckii*

(Vigors & Horsfield, 1827)

The Asiatic golden cat is a medium sized cat, sturdily built with relatively long legs. It looks similar to the African golden cat *Profelis aurata*, except that the Asian species is heavier with a longer tail. The two species are, however, not related. The fur colour varies from golden to red brown, dark brown or grey with almost no markings. There is also a spotted form called 'ocelot morph' and a rare melanistic form. Both uniform and ocelot morph have white lines bordered with black in the face and on the inner side of the legs. The most distinct features of this cat are the white lines bordered with dark brown to black running across the cheeks, and from the inner corners of the eyes up to the crown. The rounded ears have black backs with a grey spot. The underside of the tail is white.

Habitat and Distribution

The Asiatic golden cat ranges from China over India and Nepal to Indochina, Malaysia and Sumatra. It inhabits tropical and subtropical evergreen, mixed and dry deciduous forest up to an elevation of over 3,500 m. Sometimes it occurs in more open areas.

Feeding Ecology

The Asiatic golden cat mainly feeds mainly on rodents and other small mammals, as well as on birds sankes and lizards, but also on small ungulates like muntjacs or small samba deer. In Peninsular Malaysia, scat analysis revealed that golden cats also prey on monkeys and mouse.deer. It may be capable of hunting mammals up to the size of small deer and is also known to prey on poultry.

Behaviour

The ecology of the Asiatic golden cat is not well known. It is a terrestrial hunter and is active at night and in twilight hours. The home ranges of two radio collared golden cats in Thailand were 33 km² (female) and 48 km² (male) and overlapped in in 78% of their area. In captivity a variety of different vocalisations and scent marking behaviours have been observed.

Threats and Conservation

The Asiatic golden cat is rarely observed in nature and its population status is largely unknown. However, it has repeatedly been photographed during recent camera trapping surveys, suggesting that it may be more common than previously thought. The biggest threat to the Asiatic golden cat is habitat loss, as Southeast Asian forests are undergoing the world's fastest regional deforestation rates. Although they are protected, Asiatic golden cats are still hunted for their fur and bones which are used in the traditional medicine. Their bones are sometimes ground and taken agains fever. Their meat is considered a delicacy and the whole animal is often roasted on a spit. They are also persecuted because they prey on poultry.

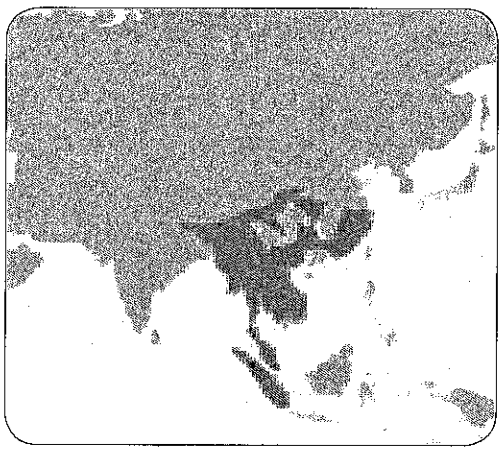


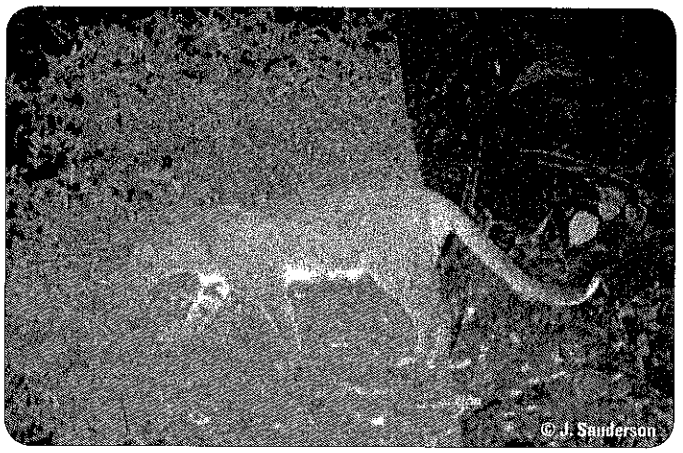
Asiatic Golden Cat
Asiat. Goldkatze, chat doré d'Asie

Weight	9–16 kg
Body length	71–105 cm
Tail length	40–56 cm
Longevity	to 17 years
Littersize	1–3 cubs

IUCN Red List: Near Threatened







Marbled cat *Pardofelis marmorata* (Martin, 1837)



Marbled Cat
Marmorkatze, chat marbré

Weight	2–5 kg
Body length	45–62 cm
Tail length	36–55 cm
Longevity	to 12 years
Litter size	2 cubs

IUCN Red List: Vulnerable

The marbled cat is about the same weight as a very large domestic cat, but gives the impression of being more slender and elongated. Marbled cats are often compared to small clouded leopards, as both species bear the distinctive marbling pattern on their coats, with the combination of large, irregular shaped dark blotches, margined with black. The background colour is brownish-grey to reddish-brown. Melanistic individuals have been observed in Sumatra. The tail is nearly as long as the head and body length and very bushy. The tail is marked with black spots proximally and rings distally. While walking, they bear it stretched out horizontally and do not drag it on the ground like a snow leopard. The foot structure, relatively short legs and the long tail indicate the arboreal adaptations of this small cat. The spots on the forehead merge into narrow longitudinal stripes on the neck and back. This small cat has a more rounded head than most other felids with a broad face and also rounded ears that have white bars on the back.

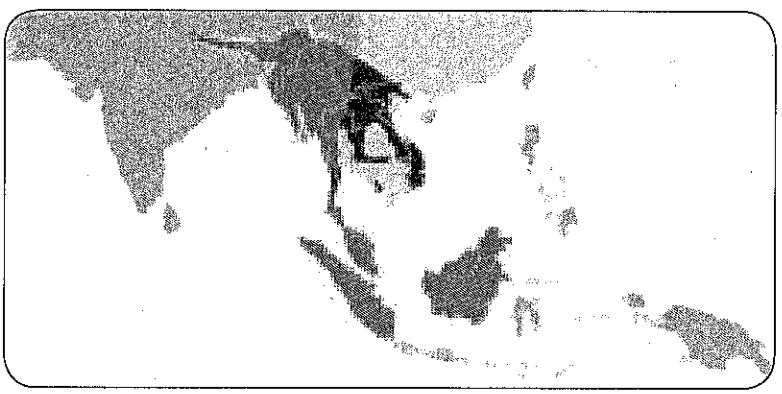
Habitat and Distribution
The marbled cat is found from Nepal, Bhutan and northeastern India to parts of Indochina. It also occurs in Malaysia, Sumatra and Borneo. The marbled cat's favoured habitats are remote moist forests. It inhabits tropical rain forests, evergreen mountainous forests and deciduous forests from sea level up to an elevation of 3,000 m. The only radio-collared cat was trapped in a mixed hill evergreen/bamboo forest. Although they most commonly inhabit primary forest habitats, individuals have also been documented in agricultural plantations.

Feeding Ecology
Marbled cats feed on birds, tree squirrels, fruit bats, rats, and presumably also on lizards and frogs. There have also been several documented instances of marbled cats preying on monkeys. Exact eating habits are difficult to assess because of their preference for dense forest habitat, they are only rarely observed. They seem rare compared to sympatric felid species, but this might be because they are easily overlooked. It is referred to as the Old World margay for its arboreal activity.

Behaviour
Ecology and behaviour of the marbled cat are poorly known. Presumably it is crepuscular and nocturnal. The marbled cat is thought to spend most of its time in the trees, however they are showing up in some photo trap projects so they obviously spend some time on the ground as well. A radio-tagged female in Thailand used an area of 6 km2.

Threats and Conservation
Status and distribution of the marbled cat are poorly studied and population trends are unknown. Marbled cat populations surely are susceptible to negative impacts from the destruction of their habitats through deforestation. The marbled cats seem especially sensitive to changes and disruptions caused by human. Although hunting is prohibited in Bangladesh, Cambodia, Indonesia, Malaysia, Myanmar, Nepal and Thailand, marbled cat parts are still found displayed in markets.





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Clouded Leopard *Neofelis nebulosa* and *N. diardi*

(Griffith, 1821; Cuvier, 1823)

The clouded leopard is comparable in size to a small leopard with a tail nearly as long as the head and body and relatively short legs. However some features make this cat stand out: the hind legs are very much longer than the front; the skull is long with canine teeth proportionally longer than those of any other extant cat; and its unique coat makes this cat easy to recognize. On a light background cloud-like rosettes with dark outlines and lighter centres form distinct markings over the back and sides. Two long stripes run along the spine and the tail has 6 crosswise stripes. Colouration and markings vary geographically and separate clouded leopards from the mainland (photo to the right) and the Sunda islands (picture below).

Habitat and Distribution

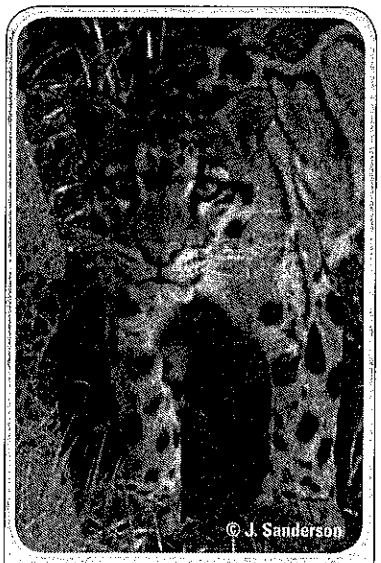
Clouded leopards are distributed from Nepal, Bhutan and southern China throughout Southeast Asia to Indochina and Malaysia. The clouded leopards living on Sumatra and Borneo are separated from the continental species and listed as a separate species, the Sunda clouded leopard (*N. diardi*). In some parts of its wide range it may be common but not that much detail is known about its population trend since it is inhabits typically very dense vegetation. Recent studies in Thailand and Borneo are increasing the understanding of the ecological niche of this elusive cat. In Borneo a programme for research and conservation studies combines capacity building with public awareness and conservation initiatives based on local input. Clouded leopards throughout their range occupy mainly the deepest parts of evergreen forests and up to 1,300 m.

Feeding Ecology

Clouded leopards feed on both arboreal and terrestrial vertebrates - for example on small deer, monkeys, squirrels and birds. Occasionally they hunt domestic poultry and goats but are not apparently interested in carrion.

Behaviour

Clouded leopards are solitary and mostly nocturnal and crepuscular. They move easily through the trees and are excellent climbers, one of the few cats which can also climb headfirst down a vertical trunk and hang from branches by their hind feet. The clouded leopard can also travel over quite long distances on the ground. They are solitary animals and mark their territories with scent.

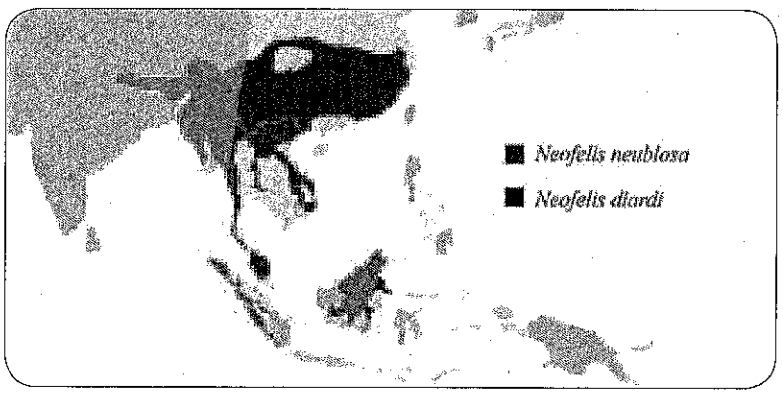


Clouded Leopard
Nebelparder, panthère nébuleuse

Weight	16–23 kg
Body length	69–108 cm
Tail length	61–91 cm
Longevity	15–17 years
Littersize	1–2 cubs

IUCN Red List: Vulnerable





Threats and Conservation

Clouded leopards suffer from crucial habitat loss when forests are converted to agricultural land and in some areas its prey base is seriously overhunted for local meat markets. Hunting for the valuable fur and traditional medicine market makes the mainland species especially vulnerable to human exploitation. Some trade in live animals for the exotic pet market keep the monetary value for this species high in some places and therefore subject to further population decline though protected from hunting over most of its range. There is a recognized need for more studies and monitoring for both species. Current work on Borneo will shed light on the ecology of *N. diardi*.

Borneo bay cat *Catopuma badia* (Gray, 1874)



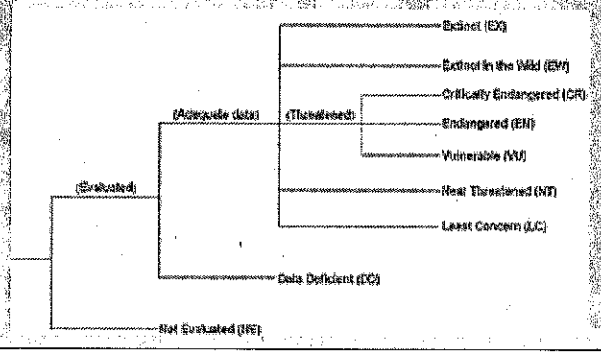
Borneo Bay Cat
Borneokatze, chat bai

Weight	3–4 kg
Body length	53–67 cm
Tail length	32–40 cm
Longevity	unknown
Litter size	unknown

IUCN Red List: Endangered

The IUCN Red List Categories

Species that have been assessed for the IUCN Red List are placed into one of the following categories. Extinct, Threatened (comprising the categories Critically Endangered, Endangered, and Vulnerable) or Near Threatened. Near Threatened species also need attentive surveillance, as they may quickly end up in on one of the Threatened categories. If a species is not at risk of extinction it is classified as Least Concern.



Little is known about many of the small cat species, but the Bornean bay cat is the least known of all. It was discovered in 1855 and was described from only few skins and skulls. It looks similar to a small Asiatic golden cat and was initially mistaken for an island form of this species. It took until 1998 to get a photo of this small cat and they showed up only in 2002 in the wild in a photo trap project. The first live Bornean bay cat scientifically examined was a female captured in 1992 and it weighed 2 kg. However, this animal was emaciated and healthy cats probably weigh 3-4 kg. Genetic samples from this individual confirmed that this is indeed a unique species. Bornean bay cats have a very long tail, a rounded head, and small rounded ears. The coat is either mahogany red or grey. The belly and the underside of the tail are light. The forehead is marked with faint dark stripes and there are light markings at the inner corners of the eyes. The backs of the ears are dark, lacking white spots.

Habitat and Distribution

The Bornean bay cat is endemic to the island of Borneo. It is probably forest dependent and has been reported from lowland and hill forests up to 800 m, as well as swamp forests and regenerating logged forests as confirmed by the innovative Bornean Wild Cat Programme. Presence in the disturbed forests, whether selectively logged or regenerating, indicates some level of adaptability but presumably the numbers are lower than in the primary forests. All species in the felid guild were recorded in the logged and unlogged forest mosaic surveyed by the team over three years but what is more threatening than logging is the alarming rate of clearing forest for palm oil plantations. In this type of disturbed landscape only one species was found, the leopard cat. Ongoing and future research will answer more details about the Bornean Bay cat's habitat use.

Feeding Ecology

There are no formal studies on the diet of the Bornean bay cat.

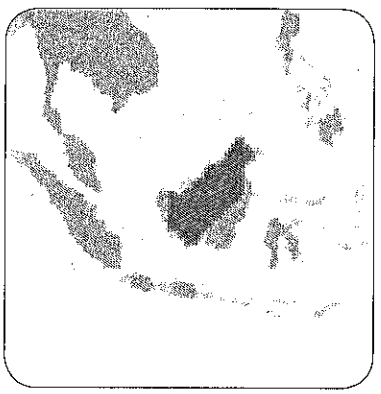
Behaviour

Today, behaviour, ecology and reproduction of the Bornean bay cat remain unknown. As it is rarely observed, it was thought to be nocturnal, but several recent camera trap pictures have also been taken during the day. All photographs are of single animals, suggesting that the bay cat is a solitary species.

Threats and Conservation

The Bornean bay cat is protected. Its limited distribution makes it endangered. Habitat loss and fragmentation caused by logging and conversion of forest to palm oil plantations are the main threats to this species. Another threat may be the high demand on this rare cat by foreign zoos and breeding facilities.





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Flat-headed cat *Prionailurus planiceps* (Vigors & Horsfield, 1827)

A rather odd-looking cat, the flat-headed cat resembles more a civet than a felid: its head is long and narrow with a flattened forehead with small rounded ears. The tail is short, measuring only a quarter of the cat's head and body length and is heavily furred. The underside of the tail is light in colour. It has long and narrow feet with some webbing. That feature along with the very pointed teeth that are backward facing, indicate some adaptations to at least some level of aquatic activity. The flat-headed cat's long and soft fur is reddish brown on top of the head and dark brown on the body. The hairs are tipped with white, which gives its fur a silvery appearance. The chin, muzzle and belly appear white. The face is lighter in colour than the body and two prominent whitish streaks run on either side of the nose. The noticeably large eyes of the flat-headed cat are set closer together than those of other cats, giving it better stereoscopic vision and suggest a nocturnal activity pattern. The flat-headed cat bears also the characteristic trait of partial claw retraction. That is, the claws are pulled into a sheath which leaves two thirds protruding.

Habitat and Distribution

The flat-headed cat's range extends from southern Thailand to Malaysia, Sumatra and Borneo. It inhabits tropical rainforests and marshes and is found along rivers and streams. Generally it is closely associated with watercourses Almost all photo records are from extreme lowland areas, generally below 100m.

Feeding Ecology

The flat-headed cat is believed to feed mostly on fish, but also eats frogs, mice, rats, crustaceans or fruits. The particular dental structure of this small cat help it grab and hold the slippery main prey items that it hunts.

Behaviour

Very little is known about the behaviour of this secretive cat. It is believed to be a solitary, nocturnal and crepuscular animal. Behavioural observations come exclusively from the few individuals kept in captivity They are extremely difficult to observe in the wild. Most sightings there were made of flat-headed cats walking on riverbanks. Their prey is caught in the water, but flat-headed cats carry their hunts away from the bank before consuming it. They have been observed swimming across rivers. Similar to other cats it sprays urine marks, but does so unlike any other cat: it walks forward in a crouching position leaving a trail on the ground.

Threats and Conservation

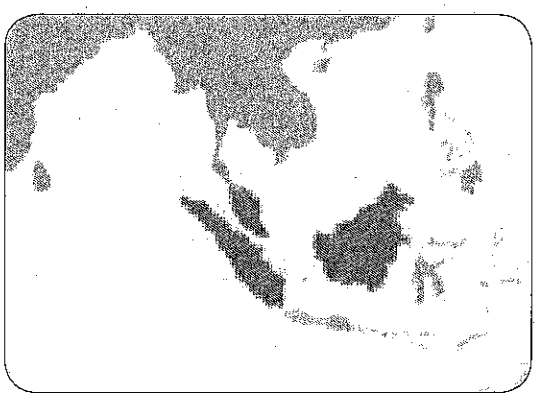
Records of sightings near oil palm plantations where they are supposed to feed on rodents lead to the assumption that flat-headed cats have some tolerance of modified habitats. However, recent work indicates that the flat-headed cat might not be as tolerant as previously believed as it ultimately depends on tropical lowland and peat swamp forests. These habitats show the highest degradation rates and only a low percentage is protected by law. Therefore the flat-headed cat can be considered a flagship species for the protection of other species associated with this type of habitat. In addition, the flat-headed cat suffers from pollution of watercourses mostly due to oil, chlorides and heavy metals. Fish are poisoned with direct consequences for this predator. It is protected over most of its range but not in Brunei and Singapore, where it no longer occurs. First conservation projects that aim to establish large tracts of forest with connecting corridors are underway in Borneo, but more conservation efforts and detailed studies of this rare cat are urgently needed.



Flat-headed Cat
Flachkopfkatze, chat à tête plate

Weight	ca. 2 kg
Body length	45–52 cm
Tail length	13–17 cm
Longevity	to 14 years
Littersize	1–2 cubs

IUCN Red List: Endangered





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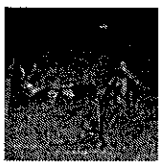


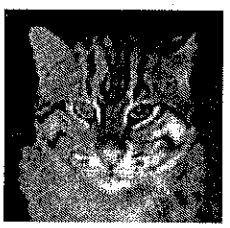

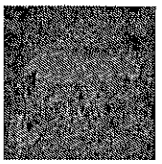
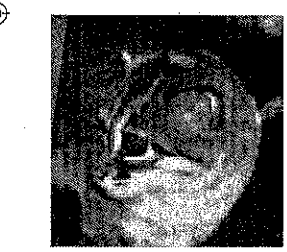

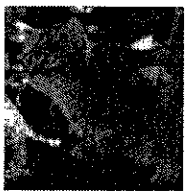


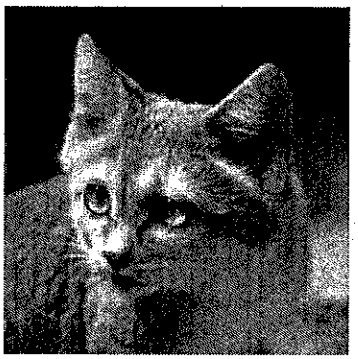
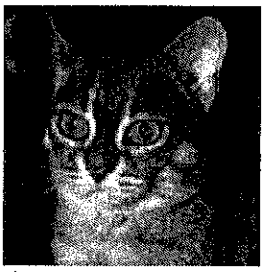

SPECIES SURVIVAL COMMISSION

CAT SPECIALIST GROUP

IUCN SSC

SPECIES SURVIVAL COMMISSION
CAT SPECIALIST GROUP

Development of Teaching Material for a Cat Conservation Course

Progress Report

In September 2010, the Forestry Bureau, Council of Agriculture of Taiwan, has granted the IUCN/SSC Cat Specialist Group an amount of US$ 10,000 to develop "Teaching Material" for cat conservation courses that the Cat Specialist Group is carrying out to increase the capacity around the globe.

The following progress has been made since the project has been approved last fall:

- A series of presentations on the different topics have been prepared in a standardized way (see list and first two slides below).
- We are in the process of writing the Field Handbook (Content see attachment).

All material will be tested in a course in the Caucasus in May 2011 and experience will be integrated into the final version.

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List of prepared presentations

1. Introduction
    - 1.1. Presentation of Cat SG
    - 1.2. Presentation of KORA
    - 1.3. Ecology of lynx in Switzerland
2. Conservation planning
    - 2.1. And how is the cat? Assessment of status and conservation needs of felids
    - 2.2. How to save the cat – Strategic conservation planning
    - 2.3. How to save the cat 2 – Development of status report, conservation strategy and national action plan
3. Monitoring
    - 3.1. Principles of monitoring
    - 3.2. Camera trapping
    - 3.3. Baseline surveys
    - 3.3. Disease surveillance
    - 3.4. Conservation genetics
    - 3.5. Habitat modelling
4. Practical training
    - 4.1. Kill identification
    - 4.2. Scat analysis
    - 4.3. Trapping systems
    - 4.4. Field anesthesia of Eurasian lynx
    - 4.5. Animal location and home range analyses
    - 4.6. Camera trapping – practical aspects
5. Concepts
    - 5.1. How to write a scientific paper
    - 5.2. SCALP – an expert network for cross border cooperation in conservation

First two slides of the Power Point Presentations

And how is the cat?

Assessment of the Status and Conservation Needs of Free Living Cat Species

1. The IUCN/SSC Red List assessment
2. The Global Mammal Assessment (GMA)
3. What do we need to know?
4. The CatSIS – Cat Species Information System

The teaching material for the IUCN/SSC Cat SG capacity development activities has been produced with support of

1. Taiwan Council of Agriculture's Forestry Bureau
2. The Wild Cat Club
3. KORA

Content of Field Handbook

1. Field signs and kill identification
   - 1.1. Species accounts
     - 1 page A5 per species: Picture, fact sheet, track, etc.
   - 1.2. Field signs
     - Tracks, scats,
2. Collection of data and samples for monitoring
   - 2.1. Baseline surveys
     - Interviews: Protocols, forms
   - 2.2. Recording of (chance) observations
     - Categories, forms
   - 2.3. Recording of kills
     - Protocol: kill site, kill, killing signs
     - Data recording: Pictures, measurements, forms...
   - 2.4. Genetic samples
     - Captures: blood, hairs, etc.
     - Necropsies
     - Field: saliva, hairs, scats (e.g. at kills)
   - 2.5. Scats & urine
   - 2.6. Photos
     - Taking pictures in the field
     - Storing pictures in the system
3. Tracking & Transects
   - 3.1. Purpose and goals
     - Opportunistic (e.g. to find kills) versus "behavioural" tracking versus transects
   - 3.2. Field procedures
     - Personal gear and tools
     - Protocol(s)
     - Recording data in the field (forms)
   - 3.3. Transfer of data and data analysis
     - Download of GPS data, pictures, field notes, etc.
   - 3.4. Track transects
     - (Not only for CH...)
4. Camera trapping (photo and video)

   "Only a spotted lynx is a good lynx!"
   - 4.1. Planning & preparation
     - Identification of reference area and sites (grid, density, distribution...) (Guidelines?)
     - Materials, inventory, checklists
   - 4.2. Camera-trap handling
     - Types of camera traps, uses and handling
   - 4.3. Setting and checking
     - Mounting at different sites (path, kill, marking spot)
     - Controls and control rhythm
     - Materials and checklists
   - 4.4. Analyses of the data

- Analogue cameras/films: development, scanning
- Digital camera/pictures: handling of cards, downloading, storing...
- Brief (detailed in Guidelines): Identification of lynx, construction of capture history, estimation of abundance and density

5. Captures and immobilisation
   5.1. Box traps
   - Description and function
   - Installation and set up
   - Survey (alarm system) and control
   - Maintenance
   - Materials, checklist

   5.2. Foot-snares and leg-holds
   - Description and function
   - Installation and set up
   - Survey (alarm system)
   - Maintenance
   - Materials, checklist

   5.3. MICS
   - Description and function
   - Installation and set up
   - Maintenance
   - Materials, checklist

   5.4. Immobilisation & animal handling
   - Introduction (drugs)
   - Material and checklist (capturing kit)
   - Application of drugs
   - Handling of immobilised animals incl. vet. protocols
   - Transport of immobilised animals

6. Telemetry
   6.1. Introduction: the meaning of life and telemetry
   6.2. VHF
   - Materials
   - Field procedures, protocols and forms

   6.3. GPS (GSM)
   6.4. Data handling...

IUCNSSC 入侵種專家小組計畫成果摘要

IUCNSSC 入侵種專家小組(Invasive Species Specialist Group, ISSG)所提計畫，摘要如下：

依據數年計畫資料，入侵種專家小組(ISSG)於 1993 年設立，目前有來自 40 餘國 196 名志工會員。ISSG 的任務為「提升大眾對防除入侵性外來種(Invasive Alien Species, IAS)之瞭解，以減少自然生態系及物種所面臨之威脅」。ISSG 的全球入侵種資料庫(Global Invasive Species Database, GISD)彙整全世界外來種資料，ISSG 研究人員負責蒐集資料，初稿經專家審核修訂後，即置入資料庫供各界人士運用。IUCN/SSC 入侵種專家小組辦公室原設於紐西蘭奧克蘭大學(University of Auckland) Tamaki 校區。2008 年底，義大利籍新任主席 Dr. Piero Genovesi 上任，ISSG 秘書處也移至義大利環境保護和研究試驗所(Institute for Environmental Protection and Research)，但 GISD 仍繼續由紐西蘭奧克蘭大學負責，並擔任太平洋地區辦公室。

ISSG 是全球性團體，主要工作項目包括：

一、經由系統化及合作方式，採取保育行動。

二、政策和入侵性外來種主要議題。

三、彙集資料，建立全球入侵種資料庫，包括入侵種名錄、生態、衝擊、分佈、入侵途徑、專家聯絡資料、預防和經營管理等資料。2007 年有 432 種 IAS 資料，2008 年 485 種，2009 年 2 月增至 515 種。2008 年每天約有 1,100 人(約有 75,000 次)上網查閱資料。2009 年 2 月增至每天 1,800 人(125,000 次)。

四、出版外來種通訊(Aliens newsletter)。

ISSG 過去數年的主要工作成果包括：

一、協助 IUCN、IUCN 會員和合作單位

- 2002 年 5 月，代表 IUCN 總部籌辦入侵性外來種研討會。
- 準備入侵性外來種資料，供 IUCN 參加生物多樣性公約相關會議。
- 2003 年世界保護區大會(World Parks Congress)期間，於 Management Effectiveness Stream 議題項下，合辦入侵性外來種研討會。
- 2003 年 9 月，協助辦理全球環境與貿易生物多樣性論壇。
- 協助 IUCN 參加世界襲產公約(World Heritage Convention)會議。

二、出版品

- 外來種移除相關出版品：Turning the Tide: The Eradication of Invasive Species, Proceedings of the International Conference on Eradication of Island Invasives。
- 世界百大入侵性外來種(100 of the World's Worst Invasive Alien Species)。

- 外來種通訊 Aliens: bi-annual newsletter 和 Aliens-L:入侵種名錄。

三、建立全球入侵種資料庫(Global Invasive Species Database, GISD)

- 已收錄 515 種對生物多樣性有負面影響的微生物、動物和植物資料 (http:www.issg.org/database)。

四、2002 年 6 月起，與紐西蘭政府合作統籌「島嶼入侵性外來種合作行動」。

GISD 2007 年和 2008 年計畫，主要為因應氣候變遷對外來入侵種在天然林和造林地分佈和數量之影響，提供生態、散佈、衝擊和經營管理資料，給森林經營管理人員運用。氣候變遷對外來種之散播有所影響，而全球 1/3 的森林有可能遭受氣候變遷的負面衝擊。預計建立數種森林入侵性外來種資料。

2007 年計畫係彙整 4 種日漸嚴重的森林入侵性外來種資料，納入 Aliens-L 和 PestNet 等網站供大家參考。GISD 工作成果摘要如下：

一、GISD 已建立 485 種 IAS 資料。

二、與 IUCN 法國委員會簽訂合作備忘錄。

三、建立 15 種海洋入侵種(Marine Invasive Species)資料，經費由 Biosecurity New Zealand (隸屬農業和森林部)和重要生態系合作基金(Critical Ecosystem Partnership Fund, CEPF)贊助。

四、2008 年初 CEPF 贊助製作新版資料 CD。

2007 年我國贊助計畫，已建立 4 種森林入侵性外來種資料(詳如下列網站連結)：

一、Pine-needle scale insect- *Hemiberlesia pitysophila* Takagi
http://www.issg.org/database/species/ecology.asp?si=1202&fr=1&sts=

二、Fall web-worm - *Hyphantria cunea* (Drury)
http://www.issg.org/database/species/ecology.asp?si=1201&fr=1&sts=

三、Pine mealy bug- *Oracella acuta* (Lobdell)
http://www.issg.org/database/species/ecology.asp?si=1203&fr=1&sts=

四、Pine-shoot beetle- *Tomicus piniperda* (Linnaeus)
http://www.issg.org/database/species/ecology.asp?si=1200&fr=1&sts=

2008年，ISSG和GISD工作成果摘要如下：

- ISSG主席暨創始人Prof. Mick Clout於2008年終卸任，新任主席為義大利籍 Dr. Piero Genovesi，ISSG總部也移至義大利環境保護和研究試驗所(Institute for Environmental Protection and Research)。
- 2008年10月於西班牙召開世界保育大會(World Conservation Congress)期間，辦理4次活動，宣導入侵種對島嶼生態系之衝擊。
- 查閱GISD人數大量增加，每天有8,100人瀏覽，被點閱125,000次。
- 更新GISD法文資料，GISD中文版事宜，也與臺灣之中央研究院洽談中(註：

2009年4月間已討論至簽訂備忘錄階段)。

- 研擬設立Global Register of Invasive Species。

2008年我國贊助計畫，已建立數種森林入侵性外來種資料(詳如下列網站連結)：

- *Anoplophora chinensis* (Forster, 1771) the citrus long-horned beetle beetlehttp://interface.creative.auckland.ac.nz/database/species/ecology.asp?si=1404&fr=1&sts=&lang=EN
- *Dendroctonus valens* LeConte, 1860 the red turpentine beetle http://interface.creative.auckland.ac.nz/database/species/ecology.asp?si=1405&fr=1&sts=&lang=EN
- *Brontispa longissima* Gestro, 1885 the coconut hispid beetle http://interface.creative.auckland.ac.nz/database/species/ecology.asp?si=1406&fr=1&sts=&lang=EN

於2008年將捐款經費撥給ISSG後，保育組與ISSG洽談合作將全球入侵種資料庫翻譯為中文事宜，對方非常樂意進行此計畫。取得對方同意後，保育組委託中央研究院繼續討論細節，2009年4月間，簽訂備忘錄，2009年目標為將世界百大外來入侵種譯為中文。為配合此項計畫之實施，ISSG電腦須要調整，讓中研院團隊可以取得基本資料，而GISD也需設定為可以顯示中文資料。另外，世界百大外來入侵種資料係2000年代早期蒐集，有28種需大幅修訂，20種需小幅修訂。

2009 年，IUCN/SSC 入侵種專家小組所提「全球入侵種資料庫中文版計畫」，依據計畫和報告資料，摘要如下：

為配合將全球入侵種資料庫翻譯為中文，ISSG電腦須要調整，2009年目標為將世界百大外來入侵種譯為中文。

本計畫工作進度如下：

- GISD和中文版相容性處理，持續進行中。
- 已將48種外來種資料圖像資料納入網站。
- 審核參考資料，整理網站連結。
- 整理文獻資料，更新28種外來種資料。
- 持續進行的工作包括：建立資料結構、更新資料、檢視和更新資料庫等。

2010 年，IUCN/SSC 入侵種專家小組所提「島嶼、受威脅和入侵物種主題資料庫：建立太平洋和亞洲資料(包括日本群島和台灣及所屬小島)」計畫，摘要如下：

依據2009年IUCN紅皮書(IUCN Red List of Threatened Species)分析報告：

- 入侵種為兩棲類第5大威脅，列在棲地消失、污染、疾病和火災之後。
- 入侵種為鳥類第3大威脅，列在農業和伐木之後。
- 入侵種為哺乳類第3大威脅，列在棲地消失和人類利用(主要為食物及醫藥)之後。
- 入侵種為爬蟲類第4大威脅，列在污染、殺害和天然災害之後。
- 歐洲受威脅淡水魚主要影響因子為水污染(66%)、入侵種(55%)和抽水(55%)。
- 面臨絕種的海洋物種中，入侵種被認為是主要威脅因子。

大洋中的島嶼特有種比例高，本土生物多樣性更容易受到棲地消失和外來種入侵之影響。依據國際鳥盟(BirdLife International)2008年世界鳥類資料庫(World Bird Database)資料，75%大洋型海島(oceanic islands)之受威脅鳥類，因入侵種而受害。比較起來，僅有21%大陸型海島(continental islands)之受威脅鳥類，因入侵種而受害。GISD因而規劃設立特殊主題之資料庫，以島嶼、受威脅和入侵物種為重點。另外，也規劃將此資料庫與全球島嶼資料庫(Global Islands Database, GID)整合，此即為全球島嶼夥伴關係(Global Islands Partnership, 簡稱GLISPA)工作。

太平洋區特殊主題資料庫於2009年5月啟動，重要生態系合作基金(Critical Ecosystems Partnership Fund, CEPF)支援九個國家的資料庫，包括Cook Islands, Fiji, French Polynesia, Federated States of Micronesia, Marshall Islands, Palau, Pitcairn, Samoa, Toga。另外，美國政府的太平洋環境補助金(Pacific Environmental Grant)贊助太平洋島國中的另外15國，包括American Samoa, Guam, Kiribati, Nauru, New Caledonia, Niue, Norfolk Island, Northern Mariana Islands, Papua New Guinea, Solomon Islands, Tokelau, Tuvalu, US Minor Outlying Islands, Vanuatu, Wallis and Futuna。

太平洋區資料庫仍須納入的包括澳洲、紐西蘭、附近島嶼、日本群島和台灣及所屬小島、South China Sea小島。澳洲和紐西蘭資料庫部分已向澳洲太平洋科學基金會(Australia-Pacific Science Foundation)申請經費。希望我國能贊助日本群島和台灣及所屬小島之資料庫經費。

經過文獻整理和外來種資料蒐集後，預計2010年3月設立資料庫，預計2010年8月啟動網路可搜尋資料庫。

島嶼、受威脅和入侵物種主題資料庫目前已蒐集資料包括：
- 24個太平洋島國之島嶼基本資料，入侵種和受威脅物種資料。
- 9個國家的67種優先物種(priority species)之入侵種威脅摘要資料和保育行動摘要資料。
- 5個綜合案例研究準備中。

- 9個太平洋島國的160種優先物種，資料蒐集中。
- 2010年3月資料庫開放試用及徵詢各界意見。

2010年計畫執行情形摘要如下：

工作項目執行情形如下，預計2011年9月完成所有工作：
- 已聯絡相關國家蒐集資料，工作持續進行中。
- 完成文獻回顧工作。
- 完成基本資料之彙整。
- 整理物種資料工作持續進行中。

資料蒐集部分包括：
- 多篇報告和日本小笠原群島(Ogasawara Islands)申請世界襲產研究報告中彙整的經營管理和行動計畫相關資料，包括物種現況細節、入侵種之衝擊、將採取之行動等。60餘頁A4資料將於會議時傳閱。
- 小笠原群島特有之軟體動物為受威脅物種，聯絡相關學者彙整資料，整理IUCN和日本紅皮書資料，整理需處理清單，包括入侵種威脅因子摘要、入侵種管理摘要和保育成果。
- 物種受威脅原因資料持續整理中。

2011年ISSG所提「島嶼生物多樣性和入侵種之威脅：建立南太平洋島嶼資料庫計畫」，摘要如下：

本計畫為延續計畫，背景資料請參考2010年計畫。本資料庫最主要的識別項目為島嶼名稱，次要識別項目為受威脅物種名稱，資料庫資料包括：
- 島嶼資料：經緯度、面積、所有權、公告指定區、保育價值等皆納入國家/島嶼摘要中。
- 入侵種資料：國家/島嶼入侵種調查。
- 受威脅物種資料：國家/島嶼受威脅物種清單，包括紅皮書位階、分類、和入侵種造成威脅之資料。
- 文獻參考資料、資料庫說明資料和使用指南。

島嶼生物多樣性和入侵種之威脅資料庫(Island Biodiversity and the threat of Invasive Species, IBIS)，已納入下列資料：
- 24個太平洋島國之島嶼基本資料、入侵種和受威脅物種資料。
- 24個國家的244種優先物種(priority species)之入侵種威脅摘要資料和保育行動摘要資料。
- 14個太平洋島國的365種優先物種，資料蒐集中。

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Progress report: for the Conservation Grant 2010-2011, Conservation Division Forestry Bureau. COA, Taiwan- February 2011

Project title:

'Islands, Threatened and Invasive Species' thematic database: Development of the Pacific Ocean -Asian component (Pacific Ocean islands of Japan, Taiwan and its islands).'

Project progress:

The project activities commenced during October 2010.

Networking with practitioners working in the project area was undertaken in the first instance so current and authoritative information could be exchanged. Several practitioners sent us many journal articles and results of studies including the Management and Action plan compiled for UNESCO for the nomination process of the Ogasawara Islands as a World Heritage Site. This action plan includes all details of species status, invasive species impacts, actions planned etc.

Endemic molluscs are highly threatened on the Ogasawara islands. Contact was made with leading researchers in this project area and information obtained much of it published in Japanese which would not have been easily available otherwise. Data and information has been extracted from the documents and stored in excel worksheets for processing. Information on native species under threat listed both in the IUCN Red List of Threatened Species as well as the Japanese red Data Book has been compiled and a shortlist of species has been marked for in-depth treatment (invasive species threat summary, invasive species management summary and conservation outcomes).

Work has commenced on compiling species threat summaries.

Please find attached an Excel file (Ogasawara Master) which will provide a synopsis of data and information collated

Table 1: Activities status

Activity	Status
Contact with practitioners for data and information	Initial contact and information collated completed; ongoing
Desktop literature survey for relevant info	completed
Compilation of baseline information	completed
Species summary compilation	ongoing

It is envisaged that the project will be completed by end September 2011. A full report will be submitted by the middle of October 2011.

For more details and any comments please contact:

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Manager, Species Information Services

IUCN SSC Invasive Species Specialist Group
Regional Office for the Pacific

CountryCode	CountryName	IslandType	IslandGroup	IslandName	Latitude-decimals	Longitude-decimals	Latitide-degrees
124	Japan	Ogasawara	Mukojima	Kitanoshima			N27deg43'06"
124	Japan	Ogasawara	Mukojima	Mukojima			N27deg40'52"
124	Japan	Ogasawara	Mukojima	Nakodojima			N27deg37'40"
124	Japan	Ogasawara	Mukojima	Yomejima			N27deg29'47"
124	Japan	Ogasawara	Chichijima	Ototojima			N27deg09'59"
124	Japan	Ogasawara	Chichijima	Anijima			N27deg07'21"
124	Japan	Ogasawara	Chichijima	Chichijima			N27deg04'12"
124	Japan	Ogasawara	Chichijima	Nishijima			N27deg07'02"
124	Japan	Ogasawara	Chichijima	Higashijima			N27deg05'36"
124	Japan	Ogasawara	Chichijima	Minamijima			N27deg02'18"
124	Japan	Ogasawara	Hahajima	Hahajima			N26deg40'01"
124	Japan	Ogasawara	Hahajima	Mukohjima			N26deg36'11"
124	Japan	Ogasawara	Hahajima	Hirajima			N26deg35'07"
124	Japan	Ogasawara	Hahajima	Meijima			N26deg34'10"
124	Japan	Ogasawara	Hahajima	Anejima			N26deg33'15"
124	Japan	Ogasawara	Hahajima	Imotojima			N26deg33'33"
124	Japan	Kazan		Kita-iwoto			N25deg25'60"
124	Japan	Kazan		Iwoto			N24deg14'06"
124	Japan	Kazan		Minami-iwoto			N24deg50'03"
124	Japan			Nishinoshima			N27deg14'48"
124	Japan			Minamitorishima			
124	Japan			Okinotorishima			

Longitude-degrees	Area (ha)
E142deg05'59"	35
E142deg08'20"	285
E142deg10'40"	147
E142deg12'38"	77
E142deg11'27"	536
E142deg12'35"	812
E142deg12'33"	1410
E142deg10'00"	51
E142deg14'42"	26
E142deg10'30"	33
E142deg09'20"	1419
E142deg07'47"	144
E142deg09'18"	64
E142deg13'54"	94
E142deg09'23"	153
E142deg12'35"	131
E141deg16'56"	557
E141deg27'45"	355
E141deg22'21"	912
E140deg52'33"	30

龜類動物存續聯盟計畫報告摘要

龜類動物存續聯盟(Turtle Survival Alliance, TSA)主要任務為將對龜類動物之熱愛轉化為保育行動，建立全球活標本蒐集聯絡網和執行復育計畫。TSA 為達成「21 世紀沒有龜類動物絕種(zero turtle extinctions in the 21st century)」之宗旨，執行下列工作：

- 推動繁殖計畫，包括為瀕臨絕種淡水龜和陸龜興建繁殖設施。
- 進行野外研究。
- 擬定並執行保育計畫。
- 於當地社區辦理保育宣導活動。
- 與全球各地保育團體合作，並提供支援、專業知識、訓練和資源。
- 倡導有效執行野生動物相關法令。

為供應中國市場，亞洲龜類動物族群大量被捕，造成族群危機，此即亞洲龜危機(Asian Turtle Crisis)。有些物種族群若無有效管理可能面臨絕種命運，TSA 於 2001 年設立，為國際自然保育聯盟(International Union for Conservation of Nature, IUCN)合作夥伴，負責瀕臨絕種龜類動物繁殖計畫(breeding programs)，確保永續性淡水龜和陸龜圈養繁殖。TSA 在 IUCN 架構下運作，為陸龜和淡水龜專家小組(Tortoise and Freshwater Turtle specialist Group, TFTSG)之特別工作小組(Task Force)。TSA 在歐洲和美國均有分部，成員包括動物園、水族館、大學、龜類繁殖者、龜類愛好者、獸醫、保育團體、原產國龜類動物救援中心(turtle rescue center)或相關設施等。TSA 總部位於美國德州之 Fort Worth Zoo，為全球唯一以保育龜類動物為單一目標之團體。TSA 網站有列出執行計畫，包括將近 60 種龜類動物，計畫執行地包括貝里斯(Belize)、柬普寨、中國、印度、印尼、馬達加斯加、緬甸、泰國、馬來西亞、菲律賓、美國、越南、TSA 非洲計畫、TSA 歐洲計畫等。

TSA 於 2010 年提供野生動物保育協會(Wildlife Conservation Society, WCS)支持信函，主要內容為 WCS 於 1993 年與緬甸林業部(Ministry of Forestry, MOF)簽訂野生動物保育合作備忘錄，淡水龜和陸龜保育計畫為其中之一。WCS 與 TSA 共同執行緬甸淡水龜和陸龜域內(*in-Situ*)和域外(*ex-Situ*)保育計畫。TSA 提供經費和技術協助，於緬甸設立龜類動物救援中心和繁殖設施。興建 Lawkananda Wildlife Sanctuary 瀕臨絕種龜類圈養繁殖設施為 WCS 、TSA 和 MOF 所同意之優先計畫。WCS 係由美國紐約市數個動物園和水族館(例如 Bronx Zoo、New York Aquarium、Queens Zoo 等)聯合組成之團體，在全球 53 國執行保育計畫。

2010 年林務局與台北動物園共同贊助龜類動物存續聯盟所提「緬甸星龜物種復育計畫(Implementation of the Species Recovery Plan for the Critically Endangered Burmese star tortoise, *Geochelone platynota*)」，媒體有報導相關捐贈儀式，及計畫

內容。

緬甸星龜物種復育計畫之內容及報告摘要如附：

緬甸星龜(Burmese star tortoise, *Geochelone platynota*)為分佈於緬甸中部乾燥地區之特有種，為 IUCN 紅皮書中列為 25 種最危險的瀕臨絕種淡水龜和陸龜之一。野外族群經多年過量搜捕，已被認定為功能性滅絕(functionally extinct)。目前緬甸星龜復育計畫完全仰賴管理良好之圈養族群，日後野放至緬甸保護區。

幸好緬甸星龜於圈養環境繁殖狀況良好，緬甸國內和美國緬甸星龜人工繁殖情形也越來越普遍。美國動物園協會(American Zoos Association, AZA)數據顯示全美國現有緬甸星龜雄 74 隻、雌 66 隻、性別不明 276 隻，其中 AZA 的動物園中有雄 31 隻、雌 20 隻、性別不明 31 隻。目前緬甸有將近 1,800 隻圈養緬甸星龜，分別在 5 個地點，4 處為政府設立之繁殖設施，一處為私人設置之 Griffin Enterprise。Griffin 為緬甸最大之圈養設施，有 1,000 隻緬甸星龜，每年孵育 500 隻幼龜。第 2 大的位於 Lawkananda Wildlife Sanctuary，2010 年有 512 隻緬甸星龜，每年孵育約 50 隻幼龜。緬甸政府和 Griffin Enterprise 簽約，每年 Griffin 提供 20%年產圈養緬甸星龜給政府設立之繁殖設施。Lawkananda 設施與 Griffin 距離很近，Griffin 每年提供 100 隻幼龜給 Lawkananda。

2007 年，TSA 贊助 Yadanabon Zoo 和 Minsontaung Wildlife Sanctuary 設立圈養設施，這兩處的飼養環境有所改善，繁殖成功率也有增加。2010 年 TSA 爭取到經費協助 Lawkananda 擴充繁殖設施，2010-11 生殖季有 39 窩，257 個蛋，為設立 11 年來繁殖最成功的一次。

2009 年 1 月 TSA 草擬緬甸星龜復育計畫。緬甸星龜復育計畫內容包括下列改善建議事項：

- 圈養族群管理：例如為維持圈養繁殖族群之基因多樣性，4 處政府設施應至少有 200 隻或 100 對繁殖個體等。
- 圈養設施：針對 4 處政府設施之改善建議。
- 飼養管理。
- 註記及資料記錄。
- 健康注意事項：例如 4 處政府設施應設立檢疫設施，以防止私人設施提供之幼龜散佈疾病。
- 再引入指南(Reintroduction)及注意事項：包括選擇野放地點、個體健康狀況、挑選野放個體、野放季節、野放前之野外環境適應期、野放前資料記錄、野放後監測等。

TSA 於 2009 年 1 月至 Lawkananda Wildlife Sanctuary 考察其圈養繁殖設施，並提出改善建議，包括改善飼養環境和加強安全措施，原設施為 88x88ft，建議另建立一個 60x60ft 之擴充設施。設施擴建工作於 2010 年 11 月 4 日開始，2011 年 3 月 20 日完工，擴充後設施圍籬為 154x88ft。設施照片請參考計畫報告。

擴充設施預算支出情形如下：

擴建項目	經費(US$)
幼龜生長區	6888.88
雛龜養育區	2777.77
靴腳陸龜(*Manouria emys*)圈養區	166.66
圍籬	10555.56
保全塔(Security Tower)	1666.66
水源供應	277.77
供電系統	888.88
除水槽	666.66
總計	23,888

Progress Report: Completion of Star Tortoise Propagation Facility in Lawkanandar National Park, Myanmar

In Myanmar, nearly 1800 star tortoises are maintained in five captive-breeding facilities; these include four government-operated facilities (Shwe Settaw Wildlife Sanctuary, Minzontaung Wildlife Sanctuary, Yadanabon Zoo, and Lawkanandar National Park) and one private farm (Griffin Enterprises). Griffin Enterprise (Bagan) holds the vast majority of captive star tortoises in Myanmar; about 1000 breeding tortoises are maintained on the farm which produces about 500 hatchlings annually. An agreement between Griffin Enterprise and the Myanmar Forestry Department requires that 20% of the annual production of hatchlings must be transferred to the government-operated facilities. Lawkanandar National Park is located a short distance from Griffin Enterprises and receives about 100 star tortoise hatchlings each year. Lawkanandar NP maintains the second largest population of captive star tortoises (512 star tortoises in 2010) in Myanmar and has experienced considerable success in propagating these animals (ca. 50 hatchlings are produced annually). Consequently, the population of star tortoises held at Lawkanandar is growing rapidly and overcrowding of the available facilities is fast becoming a concern to managers. In 2010 TSA raised funds to expand the facilities at Lawkanandar NP and during the following nesting season (2010-11), a total of 39 nests and 257 eggs were produced, the most successful nesting season since the facility was established 11 years ago.

The existing star tortoise facility at Lawkanandar NP is subdivided into various pens that house adult breeders, hatchlings, and juveniles. There is also a substantial quarantine area used to house tortoises transferred to Lawkanandar NP from Griffin Enterprises. Construction of the expanded facilities at Lawkanandar NP began on 4 November 2010 and was completed by 20 March 2011. The

perimeter fence measures 154 ft (47 m) × 88 ft (27 m). Tortoises can be freely moved around the new facility and the risk of theft is considerably reduced because of the improved security system. Previously, tortoises were placed into locked boxes every night owing to serious security concerns. The improved security minimizes handling of the tortoises, making the job of the keepers easier and involves less stress for the tortoises. The latter is thought to be at least partially responsible for the record number of eggs produced in the current nesting season. The proposed guard tower was not built and instead the park warden has asked to construct a security house with a food storage area for the same cost. After constructing the new tall perimeter fence, the security personal realized a tower is not required because the whole enclosure is visible through the mesh fence. In accordance with TSA recommendations in 2009, park workers have significantly thinned the trees that once shaded the facility.

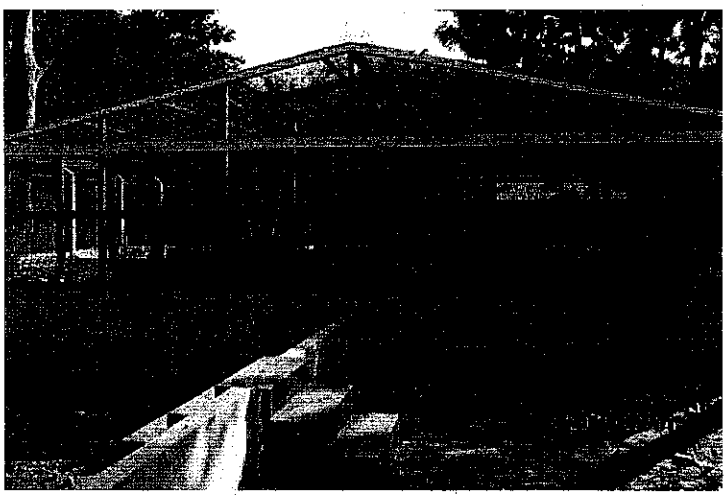

Figure 1. The juvenile grow-out facility, predator proofed and with improved security. A strong, fine mesh wire is used for the wall, and the roof is gabled and meshed to prevent rats from entering. This enclosure is situated in the middle of the enclosure, which is surrounded by a brick wall topped with razor wire.

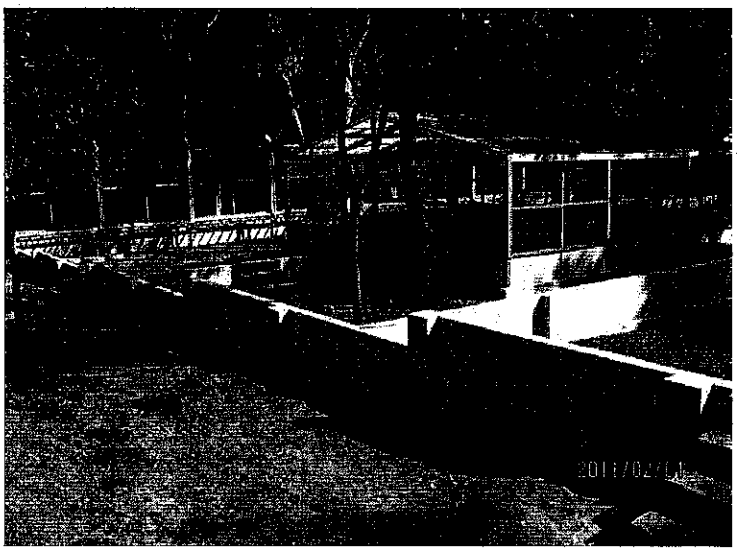

Figure 2. This view shows a 60 ft × 28 ft addition to the star tortoise enclosure. This new area was added to better utilize the adjacent space. It consists of six 20 ft × 14 ft enclosures designed for rearing various size- and age-groups of tortoises.

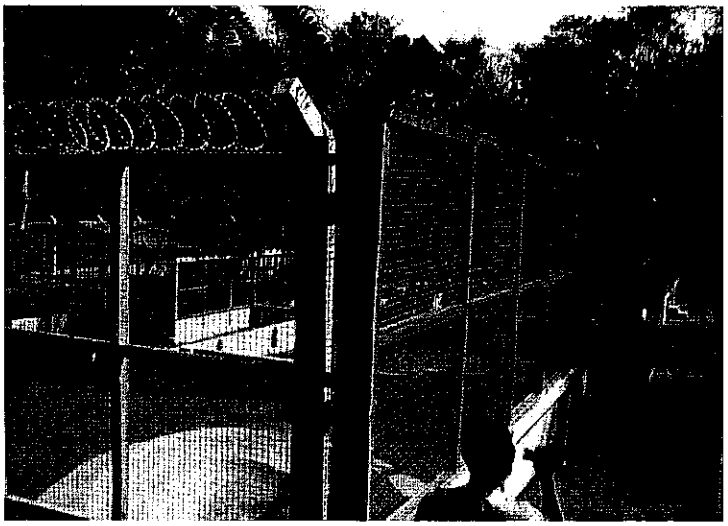

Figure 3. A 154 ft × 88 ft enclosure containing eight pens for subadults and breeding groups of adult tortoises surrounding a central grow-out facility for juveniles. Note the perimeter wall surrounding the entire facility.

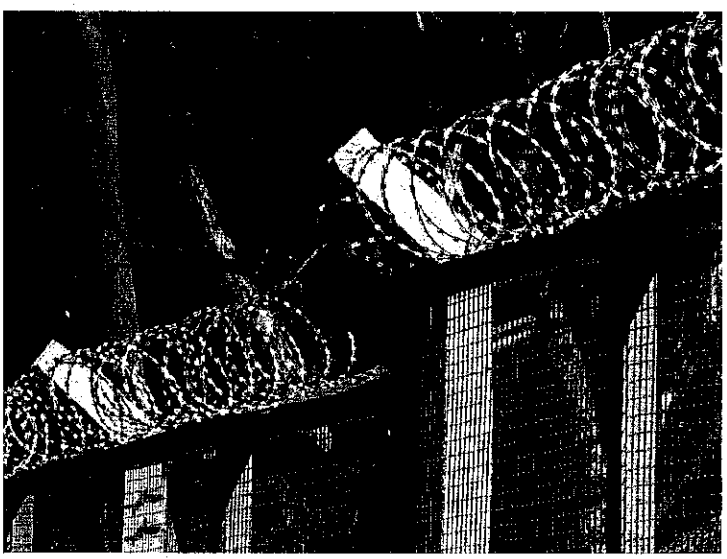

Figure 4. Security is a major concern at all government-run tortoise facilities and past thefts have led to staff dismissals and concerns by staff over job security. Note the 2 ft brick wall topped with 2 × 2 ft iron rail covered with heavy duty 1 inch square mesh and razor wire.

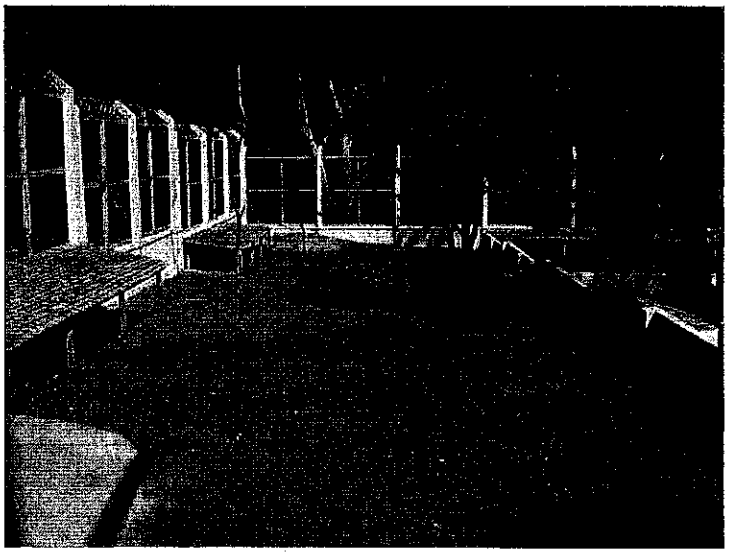

Figure 5. Another expansion , a 28 ft × 88 ft enclosure for Asian mountain tortoises (*Manouria emys*) with a built-in concrete pool with drain at each corner.



Figure 6. Star tortoise nesting in the new enclosure. During the 2010-11 season, 39 nests containing 257 eggs have been produced at Lawkanandar NP. This is the greatest number of nests produced in a single year since the facility was established 11 years ago.

The proposed guard tower was not built, the park warden has requested instead to build a guard house with storage area for food with the same cost. After the construction of the new tall perimeter fence, the park staff realized that the tower does not need to be 40 feet tall because the whole enclosure is visible through iron square mesh fence. In the past the tortoise facility was heavily shaded with deciduous trees, upon TSA recommendations in 2009, park workers thinned out some of the trees and they are currently regrowing.

Budget:

The new facility was divided into eight different construction types as follow:

1)	Juvenile grow out area and for breeders	6888.88
2)	Hatchlings rearing facility	2777.77
3)	*Manouria emys* Pen	166.66
4)	Fence	10555.56
5)	Security Tower	1666.66
6)	Water Supply	277.77
7)	Electrical Work	888.88
8)	Water Storage Tank	666.66

TOTAL 23,888 US$

國際拯救犀牛協會計畫執行報告

2009 年國際拯救犀牛協會所提「加強夥伴關係保育亞洲犀牛計畫」，計畫內容及報告摘要如下：

亞洲犀牛所面臨之危機主要是盜獵和棲地破壞，棲地破碎化增加人和犀牛衝突的頻度，也間接造成犀牛尋偶不易。通往保護區的道路更使盜獵者更容易設置圈套或陷阱。近來，外來植物入侵也影響到犀牛食物來源。

「加強夥伴關係保育亞洲犀牛計畫」主要為籌畫辦理東南亞犀牛保育研討會，由國際拯救犀牛協會、亞洲犀牛專家小組(Asian Rhino Specialist Group, AsRSG)和國際犀牛基金會(International Rhino Foundation, IRF)共同規劃。

亞洲犀牛專家小組隸屬國際自然保育聯盟(IUCN- the International Union for Conservation of Nature)物種存續委員會(Species Survival Commission, SSC)。小組成員包括研究人員、公務員、野生動物獸醫師、動物園和植物園工作人員、保護區管理者、亞洲犀牛專家、國際保育團體等。AsRSG 主要工作目標為：

- 評估亞洲犀牛野生和圈養族群之現況和趨勢，並蒐集盜獵案件資料。
- 促進資訊交換和合作。
- 提供犀牛經營管理技術資料，促成亞洲犀牛保育研究計畫間之相互合作。
- 協助擬定犀牛保育策略，並對執行事宜提出建議。
- 召開亞洲犀牛專家小組會員會議。
- 告知 AsRSG 會員，非洲犀牛保育現況及相關保育計畫。

「加強夥伴關係保育亞洲犀牛計畫」工作項目包括：

- 設立犀牛管理者和研究人員聯絡網，改善原產國犀牛保育工作。
- 研擬亞洲犀牛保育策略。
- 彙整各原產國亞洲犀牛現況和保育資料。
- 提供和改善亞洲犀牛保育技術資料，並提供相關建議。
- 鼓勵辦理亞洲犀牛保育相關活動。
- 經由經驗交換，強化會員之能力。
- 建立 75 筆聯繫資料，並納入 AsRSG 網站。

AsRSG 東南亞研討會 2010 年 2 月 10-12 日於印度召開，由 AsRSG 和阿薩姆省森林部(Assam Forest Department)合辦，會場布條上列有所有贊助單位(包括林務局)的 logo。參加者包括亞洲犀牛研究人員和管理人員，原產國(range states)專家分別來自印尼、馬來西亞、越南、印度和尼泊爾。非原產國專家來自美國、英國、澳洲和瑞士。

國際拯救犀牛協會所提「保護印尼布吉巴里桑西拉坦國家公園受威脅物種和棲地計畫」內容，以及 2009 年和 2010 年執行情形，摘要如下：

依據 2009-2011 年計畫資料，國際拯救犀牛協會(Save the Rhino International)於 1994 年向英國政府註冊為非營利保育團體，設立宗旨為保育瀕臨絕種的亞洲和非洲犀牛，成立以來與 13 個亞洲和非洲民間團體合作，努力從事犀牛保育工作。

國際拯救犀牛協會之目標為：
一、增加野生犀牛族群之數量
二、增進生態系之健全
三、確保當地社區能由保育行動中獲益

國際拯救犀牛協會 2007 至 2008 年募得 604,000 英鎊，贊助的計畫包括：
- 反盜獵和巡邏監測計畫，保護和改善生態系計畫。
- 犀牛族群再引入(reintroduce to former habitats)計畫。
- 社區保育和發展計畫，協助當地社區以更有創意的方式經營管理自然資源。
- 環境教育計畫，針對學童和民眾宣導保育自然資源之重要性，並處理人和野生動物衝突相關議題。
- 調查影響犀牛生存之原因，以及犀牛角替代品之研究。
- 獸醫相關工作，例如於犀牛角上裝設發報器或索套移除等。

國際拯救犀牛協會非洲計畫之成果包括：
- 保護 126,374 平方公里生物多樣性高之地區。
- 直接贊助保護 57%現有之 4,240 頭黑犀牛及 14%現有之 17,500 頭白犀牛。
- 協助雇用 250 當地工作人員。
- 經由社區發展和環境教育計畫，支助 334,420 人。

國際拯救犀牛協會亞洲計畫之成果包括：
- 保護 17,033 平方公里生物多樣性高之地區。
- 協助保護 64%現有之 2,700 頭印度犀牛、53%現有之 200 頭蘇門達臘犀牛及 91%現有之 55 爪哇犀牛。
- 協助雇用 250 當地工作人員。

蘇門達臘犀牛(Sumatran rhino)為極危(critically endangered)物種，野外族群不到 200 頭。1980 和 1990 年代，因森林消失和棲地破碎化族群量減少 50%。布吉巴里桑西拉坦國家公園(Bukit Barisan Selatan National Park, BBS)和 Way Kambas (WK) National Park 為蘇門達臘犀牛三個主要分佈地中的二個。此兩個國家公園

也有蘇門達臘虎和蘇門達臘象。目前 BBS 約有 50-70 頭犀牛，40-50 隻老虎，500 頭大象。Way Kambas 有 25-27 犀牛(不包括未成年犀牛)。蘇門達臘犀牛主要分佈在印尼三個國家公園。其中兩個國家公園設有犀牛保護小組(Rhino Protection Unit, RPUs)，負責防止盜獵、非法入侵、監測和保護受威脅物種和棲地。

早期蘇門達臘犀牛族群減少主要因為犀牛角盜獵，但現在主要受限於棲地，因為人口成長佔用國家公園土地，砍伐森林改為農業用地，國家公園面積少了 30%。印尼國家公園資源和人力都有限，由民間協助組成的 RPU 對保護野生動物和棲地的功能，更顯其重要性。1995 年起 BBS 的 RPUs 開始運作，WK 的 RPUs 於 2001 年設立。計畫主要目標係維持 BBS 8 個巡邏隊和 WK 5 個巡邏隊之持續運作。特定工作目標包括：

- 經由密集巡邏(每隊每月至少 15 天)維護犀牛保護區之功能。
- 移除各式為犀牛和其他野生動物所架設之陷阱，逐出任何不該在犀牛保護區出現的人。
- 由情報和執法小組(Intelligence and Law enforcement Units, ILEU)保持情報和線民聯絡網正常運作，以預防盜獵和非法侵佔事件。
- 調查及蒐證，以利逮捕或起訴於國家公園中非法盜獵、盜伐、入侵和從事其他非法行為的人士。
- 改善棲地侵佔現況。

2001 年起，RPUs 開始運作，協助於國家公園進行重點地區巡邏，移除各式陷阱，逮捕非法入侵者(包括盜獵者)，調查犯罪現場等工作，以達到預防野生動物數量減少的功效。RPU 為 4 人一組之反盜獵小隊，隊長為國家公園 ranger，可攜帶武器和逮捕盜獵嫌疑犯。其他 3 名隊員選自當地社區，僅攜帶防身噴霧器(pepper spray)，當犯案者拒捕時提供協助。隊員經過嚴格遴選程序並需通過訓練課程。巡邏任務通常一次 4-7 天，休息 1 天，填寫報告 1 天，準備下次任務 1 天。最佳狀況是每隊每月巡邏 15 天。ILEU 情報蒐集工作為 RPUs 的後盾，RPUs 也與國家公園工作人員密切合作，成效卓著。有 RPUs 巡邏的國家公園已超過 3 年未發生犀牛盜獵案件。

本計畫主要針對印尼布吉巴里桑西拉坦國家公園，1995 年 RPUs 開始運作，起初係針對保護犀牛而設，後來任務擴充至其他物種及棲地。

2009 年的工作成果包括：

- RPUs 平均每人每月巡邏 15 天，巡邏或調查路程共計 3,600 公里。
- 記錄到 207 個犀牛足印。
- 發現 7 件非法盜伐林木案件。
- 發現 61 件非法侵佔案。

- 發現 8 件非法獵捕魚類、鳥類、鹿等案件。
- 移除 16 個陷阱。
- 逮捕 40 人涉及非法獵捕、買賣、釣魚、伐木和侵佔。

2010 年統計資料和工作成果包括：

犀牛族群	50-70 頭
大象族群	約 500 頭
RPUs 數量	7 小隊
平均每月巡邏天數	16 天
巡邏步行總公里數	3,181 公里
被盜獵犀牛	0
被盜獵大象	0
發現或調查非法佔用案件	42 件
發現或調查非法伐木案件	9 件
發現或調查非法狩獵案件	51 件
移除陷阱	29 個
逮捕盜獵者或非法佔用者	13 人

RPU 每次巡邏均會紀錄犀牛獸跡資料，例如足跡、排遺、打滾泥坑、覓食痕跡、目擊犀牛資料或其他痕跡資料。所有資料都輸入資料庫，日後可彙整出月報、季報和年度活動和成效報告(Annual Activities and Performance Reports)。資料和 GIS 系統也運用到分析或製作犀牛或其他野生動物分佈圖，估計犀牛密度。非法資料例如侵佔、盜伐林木、非法盜獵、非法採集林產品等均列入記錄並進一步調查。同時蒐證、逮捕嫌犯，並準備犯罪報告。

RPUs 有提供詳細巡邏報告二份，Rhino Protection Unit (RPU) Activities & Performance Report Bukit Barisan Selatan NP, Way Kambas NP & Ujung Kulon NP 2010 年第 3 季和第 4 季報告(詳如報告資料)。

RPUs 與當地社區互動良好，也協助居民改種對環境較友善的作物，除增加收入外，也減少野生動物棲地被侵佔的情形。例如輔導農民將部分土地改種每月可收成的可可豆，取代一年一收的咖啡豆，增加農民收入。另外，設立 2 處農民合作社，設立帳戶的農民可借支經費。加入合作社要簽署「不侵佔國家公園土地保證書」，且提供非法活動情報。有些地區侵佔地因上述措施減少 60% (印尼首次)，並交出 87 把非法槍枝。農民收入增加，侵佔土地因而減少，野生動物棲地得到保護，可說是雙贏的作法。RPUs 也提供當地居民就業機會，相當於國家公園與附近居民建立夥伴關係共同推動保育工作。



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Progress report from Save the Rhino International to Taiwan Forestry Bureau: *Protecting Threatened Species and Habitats in Bukit Barisan Selatan National Park, Indonesia*

Recap
In October 2010 a grant of $5,000 was awarded by the Taiwan Forestry Bureau. The grant was allocated towards the project entitled "Protecting threatened species and habitats in Bukit Barisan Selatan National Park, Indonesia". The grant was to be used towards the running costs and operations of the Rhino Protection Units (RPU). The RPUs are highly-trained anti-poaching teams that intensively patrol key areas within this critical National Park in order to prevent poaching of threatened species and halt habitat encroachment and destruction.

Save the Rhino International is delighted to provide the following programmatic report, which is based on the detailed quarterly reports submitted by the Rhino Protection Unit Programme and Yayasan Badak Indonesia (YABI) for January 1- December 31, 2010. (Copies of the detailed reports are available upon request.)

Indonesian Rhino Protection Units

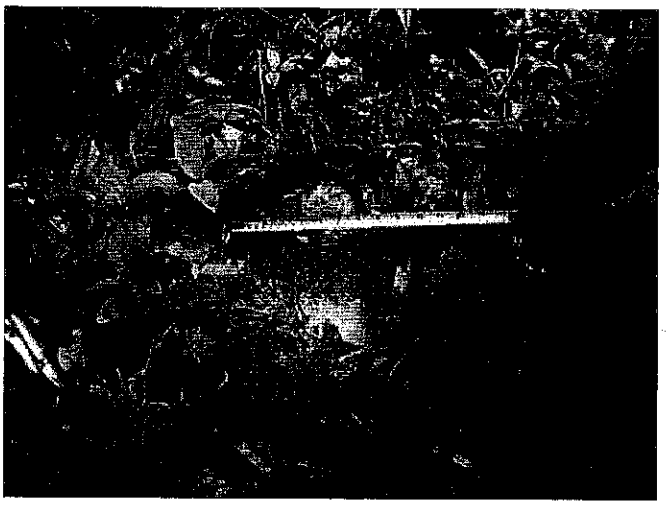
Fewer than 200 Critically Endangered Sumatran rhinos are believed to remain on Earth. The population declined at a rate of 50% in the 1980s and 1990s from deforestation and habitat fragmentation. Bukit Barisan Selatan National Park (BBS) and Way Kambas National Park (WK) in Sumatra, Indonesia, are two of the three major habitats for Sumatran rhino, and are also two of the highest priority areas for other threatened megafauna, including the Sumatran tiger and Sumatran elephant. Approximately 50 rhino, 40-50 tigers, and about 500 elephants inhabit BBS. Way Kambas is home to 25-30 Sumatran rhino. The Javan rhino is also Critically Endangered, with fewer than 48 animals believed to exist in two known populations. The only viable reproductive population lives in Java's Ujung Kulon National Park (between 37 and 44 animals). Ujung Kulon National Park -- Indonesia's first UNESCO World Heritage Site -- is the largest remaining lowland forest site in Java. In addition to holding the world's only viable population of Javan rhino, Ujung Kulon is home to a number of other endangered species, including the Javan gibbon, ebony leaf monkey, Javan leaf monkey, leopard, fishing cat, and the banteng, a species of wild cattle.

The main cause of the initial decline of Javan and Sumatran rhinos was poaching for horn, which is used in traditional Chinese medicine. Now, the populations are also limited by available

habitat, which is continuously being encroached by human populations. In Bukit Barisan and Way Kambas, illegal encroachment and conversion of forests to agricultural land has reduced the parks' area by up to 30%, though the rate is now declining in some areas, where in partnership with national park authorities, RPUs are helping implement community development schemes to reduce encroachment. In one area bordering BBS, encroachment has decreased by as much as 60%, and – a first for Indonesia – farmers turned over 87 illegal guns to the RPUs.

With our partners, the International Rhino Foundation and the Indonesian Rhino Foundation (YABI), a comprehensive programme is delivered, aimed at protecting and increasing the populations of Sumatran and Javan rhinos in Indonesia – the Rhino Protection Units are the backbone of this program.

Rhino Protection Units (RPUs) are highly-trained, four-person anti-poaching teams that intensively patrol key areas within Indonesia's national parks. They monitor threatened wildlife, deactivate traps and snares, identify and apprehend illegal intruders, including poachers, and investigate crime scenes, thus preventing or reducing the loss of wildlife. The goal of the RPU programme is to prevent the extinction of Sumatran and Javan rhinos and other threatened species and to protect critical habitats in Java and Sumatra through proactive prevention of poaching and habitat destruction.



RPUs identify and measure rhino footprints to help monitor rhino population density.

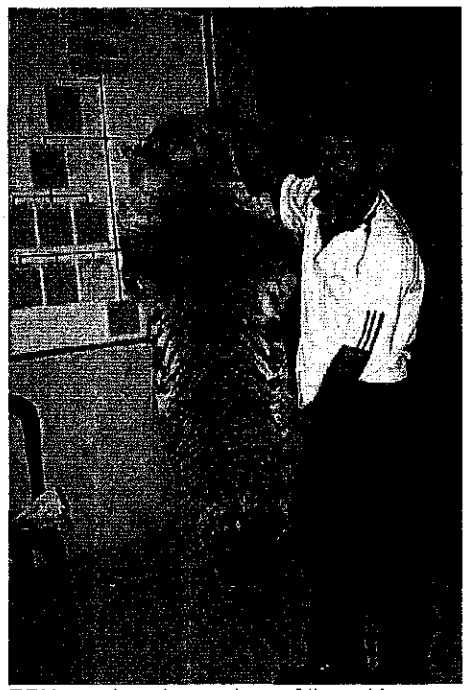
Thanks to the Rhino Protection Units, there have been no incidences of poaching of Sumatran rhinos in Bukit Barisan and Way Kambas National Parks in Sumatra for the past 5 years, or of Javan rhinos in Ujung Kulon National Park in Java, for the past 14 years. The RPUs also protect numerous other threatened species, including tigers, elephants, tapirs, gibbons, monkeys, leopards and fishing cats. Specific results for each park are listed below.

Bukit Barisan Selatan National Park- Update

Bukit Barisan Selatan National Park (BBS) in Sumatra, Indonesia, is one of the highest priority areas for Sumatran megafauna, including the Sumatran rhino, Sumatran tiger, and Sumatran elephant. Approximately 50-70 rhino, 40-50 tigers, and about 500 elephants inhabit the Park. RPUs have been operating in BBS since 1995. Originally, the BBS anti-poaching units focused mainly on rhino, but now cover all the megafauna and habitats in both the southern and northern portions of the Park (rhinos occur only in the southern half), counteracting all forms of wildlife crime and habitat destruction, such as illegal logging and encroachment. This work is augmented by a law enforcement and advocacy programme (Intelligence and Law Enforcement Unit or ILEU) that facilitates prosecution of poachers.

Specific statistics and accomplishments from January 1 – December 31, 2010 include:	
Rhino Population:	50-70
Elephant Population:	Approx. 500
Number of RPUs:	7
Average Days per Month on Patrol:	16
Total Kilometers Walked on Patrol:	3,181
Rhinos Poached:	0
Elephants Poached:	0
Instances of Encroachment Identified/Investigated:	42
Instances of Illegal Logging Identified/Investigated:	9
Instances of Illegal Hunting Identified/Investigated:	51
Traps Removed:	29
Arrests of Poachers/Encroachers:	13

During this period, the ILEU conducted more than 30 investigations into illegal wildlife hunting and trade and other illegal activities. As a result, 13 people were arrested for participating in poaching or illegal wildlife trade. Additionally, the RPUs and ILEU confiscated 12 spears or knives, 9 chainsaws, 5 motorcycles, and 19 guns. They also confiscated poached deer, pieces of ivory, pieces of tiger skin, and several fake rhino horns that were being offered for sale.



RPU member shows piece of tiger skin confiscated from arrested poacher.

The RPUs were also called in to assist with multiple cases of human-elephant conflict during this reporting period. In each incident, either a single elephant or group of elephants was raiding the crops of farming families living in the villages surrounding the park borders. The families contacted the police and/or park authorities, who then contacted the RPUs and asked them to help resolve the situations peacefully. In each of the dozen incidents, after responding to the situation as quickly as possible, the RPUs were able to successfully drive the elephants back into the park, without any harm coming to the elephants or villagers.

In one special case several months ago, a Rhino Protection Unit, having just come off of a 15-day patrol in the jungle, received a call that a group of Sumatran elephants was feeding at a village in West Lampung. They used the programme motorcycles to reach the village as quickly as possible. The RPU spent several hours talking with the villagers and gathering information, and then early the n ext morning, hiked until they received the elephant family. There were six juvenile/adult elephants in area near several houses, where they were eating banana and cassava from the farmers' gardens. The RPU members were surprised to see a newborn elephant calf with the group, estimated at only 1-2 days old. Normally the RPU would drive the elephants away from the villages and back into the forest, but in this case, they didn't want to take any chances on

startling or angering the elephants with a newborn present. So the RPU returned to the village and explained the situation to the farmers, who agreed to leave the elephants alone because of the baby. The RPU stayed in the village for three days, monitoring the elephant family and trying to prevent them from doing too much damage to the local farms, until the baby was strong enough and the family began moving back into the jungle on their own. The elephant family made it safely back into the park, and the local villagers were very happy with the RPU's support. They promised to contact the RPU in case of any future elephant issues, rather than try to scare or harm the elephants.

Quarter 3 RPU Report Update

- In this period, the average number of field days per person per month in BBS and WK has been less than the programme required of 20 days/month.
- RPU BBS has achieved 17.43, higher than previous Q1 17.00 and Q2. It was from their 20 patrols/surveys activities out of all the 45 activities.
- Distance walked for patrol and survey was 517.1 km (compare with previous Q1 was 1.206.5 and Q2 was 766.5).
- Other activities were the involvement in collaborative operations to remove encroachments and also investigations of cases in wildlife-human conflict resolutions (elephant conflicts).
- There was no direct sighting of rhino in BBS, WK and UK but, for Ujung Kulon, the RPU encountered the largest number of rhino signs (74 footprints and 75 of other signs).
- In BBS, there was mostly non mammal poaching (fishing and bird trapping) encountered when RPU undertook patrol / surveying.

Quarter 4 RPU Report Update

- In this Q4 period, RPU BBS performed field days per person per month 15.39, which was lower than in Q3 (17.43). But in this period they detected a higher number of independent rhino signs (202) compare with in Q3 (32). Also higher illegal activities were detected (52 cases) compared with in the Q3 (7).
- BBS detected the highest number of independent rhino sign (202) compare with WK (137) and UK (65), and the highest cases detected (52) compare with WK (37) and UK (5).
- The RPU in BBS in this Q4 has been involved in handling three elephant conflict cases, which caused some disturbance in encroached areas.
- RPU BBS distance walked for patrol and survey was 558.2 km (compared with previous Q1 was 1.206.5, Q2 was 766.5 Km and Q3 was 558.2 km).
- There was no direct sighting of rhino in BBS, WK and UK, and especially for BBS, the RPU encountered a larges number of rhino signs (181 footprints and 21 of other signs).
- In BBS, mostly illegal activities encountered by RPU was non mammal poaching (fishing and bird trapping) whilst undertaking patrol / surveying. Meanwhile the programme must continue to be aware of the abandoned encroachment areas in Way Kambas and Bukit Barisan Selatan where people tend to carry out illegal activities. Furthermore, wildlife trade indications in both surrounding areas of WK and BBS are still occurring.

3RD QUARTER REPORT
JULY - SEPTEMBER 2010



Photo by: BBC - 2010

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Rhino Foundation Of Indonesia

YABI

Yayasan Badak Indonesia

www.badak.or.id

PROJECT TITLE : PROTECTION PROGRAM OF YAYASAN BADAK INDONESIA

Reporting Period: July - September 2010

Name and Address of Grantee:

1. **International Rhino Foundation (IRF)**
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Reporting provided by Protection Manager (Mr. M. Waladi Isnan). Material and information gathered from RPU - ILEU field report and associated document.

Executive Summary:

The decline of Sumatran and Javan rhino has been in process for a long time. The Javan rhino for example was eliminated from Malaysia in the 1930's. Meanwhile, following the Sumatran rhino PHVA (1993) indicated that the decline of Sumatran rhino probably 50% during the last decade. The total population of Sumatran rhino in Indonesia is estimated only 215 – 319 and will be extinct for the next decade if there are no appropriate and serious management. (Strategy and Action Plan for the Conservation of Rhinos in Indonesia 2007 – 2017). Rhino decline in South East Asia is due to a combination of reduction in habitat and overexploitation of rhino (most recently by poachers after the horn). At this time, poaching pressure continues to be high in Indonesia; hence there is a strong need of this country to emphasize anti-poaching activities. To this, the rhino protection program of Yayasan Badak Indonesia (YABI) is activated to answer the need. Rhinoceros is subjected to poaching pressure both from hunters and form trappers who use gun, wire snares and other traps that maims to kill animals. The method employed in poaching prevention are primarily in forms of field patrols to search for traps and other signs of poaching attempt, to destroy these traps, and to collect evidence to identify and apprehend the suspects involved. Ambush method to apprehend poachers with guns were also practized. While in support to field patrol intelligence activities is operated to assist in the apprehension of poachers and identify the routes of illegal trade of protected animal parts (horn, skin, hooves etc.).

The Indonesian Rhino Protection Program of YABI integrates partners of Governmental and non-governmental bodies namely: Directorate General of Forest Protection and Nature Conservation of the Ministry of Forestry, International Rhino Foundation and World Wide Fund for Nature as well as local villager. The program entails series of approaches which includes: wild population protection by intensive patrolling of areas to detect traps and arrest intruders, more intensive and extensive surveys and monitoring of the rhino population, and

intelligence operations to assist in the apprehension of poachers and identify of illegal routes used for the horn trade and establishment of rhino database system using the Geographic Information System (GIS) techniques.

The Indonesian Rhino Conservation Program (that was originated from GEF Project and that is now has merged into YABI) and this Rhino Protection Program of YABI fully understood that the program is very costly. But, it is important to bring an understanding the operation of Rhino Protection Units (RPUs) backed-up by Intelligence and Law Enforcement Unit (ILEU) is the most effective measure in protection of rhinos in the wild. Therefore it is important to develop a simultaneously funding plan for sustainability of rhino conservation program.

Introduction

The decline of both species of rhinoceros, Sumatran and Javan, has been in process for a long time. The populations of Sumatran rhino have been reduced to 50% in the last decade and will be extinct for the next decade if there are no serious and appropriate management of rhino. Its decline in range and number in Sumatra is attributed chiefly to fragmentation of its habitat through indiscriminate forest clearance and to poaching, stimulated by the illegal trade in horns, hides and hooves, and other parts of rhino's body.

A population and Habitat Analysis conducted in November 1993 in conjunction with the IUCN SSC and its Conservation Breeding Specialist Group (CBSG) and the AsRSG revealed a significant decline in the numbers of Sumatran rhino in Indonesia. The estimates that emerged from the new data and more rigorous assessment was arround 200 (215 – 319). Meanwhile, the previous estimate had been 420 – 875. The GEF project RPU YABI estimates that until June 1998 the presence the population of Sumatran rhino in Kerinci Seblat National Park 27 – 32, Bukit Barisan Selatan National Park 40. - 50, and Way Kambas National Park 24 - 30

Although the Javan rhino population in Ujung Kulon National Park seems to be holding at about 50 –60, yet the threat of poaching still remains. The loss of rhino has become a matter of global concern. In 1994, at least one rhino was poached in Ujung Kulon and a suspect has been identified but no prosecution has in progress at that time. Although rhino poaching evidence and attempt was not found during this quarter, poaching of other wildlife such as deer, birds, langusts/lobster and other marine products were still occurring.

Saving the remaining rhino population needs further alternatives. There should be series of efforts to protect the remaining population by activating rhino patrol and strengthening its anti-poaching activities, until poacher activity and habitat destruction is reduced to the point of elimination.

The YABI Protection Program of provides protection of rhino from poaching and habitat disturbance for viable nucleus populations of Sumatran and Javan Rhinos through the establishment and operation of Rhino Protection Units, and supporting management, coordination and supervisory structures. Formerly, YABI had been operated 17 Rhino Protection Units (RPUs) until middle of 2009, while due to shortage of funding in this quarter,

only 16 RPUs continued their operation in and surrounding areas of Bukit Barisan Selatan (7 RPUs), Way Kambas (5 RPUs) and Ujung Kulon (4 RPUs) National Parks.

Objectives

The objective of the Program is to contribute to the long-term viable conservation and management of Indonesian rhinos (the Javan rhino – *Rhinoceros sondaicus*, and the Sumatran rhino – *Dicerorhinus sumatrensis*) and their habitats in Java and Sumatra.
The Indonesian Rhino Protection Program of YABI itself addressed to enhance the capabilities of the Directorate General of Protection and Nature Conservation and associated wildlife agencies to arrest and reverse the decline of rhinoceros due to poacher activity and habitat disturbance toward the national and global goal of recovery of viable populations of rhino species in Indonesia.

Output

1. Establishment and operate of at least 16 Rhino Protection Units (RPUs) in Sumatra and Java.
2. Establishment and operate Intelligence and Law Enforcement Unit (ILEU) to support law enforcement process which is undertaken by RPU and Park authority or proceed to identify information of threats from ILEU's informants for further judicial process. .
3. Community facilitation for better livelihood and to reduce threats from surrounding community.

Changes: -

Progress:
The Rhino Protection Program of YABI provides protection from poaching and habitat disturbance for viable nucleus populations of Sumatran and Javan Rhinos through the establishment and operation of Rhino Protection Units (RPUs), and supporting management, coordination and supervisory structures. The outcome of operations of 7 RPUs in Bukit Barisan Selatan National Park (BBS NP), 5 RPUs in Way Kambas National Park (WK NP) and 4 RPUs in Ujung Kulon National Park (UK NP) is reported as seen in Annex 1. (*RPUs Activities Report Period Julyl – September 2010.), as per attached.*
WK performed the lowest field day per person 15.28 if it is compared with BBS (17.43) and UK (21.67), because they performed 8 patrols of their total activity (67). The WK RPU had been actively envoled in a successful collaborative operation with Park Authority to remove old encroachment in Sekapuk and Kuala Kambas, and arrest some suspects to bring to police station.
During the implementation of this activity such as surveys and patrols the RPU/RMPU achieved numbers of surveys, distance walked and duration of time they have utilized in every

each of their activities. The Team also encountered many cases of illegal activities in the National Parks and the rhino conservation areas, into which prosecution had been made through filing the cases and hand the cases to local Police Stations.
The achievements of the Protection Program for this period July - September 2010 is described below in *Annex 1.*
Records on illegal killing of animals and other forest offenses detected by both RPUs (BBS, WK and UK) and ILEU is shown in *Annex* 2.

The field days per month of RPU's personnel is shown in Annex-1.

Intelligence and Law Enforcement Unit (ILEU) has been operating to identify the threats which come from surrounding people or outside of the Park; its operations also covers identifying possible facilitations for raising local's alternative income in order to reduce threats to the park and its rhinos . There are only 3 personnel's in this unit. They work in collaboration with informants, RPUs, Park Rangers and Police, in the case that they have a confirmed case and need to apprehend the suspect/s for further law enforcement efforts. ILEU's base operation is in BBS and the surroundings, hence they also available to assist ILEU operation in both WK and UK NPs.
ILEU's findings of their activities, together with RPU BBS findings, is reported in Annex-2,

Conclusions and Recommendation:

In this period, the average number of field days per month of every person of RPU in BBS and WK has been less than the Program required of 20 days/month.
But, RPU UK achieved 21.67, have walked 558.27 km (previously 514.09 km in Q1 and 499.78 in Q2).
RPU WK achieved 15.28 (compare with previous Q2 was 17.51) as the result of only 8 of all their 67 activities were patrols / surveys, while their other activities were involvement in collaborative operation to remove encroachment, drive elephant, trainings. Distance of walk for patrol and survey was 191.3 (compare with previously in Q1 was 264.2 km in Q1 and Q2 was 351.6).
RPU BBS has achieved 17.43, higher than previous Q1 17.00 and Q2. It was from their 20 patrols/surveys activities out of all the 45 activities. Distance of walk for patrol and survey was 517.1 km (compare with previous Q1 was 1.206.5 and Q2 was 766.5). The other activities were their involvement in collaborative operation to remove encroachments and investigations of cases and in wildlife-human conflict resolutions (elephant conflicts).

There was no direct sighting of rhino in BBS, WK andUK but, for Ujung Kulon, the RPU encountered the largest number of rhino signs (74 footprints and 75 of other signs).

Based on the patrol and survey in Ujung Kulon, it was found that poaching of non mammals (2 cases of fishing), 1 trap for mouse deer and three cases of tree felling were signs of serious threats to the park. Those infractions of regulation had been anticipated by RPU together with

Park Authority.
While in WK, 30 illegal activities encountered were mostly located within encroachment area, which are all non rhino poaching.
In BBS, mostly was non mammals poaching (fishing and bird trapping) encountered when RPU undertook patrol / survey. Meanwhile the Program must help to keep an eye and be aware of the abandoned encroachment areas in Way Kambas and Bukit Barisan Selatan from which people will usually do poaching on this or its adjacent area. Further, wildlife trade indications in both surrounding areas of WK and BBS are still occurring.

The Program had found many rhino footprints in this period but it cannot be utilized to determine the number of rhino population. It still needs to be analyzed with more sophisticated methods.

YAYASAN BADAK INDONESIA - YABI
Rhino Foundation of Indonesia - RFI

ANNEX-1:

QUARTERLY ACTIVITY AND PERFORMANCE REPORT

1 JULY - 30 SEPEMBER 2010
(Q3)

BUKIT BARISAN SELATAN NATIONAL PARK

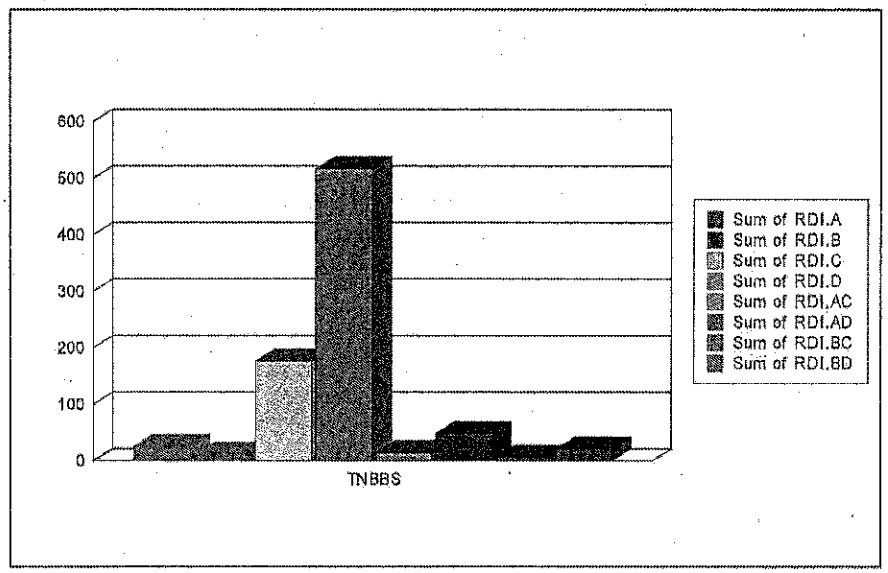
BASIC POPULATION PARAMETERS

Number of Footprints	Number of Locations with rhino signs					
	Footprints	Wallows	Feces	Feeding	Other Signs*	Direct Sighting
25	21	7	1	0	3	0

* *Include Urine, Scratches, Rubbings, etc.*

During the 20 Patrols/Surveys in this period, 32 independent signs of rhino were encountered but no direct sighting

RHINO DENSITY INDICATORS



Rhino		RPU Field Presence		Density Indicators			
A	B*	C	D	A/C	A/D	B/C	B/D
Number of print locations	Number of Rhino Signs*	Field Days**	Distance Walked***	Rhino prints/ 100 days	Rhino prints/ 1000 km	Rhino signs/ 100 days	Rhino signs/ 1000 km
25	**11**	**176**	**517,00**	**14,20**	**48,36**	**6,25**	**21,28**

(B) The total number of sign (excluding footprints) of rhino found. ** Total number of RPU group field days during surveys only (excluding other activities). *** Total number of range in kilometer covered by RPU group during surveys activity.*

ILLEGAL ACTIVITIES ENCOUNTERED

Gaharu * Theft	Encroachment	Timber Theft	Forest Product Theft	Illegal Hunting		
				Rhino / Trap	Non Rhino (Mammals)	Other
0	2	0	0	0	0	5

* *Gaharu (a component for incense) theft is listed separately, because it is a major threat in any forest in Indonesia*

In BBS, during the surveys and patrols a total of 7 cases of illegal activities were detected. The major case encountered were bird trapping in the Southern part of NP, then 2 old encroachments. **No trap of rhino** encountered.
Record of cases as per attached in **Annex – 2**, which includes: date of incidence, date of detection, type of offences, place of occurrence, evidence (forest / wildlife produces recovered, Arms /other evidence, suspects, legal status and comments.

ENCOUNTERED ANIMALS

Patrol Area	√ = encountered					
	Rhino	Elephant	Tiger	Tapir	Other Mammal	Offences
Kotaagung, Bandar Lampung dan Pemerihan.						
Liwa, Krui, dan Sukaraja.						
Pemerihan, Cawang Haro, Anak Way Canguk, Way canguk, Peg. Nanggalan, Plot Penelitian WCS, Way Pemerihan< Sumberejo, dsk.		√		√	√	√
Blok VII, Ngaras, Hulu Way Ngaras, Umbul Seno dsk.		√	√	√	√	
Limus, Tanjung mas, Way belambangan, muara way belambangan, sekawat Tampang, dsk.		√	√	√		
Kotaagung, Biha						
Pahmongan, Hulu Mahnay Balak, Mahnay Tengah dan Mandiri.	√	√	√	√		
Krui, Bandar Lampung, Way Haru.						
Rataagung, Pesanguan, Betung, Banjar Sari, Wonosobo.						
Sumberejo, Leter U, Sumber sari, Way Pemerihan, Way		√	√	√	√	

canguk, Muara Way Canguk, Muara Way Pemerihan dan sekitarnya.						
Kotaagung, Pal 50, Pemerihan dan Sukaraja.						
Kubu Perahu, Way Mentarang, W. Meluang, Tengkuluk, ulu way krui dan sekitarnya.		√	√	√		
Kotaagung, Pemerihan, Way Haru, Talang Pendowo, Talang Bangkok, Ngaras, Trimurjo.						
Panji Wayang, Grogol, Ngambur	√		√			√
Kotaagung, Pemerihan, Ngambur, Metro, Way nipah dan Pesanguan.						
Panji Wayang, hulu Way Ngambur, Kububanir dan sekitarnya.	√	√	√		√	
Muara Way Pemerihan, Way Canguk, Way Penipahan, Way babuta, Way Sawang awi, Napaliut, Siring Batu, way Siring gading dsk.					V	V
Mendati, Pg. Kuyung, Hulu way Rilau dan sekitarnya.	√	√	√			√
Talang Meranjat, Ulu Way Biha dan sekitarnya.		√	√	√		√
Kotaagung, Sukaraja atas, Pemerihan, Way Ngambur, Way Haru, Tampang, dll.						
Pal 50, Hulu Way Bambang, Km.24.		√	√	√		
Kotaagung, Tampang.						
Pal 50, Hulu Way Bambang, Talang Asahan		√	√			
Panji Wayang, Bamabu kuning, Way Ngambur bundik, Talang simpang duren, Talang Panama dan sekitarnya.	√	√	√			
Pal 50, Hulu Way Bambang, KM. 30		√		√		
Tampang, Tanjung Mas, Sinar Ogan dsk.			√			
Krui, Pahmongan, dan sekitarnya.			√	√		
Krui, Way Mahnai, Way Tenumbang dan sekitarnya.						

Kubu Perahu, Way meluang, Way Menterang, Sukamarga, Way empulan ulu landos, Bumbon, Umbul lima, Tebak leor dan sekitarnya.						
Mendati, Siring damar, Way Telemah, Panji wayang, Marang, Kubu Gedung, Biha dan sekitarnya.						
Peninggeman, Pal 50, Sumberejo dan sekitarnya.						
Pal 50, Pemerihan, Muara Pemerihan, Pintau dan Ujung Pandang Bengkunat.		√		√		
Jalan lintas bengkunat, Pemerihan, Mendati dan sekitarnya.						
Jalan lintas bengkunat, Pemerihan, Sumberejo dan sekitarnya.						
SRS Way kambas, dan Pal 50.						
Sukaraja atas, Jalan lintas sukaraja, Ngaras, Mendati, Panji Wayang, Krui dan Kubu Perahu.						
Jalan lintas bengkunat, Way Haru, Way Nipah, dan Pedamaran.						
Way Sindi Krui, Talang Gisting Kaali tengah, dsk.						
Rhino Camp						
Blok VII, Ngaras, Hulu way Ngaras, Hulu Way Pintau, Umbul Basir, Talang Samino, Bendungan, Sidomulyo.		√	√	√		
Pal 50, Talang Jhoni, Way Pemerihan, Hulu way Bamban, Jalan lintas Sanggi - Bengkunat dan sekitarnya.					√	
Panji Wayang, Hulu Way Ngambur Bay Ngambur Pangkalan, dan sekitarnya.	√					
Tampang, Tanjung Mas, Sinar Ogan, W. Blambangan, Haur Gading						
Kubu Perahu, Hulu Way Krui, Way Tenumbang, Hulu Way Mahnai, dsk.	√			√		

DETAILS OF RHINO SIGNS

Patrol Area	Footprints	Direct Sighting	Wallow	Feeding	Dung	Other Signs
Pemerihan, Cawang Haro, Anak Way Canguk, Way canguk, Peg. Nanggalan, Plot Penelitian WCS, Way Pemerihan< Sumberejo, dsk.	0	0	0	0	0	0
Blok VII, Ngaras, Hulu Way Ngaras, Umbul Seno dsk.	0	0	0	0	0	0
Limus, Tanjung mas, Way belambangan, muara way belambangan, sekawat Tampang. dsk.	0	0	0	0	0	0
Pahmongan, Hulu Mahnay Balak, Mahnay Tengah dan Mandiri.	1	0	1	0	0	0
Sumberejo, Leter U, Sumber sari, Way Pemerihan, Way canguk, Muara Way Canguk, Muara Way Pemerihan dan sekitarnya.	0	0	0	0	0	0
Kubu Perahu, Way Mentarang, W. Meluang, Tengkuluk, ulu way krui dan sekitarnya.	0	0	0	0	0	0
Panji Wayang, Grogol, Ngambur	10	0	2	0	0	0
Panji Wayang, hulu Way Ngambur, Kububanir dan sekitarnya.	6	0	3	0	0	2
Muara Way Pemerihan, Way Canguk, Way Penipahan, Way babuta, Way Sawang awi, Napaliut, Siring Batu, way Siring gading dsk.	0	0	0	0	0	0
Mendati, Pg. Kuyung, Hulu way Rilau dan sekitarnya.	1	0	0	0	0	0
Talang Meranjat, Ulu Way Biha dan sekitarnya.	0	0	0	0	0	0
Pal 50, Hulu Way Bambang, Km.24.	0	0	0	0	0	0
Pal 50, Hulu Way Bambang, Talang Asahan	0	0	0	0	0	0
Panji Wayang, Bamabu kuning, Way Ngambur bundik, Talang simpang duren, Talang Panama dan sekitarnya.	2	0	0	0	0	0

PATROL DATA

Location	Activity	Start Date	End Date	Days	No of Person	Length (Km)*	Remarks
Jalan lintas bengkunat, Pemerihan, Sumberejo dan sekitarnya.	Patroli	7 - Sep	9 - Sep	3	2	0,00	No illegal activities encountered
Jalan lintas bengkunat, Pemerihan, Mendati dan sekitarnya.	Patroli	9 - Sep	13 - Sep	5	2	0,00	No illegal activities encountered.
SRS Way kambas, dan Pal 50.	Training	16 - Sep	22 - Sep	7	2	0,00	Well done
Way Sindi Krui, Talang Gisting Kaali tengah, dsk.	Wildlife conflict	27 - Sep	30 - Sep	4	2	0,00	3 tigers and 1 juvenil ; Encountered illegal activity in adjacent protection forest in Kali tengah.
Liwa, Krui, dan Sukaraja.	Intelli gence	3 - Jul	5 - Jul	3	1	0,00	Rumors on wildlife parts ewnership; Found Rafflesia flower blooming
Krui, Bandar Lampung, Way Haru.	Intelli gence	17 - Jul	20 - Jul	4	1	0,00	Info on deer poaching.
Kotaagung, Bandar Lampung dan Pemerihan.	Intelli gence	22 - Jul	26 - Jul	5	2	0,00	Continued to do collaborative operation to arrest 4 persons in charge of encroachment. Agroup of 21 elephants interrupt to village Bandar Dalam, Way Haru.
Rataagung, Pesanguan, Betung, Banjar Sari, Wonosobo.	Intelli gence	23 - Jul	31 - Jul	9	1	0,00	Collected evidences
Kotaagung, Pemerihan, Ngambur, Metro, Way nipah dan Pesanguan.	Intelli gence	2 - Agust	11 - Agust	10	2	0,00	Ifformation on dead male elephant. Monitoring encroachment

Kotaagung, Tampang.	Intelligence	23 - Agust	28 - Agust	6	2	0,00	Info on wildlife conflict in Cukuh Pandan Tampang , 1 male elephantt, sun bear, and which attack cacao plantation
Panji Wayang, hulu Way Ngambur, Kububanir dan sekitarnya.	Patrol/ Survey	13 - Agust	20 - Agust	8	4	30,00	Rhino signs : footprint, wallow, gesekan, pelintiran, Signs of tiger and elephant .
Pal 50, Hulu Way Bambang, Talang Asahan	Patrol/ Survey	24 - Agust	31 - Agust	8	4	25,50	No rhino signs. Signs of tiger, elephant. No illegal actiovity.
Krui, Way Mahnai, Way Tenumbang dan sekitarnya.	Patrol	1 - Sep	7 - Sep	7	5	0,00	No illegal activity.
Jalan lintas bengkunat, Pemerihan, Mendati dan sekitarnya.	Patrol	12 - Sep	13 - Sep	2	2	0,00	No illegal activity.
Blok VII, Ngaras, Hulu way Ngaras, Hulu Way Pintau, Umbul Basir, Talang Samino, Bendungan, Sidomulyo.	Patrol/ Survey	22 - Sep	30 - Sep	9	5	50,50	No rhino signs. Signs og tiger, elephant, tapir. Illegal activity (bird trapping).
Pemerihan, Cawang Haro, Anak Way Canguk, Way canguk, Peg. Nanggalan, Plot Penelitian WCS, Way Pemerihan< Sumberejo, dsk.	Patrol/ Survey	12 - Jul	21 - Jul	10	4	39,00	No new rhino signs. Bird trapping indication. Encroachment in Pemerihan reducing.
Sumberejo, Leter U, Sumber sari, Way Pemerihan, Way canguk, Muara Way Canguk, Muara Way Pemerihan dan sekitarnya.	Patrol/ Survey	22 - Jul	30 - Jul	9	5	16,00	No new rhino signs. No poaching indication. Active encroachment in Sumberejo - Sumbersari.

Muara Way Pemerihan, Way Canguk, Way Penipahan, Way babuta, Way Sawang awi, Napaliut, Siring Batu, way Siring gading dsk.	Patrol/ Survey	3 - Agust	10 - Agust	8	4	39,00	No new rhino signs. Fishing indication. Active encroachment in Sumbersari - Sumberrejo.
Panji Wayang, Bamabu kuning, Way Ngambur bundik, Talang simpang duren, Talang Panama dan sekitarnya.	Patrol/ Survey	24 - Agust	31 - Agust	8	4	25,00	Rhino footprints. Encroachment in Simpang duren and Panama.
Kubu Perahu, Way meluang, Way Menterang, Sukamarga, Way empulan ulu landos, Bumbon, Umbul lima, Tebak leor dan sekitarnya.	Patrol	1 - Sep	6 - Sep	6	5	29,00	Bird trapping in Way Mahnay Kubu perahu area.
Pal 50, Talang Jhoni, Way Pemerihan, Hulu way Bamban, Jalan lintas Sanggi - Bengkunat dan sekitarnya.	Patrol/ Survey	17 - Sep	24 - Sep	8	3	28,00	Active encroachment in Sumbersari, Sumberrejo .
Rhino Camp	Patrol	30 - Sep	30 - Sep	1	1	3,00	Accompanied Guest from US Embasy Jakarta.
Blok VII, Ngaras, Hulu Way Ngaras, Umbul Seno dsk.	Patrol/ Survey	11 - Jul	18 - Jul	8	5	27,00	No rhino signs. Sign of tiger, elephant and tapir. Direct sighting 2 sun bears.
Kotaagung, Pal 50, Pemerihan dan Sukaraja.	Training	26 - Jul	2 - Agust	8	5	0,00	32 MIST_GIS Trainees were from Park, YABI, WCS-IP, TWNC.
Mendati, Pg. Kuyung, Hulu way Rilau dan sekitarnya.	Patrol/ Survey	13 - Agust	20 - Agust	8	4	15,00	Rhino old and new signs. Signs of tiger, elephant and tapir.

Pal 50, Hulu Way Bambang, KM. 30	Patrol/ Survey	24 - Agust	31 - Agust	8	5	11,00	No new rhino signs. Signs af elephant and tapir. Bird netting indication.
Limus, Tanjung mas, Way belambangan, muara way belambangan, sekawat Tampang. dsk.	Patrol/ Survey	4 - Jul	12 - Jul	9	5	0,00	No illegal activity. No rhino signs. Signs of tiger, elephant and tapir.
Kubu Perahu, Way Mentarang, W. Meluang, Tengkuluk, ulu way krui dan sekitarnya.	Patrol/ Survey	22 - Jul	31 - Jul	10	5	37,60	No rhino signs. Signs of tiger, elephant and tapir. No illegal activity.
Talang Meranjat, Ulu Way Biha dan sekitarnya.	Patrol/ Survey	2 - Agust	11 - Agust	10	4	40,00	No rhino signs. Signs of tiger, elephant and tapir. Bird netting indication. No other illegal activity
Mendati, Siring damar, Way Telemah, Panji wayang, Marang, Kubu Gedung, Biha dan sekitarnya.	Patrol	1 - Sep	8 - Sep	8	5	0,00	No illegal activity
Sukaraja atas, Jalan lintas sukaraja, Ngaras, Mendati, Panji Wayang, Krui dan Kubu Perahu.	Patrol	13 - Sep	17 - Sep	5	2	0,00	No illegal activity.
Panji Wayang, Hulu Way Ngambur Bay Ngambur Pangkalan, dan sekitarnya.	Patrol/ Survey	21 - Sep	30 - Sep	10	5	19,50	Rhino footprint and dung. Signs of owa, leafmonkeys, siamang. Bird trapping indication.
Kotaagung, Biha	Collaborative operation	5 - Jul	15 - Jul	11	6	0,00	Arrested suspect Mr. Umar and evidences(5 taxidermic of deer head, 4 deer embrios. , and 1 unit car .

Kotaagung, Pemerihan, Way Haru, Talang Pendowo, Talang Bangkok, Ngaras, Trimurjo.	Patrol	19 - Jul	29 - Jul	11	6	0,00	Elephant conflict in Talang Pendowo, Biha and Way Haru area. Arrested suspect in Trimurjo area.
Kotaagung, Sukaraja atas, Pemerihan, Way Ngambur, Way Haru, Tampang, dll.	Patrol	3 - Agust	14 - Agust	12	7	0,00	Illegal activity in adjacent HPT (limited production forest) area. Wildlife conflict in Way Haru dan Sinar Ogan area.
Tampang, Tanjung Mas, Sinar Ogan dsk.	Patrol	22 - Agust	29 - Agust	8	5	0,00	Detect ed old trap for tiger or deer, in plantation area.
Peninggeman, Pal 50, Sumberejo dan sekitarnya.	Patrol	1 - Sep	9 - Sep	9	3	0,00	A lot no of border-marks ruins/dissepear ed in Peninggeman area. Active Encroachment in Tumpak Sawo.
Jalan lintas bengkunat, Way Haru, Way Nipah, dan Pedamaran.	Patrol	13 - Sep	21 - Sep	9	2	0,00	Elephant conflict in Way Haru continuing. Encroachment area re-opened in Penyantun., for padi field.
Tampang, Tanjung Mas, Sinar Ogan, W. Blambangan, Haur Gading	Patrol	25 - Sep	29 - Sep	5	2	0,00	No illegal activity
Pahmongan, Hulu Mahnay Balak, Mahnay Tengah dan Mandiri.	Patrol/ Survey	12 - Jul	21 - Jul	10	5	28,00	Signs of rhino. Signs of tiger, elephant and tapir. No illegal activity.
Panji Wayang, Grogol, Ngambur	Patrol/ Survey	23 - Jul	31 - Jul	9	4	25,00	Rhino signs : footprints, scratch, wallow. Signs of tiger, elephant and tapir. Signs of Siamang Gibbon and birds.
Pal 50, Hulu Way Bambang, Km.24.	Patrol/ Survey	3 - Agust	10 - Agust	8	5	16,00	No rhino signs. Signs of tiger, elephant and tapir. No illegal activities.

Krui, Pahmongan, dan sekitarnya.	Patrol/ Survey	22 - Agust	30 - Agust	9	5	22,00	No rhino signs. Signs of tiger and tapir Info on gaharu theft in Krui area.
Pal 50, Pemerihan, Muara Pemerihan, Pintau dan Ujung Pandang Bengkunat.	Patrol	1 - Sep	6 - Sep	6	4	0,00	No illegal activities .
Kubu Perahu, Hulu Way Krui, Way Tenumbang, Hulu Way Mahnai, dsk.	Patrol/ Survey	22 - Sep	30 - Sep	9	6	23,00	Signs of rhino. Signs of tapir. Indication of old bird trapping.
Jalan lintas bengkunat, Pemerihan, Sumberejo dan sekitarnya.	Patrol	7 - Sep	9 - Sep	3	2	0,00	No illegal activities.
Jalan lintas bengkunat, Pemerihan, Mendati dan sekitarnya.	Patrol	9 - Sep	13 - Sep	5	2	0,00	No illegal activities.
SRS Way kambas, dan Pal 50.	Training	16 - Sep	22 - Sep	7	2	0,00	Training on new software for GIS
Way Sindi Krui, Talang Gisting Kaali tengah, dsk.	Penangana n konflik satwa	27 - Sep	30 - Sep	4	2	0,00	Tiger conflict (3 adult and juvenile). Illegal activity detected in Protection forest in Kali tengah area.
Liwa, Krui, dan Sukaraja.	Intelligen-ce	3 - Jul	5 - Jul	3	1	0,00	Info on ownership of wildlife parts of protected animal. Rafflesia flower blooming.
Krui, Bandar Lampung, Way Haru.	Intelligen-ce	17 - Jul	20 - Jul	4	1	0,00	Info on deer poaching. Got a letter to safe evidences. (Mendapat surat ketetapan tentang penyitaan barang bukti).

Kotaagung, Bandar Lampung dan Pemerihan.	Intelligen-ce	22 - Jul	26 - Jul	5	2	0,00	Investigation to 4 suspects. 21 elephants entered to village Bandar Dalam Way Haru.
Rataagung, Pesanguan, Betung, Banjar Sari, Wonosobo.	Intelligen-ce	23 - Jul	31 - Jul	9	1	0,00	Collected evidences.
Kotaagung, Pemerihan, Ngambur, Metro, Way nipah dan Pesanguan.	Intelligen-ce	2 - Agust	11 - Agust	10	2	0,00	Info on dead male elephant . Monitoring encroachment area.
Kotaagung, Tampang.	Intelligen-ce	23 - Agust	28 - Agust	6	2	0,00	Cacao plantation area disturbed by 1 male adult elephant, bear and deer.
Panji Wayang, hulu Way Ngambur, Kububanir dan sekitarnya.	Patrol/ Survey	13 - Agust	20 - Agust	8	4	30,00	Rhino signs (foot print, wallow etc.). Signs of elephant and tiger.
Pal 50, Hulu Way Bambang, Talang Asahan	Patrol/ Survey	24 - Agust	31 - Agust	8	4	25,50	No rhino signs. Signs of tiger and elephant. No illegal activity.
Krui, Way Mahnai, Way Tenumbang dan sekitarnya.	Patrol	1 - Sep	7 - Sep	7	5	0,00	No illegal activity.
Jalan lintas bengkunat, Pemerihan, Mendati dan sekitarnya.	Patrol	12 - Sep	13 - Sep	2	2	0,00	No illegal activity.
Blok VII, Ngaras, Hulu way Ngaras, Hulu Way Pintau, Umbul Basir, Talang Samino, Bendungan, Sidomulyo.	Patrol/ Survey	22 - Sep	30 - Sep	9	5	50,50	No rhino signs. Signs of elephant, tiger and tapir. Identified bird trapping.
Pemerihan, Cawang Haro, Anak Way Canguk, Way	Patrol/ Survey	12 - Jul	21 - Jul	10	4	39,00	No new signs of rhino. Identified bird trapping Identified of reducing encroachment in

canguk, Peg. Nanggalan, Plot Penelitian WCS, Way Pemerihan< Sumberejo, dsk.							Pemerihan area.
Sumberejo, Leter U, Sumber sari, Way Pemerihan, Way canguk, Muara Way Canguk, Muara Way Pemerihan dan sekitarnya.	Patrol/ Survey	22 - Jul	30 - Jul	9	5	16,00	No new signs of rhino. No indication of poaching. Active encroachment in Sumberejo-Sumbersari area.
Muara Way Pemerihan, Way Canguk, Way Penipahan, Way babuta, Way Sawang awi, Napaliut, Siring Batu, way Siring gading dsk.	Patrol/ Survey	3 - Agust	10 - Agust	8	4	39,00	No new signs of rhino. Detected old fishing. Active encroachment in Sumberejo-Sumbersari area.
Panji Wayang, Bamabu kuning, Way Ngambur bundik, Talang simpang duren, Talang Panama dan sekitarnya.	Patrol/ Survey	24 - Agust	31 - Agust	8	4	25,00	Rhino foot print. Detected illegal activity (encroachment) in Simpang duren dan Panama areas.

- *Mileage of patrol by using two or four wheeled vehicles are not recorded.*
- *There was no mileage measured in the other activities.*

GENERAL PERFORMANCE PARAMETERS

Number of general activities	45
Number of Patrol and Surveys	20
Distance Walked (Kilometers)	549.1
Distance Walked for Patrol and Survey	517.1
Number of Field Days	340
Number of Field Days for Patrol and Survey	176
Field Days per-person per-month	17.43

A total of 45 activities were conducted during the 3th quarter (July - September) of the year and among of them were 20 activities of patrol/surveys, which covers 517.1 km and field days 17.43 days per person per month. The field days in this quarter is higher than in previous quarter, although there were still their involvement in collaborative operation with The Park Administration to move encroachments and wildlife conflict resolution.

PROGRAM PERSONNEL

(Summary of Field Days Per-Person Per-Month 1 July – 30 September 2010)

Name of Personnel	Number of Field Days	Average Field Days/Month
Agung S	56	18,67 3 *Month)*
Agus Sulaeman	50	16,67 3 *Month)*
Bahara	34	17,00 2 *Month)*
Budiono	47	15,67 3 *Month)*
Didin Kamaludin	39	13,00 3 *Month)*
Edi Rusmanto	50	16,67 3 *Month)*
Hendra Wijaya	38	12,67 3 *Month)*
Heryanto	51	17,00 3 *Month)*
Jalisi	40	13,33 3 *Month)*
Johan Marwan	56	18,67 3 *Month)*
Madnurzen	64	21,33 3 *Month)*
Marsum	58	19,33 3 *Month)*
Merli aroc Hulu	41	13,67 3 *Month)*
Nang Jamadi	41	13,67 3 *Month)*
Olih	44	14,67 3 *Month)*
Rahman	56	18,67 3 *Month)*
Romiyanto	49	16,33 3 *Month)*
Samsurizal	51	17,00 3 *Month)*
Saptono	77	25,67 3 *Month)*
Sudari	51	17,00 3 *Month)*
Suharsono	61	20,33 3 *Month)*
Syahroni	50	16,67 3 *Month)*
Timbul TB	51	17,00 3 *Month)*
Toho	44	14,67 3 *Month)*
Uga Yogaswara	81	27,00 3 *Month)*
Zen Afrial	53	17,67 3 *Month)*
Zulkifli	62	20,67 3 *Month)*

Other personnels :

1.	Titus Ramadhani	Field Coordinator (Formerly was as Administrative and Finance staff of RPU BBS)
2.	----	Administrative and Finance staff of RPU BBS
3.	Nasarius S. Waja	Driver-1
4.	Suparmin	Driver-2
5.	Era Herawati	Cook-1
6.	Wawah	Cook-2
7.	Sinyo Handoko	Office boy-1
8.	Rubianto	Office boy-2

4TH QUARTER REPORT
1 OCTOBER - 31 DECEMBER 2010

RHINO PROTECTION UNIT (RPU) ACTIVITIES & PERFORMANCE REPORT
BUKIT BARISAN SELATAN NP, WAY KAMBAS NP & UJUNG KULON NP



PATROLS OF HOPE..

All Photo by: RPU - YABI

PREPARED BY: M. WALADI ISNAN

COMPILES BY:
M. SYAMSUDIN & YANKY AGUNG W

REVIEWED BY: WIDODO S. RAMONO



YABI
Yayasan Badak Indonesia

www.badak.or.id

PROJECT TITLE : PROTECTION PROGRAM OF YAYASAN BADAK INDONESIA

Reporting Period: 1 October - 31 December 2010

Name and Address of Grantee:

1. **International Rhino Foundation (IRF)**
   Executive Director, International Rhino Foundation
   138 Strasburg Reservoir Road
   Strasburg, VA 22657
   Tel/fax: 540-465-9595
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Authorship:

Reporting provided by Protection Manager (Mr. M. Waladi Isnan). Material and information gathered from field report and associated document.

Executive Summary:

The decline of Sumatran and Javan rhino has been in process for a long time. The Javan rhino for example was eliminated from Malaysia in the 1930's. Meanwhile, following the Sumatran rhino PHVA (1993) indicated that the decline of Sumatran rhino probably 50% during the last decade. The total population of Sumatran rhino in Indonesia is estimated only 215 – 319 and will be extinct for the next decade if there are no appropriate and serious management. (Strategy and Action Plan for the Conservation of Rhinos in Indonesia 2007 – 2017). Rhino decline in South East Asia is due to a combination of reduction in habitat and overexploitation of rhino (most recently by poachers after the horn). At this time, poaching pressure continues to be high in Indonesia, hence there is a strong need of this country to emphasize anti-poaching activities. To this the rhino protection program of Yayasan Badak Indonesia (YABI) is activated to answer the need. Rhinoceros is subject to poaching pressure both from hunters and form trappers, they use wire snares and other traps that maims to kill animals. The method employed in poaching prevention are primarily in forms of field patrols to search for traps and other signs of poaching attempt, to destroy these traps, and to collect evidence to identify and apprehend the suspects involved. While in support to field patrol intelligence activities is operated to assist in the apprehension of poachers and identify the routes of illegal trade of protected animal parts (horn, skin, hooves etc.).

The Indonesian Rhino Protection Program of YABI integrates partners of governmental and non-governmental namely Directorate General of Forest Protection and Nature Conservation of the Ministry of Forestry, International Rhino Foundation and World Wide Fund for Nature as well as local villager . The program entails series of approaches that includes: wild population protection by intensive patrolling of areas to detect traps and arrest intruders, more intensive and extensive surveys and monitoring of the rhino population and intelligence operations to assist in the apprehension of poachers and identify of routes used for the horn trade and establishment of rhino database system

using the Geographic Information System (GIS) techniques.

The Indonesian Rhino Conservation Program (that was originated from GEF Project and that is now has merged into YABI) and this Rhino Protection Program of YABI fully understood that the program very costly. But, it is important to bring an understanding the operation of Rhino Protection Units (RPUs) backed-up by Intelligence and Law Enforcement Unit (ILEU) is the most effective measure in protection of rhinos in the wild. Therefore it is important to develop a simultaneously funding plan for sustainability of rhino conservation program.

Introduction

The decline of both species of rhinoceros, Sumatran and Javan, has been in process for a long time. The population of Sumatran rhino have been reduced to 50% in the last decade and will be extinct for the next decade if there are no serious and appropriate management of rhino. Its decline in range and number in Sumatra is attributed chiefly to fragmentation of its habitat through indiscriminate forest clearance and to poaching, stimulated by the illegal trade in horns, hides and hooves, and other parts of rhino's body.

A population and Habitat Analysis conducted in November 1993 in conjunction with the IUCN SSC and its Conservation Breeding Specialist Group (CBSG) and the AsRSG revealed a significant decline in the numbers of Sumatran rhino in Indonesia. The estimates that emerged from the new data and more rigorous assessment was arround 200 (215 – 319). Meanwhile, the previous estimate had been 420 – 875. The GEF project RPU YABI estimates that until June 1998 the presence the population of Sumatran rhino in Kerinci Seblat National Park 27 – 32, Bukit Barisan Selatan National Park 40. - 50, and Way Kambas National Park 24 - 30

Although the Javan rhino population in Ujung Kulon National Park seems to be holding at about 50 –60, yet the threat of poaching still remains. The loss of rhino has become a matter of global concern. In 1994, at least one rhino was poached in Ujung Kulon and a suspect has been identified but no prosecution has in progress at that time. Although rhino poaching evidence and attempt was not found during this quarter, poaching of other wildlife such as deer, birds, langusts/lobster and other marine products were still occurring.

Saving the remaining rhino population needs further alternatives. There should be series of efforts to protect the remaining population by activating rhino patrol and strengthening its anti-poaching activities, until poacher activity and habitat destruction is reduced to the point of elimination.

The Protection Program of YABI provides protection from poaching and habitat disturbance for viable nucleus populations of Sumatran and Javan Rhinos through the establishment and operation of Rhino Protection Units, and supporting management, coordination and supervisory structures. Formerly, YABI had been operated 17 Rhino Protection Units (RPUs) until middle of 2009, while due to shortage of funding in this

quarter, only 16 RPUs continued their operation in and surrounding areas of Bukit Barisan Selatan (7 RPUs), Way Kambas (5 RPUs) and Ujung Kulon (4 RPUs) National Parks.

Objectives

The objective of the Program is to contribute to the long-term viable conservation and management of Indonesian rhinos (the Javan rhino – *Rhinoceros sondaicus*, and the Sumatran rhino – *Dicerorhinus sumatrensis*) and their habitats in Java and Sumatra.
The Indonesian Rhino Protection Program of YABI it self addressed to enhance the capabilities of the Directorate General of Protection and Nature Conservation and associated wildlife agencies to arrest and reverse the decline of rhinoceros due to poacher activity and habitat disturbance toward the national and global goal of recovery of viable populations of rhino species in Indonesia.

Output

1. Establishment and operate of at least 16 Rhino Protection Units (RPUs) in Sumatra and Java.
2. Establishment and operate Intelligence and Law Enforcement Unit (ILEU) to support law enforcement process which is undertaken by RPU and Park authority or proceed to identify information of threats from ILEU's informants for further judicial process.
3. Community facilitation for better livelihood and to reduce threats from surrounding community.

Changes: -

Progress:
The Rhino Protection Program of YABI provides protection from poaching and habitat disturbance for viable nucleus populations of Sumatran and Javan Rhinos through the establishment and operation of Rhino Protection Units (RPUs), and supporting management, coordination and supervisory structures. The outcome of operations of 7 RPUs in Bukit Barisan Selatan National Park (BBS NP), 5 RPUs in Way Kambas National Park (WK NP) and 4 RPUs in Ujung Kulon National Park (UK NP) is reported as seen in Annex 1. (*RPUs Activities Report Period October - December 2010.), as per attached.*

During the implementation of surveys and patrols the RPU/RMPU achieved numbers of surveys, distance walked and duration of time they have consumed in every each of their activities. The Team also encountered many cases of illegal activities in the National Parks and the rhino conservation areas, into which prosecution had been made through filing the cases and hand over the cases to local Police Stations

The achievements of the Protection Program for this period October - December 2010 is described below in *Annex 1.*
Records on illegal killing of animals and other forest offenses detected by both RPUs

(BBS, WK and UK) and ILEU is shown in *Annex* 2.

The field days per month of RPU's personnel is shown in Annex-1.

Intelligence and Law Enforcement Unit (ILEU) has been operating to identify the threats which come from surrounding people or outside of the Park; its operations also covers identifying possible facilitations for raising local's alternative income in order to reduce threats to the park and its rhinos . There are only 3 personnels in this unit that have to work in collaboration with informants, RPUs, Park Rangers and Police, in the case that they have a confirmed case and have to apprehend the suspect/s for further law enforcement efforts. Although ILEU's base operation is in BBS and surroundings, they also available to assist ILEU operation in both WK and UK NPs.
ILEU's findings of their activities, together with RPU BBS findings, is reported in Annex-2,

In this Q4 period, RPU BBS performed fielddays per person per month 15.39, it was lower than in Q3 (17.43). But , in this periode they detected higher number of independent rhino signs (202) compare with in the Q3 (32). Also, detected higher illegal activities (52 cases) compare with in the Q3 (7).

RPU WK, in Q4 performed higher fielddays per person per month (16.50) compare with in Q3 (15.28), and higher detected independent rhino signs (137) compare with in Q3 (49), also for detecting illegal activities in Q4 (37) was higher, compare with in Q3(30).

In UK, RPU in this period performed 21, lower than before (21,67). Detected 83 independent rhino signs (previous period 186) and 5 cases (previous period 1 case).

BBS performed the lowest field day per person 15.39 if ti is compared with WK (16.50) and UK (21.00) , although they performed the highest number of patrol (22), if compare with WK (!5) and UK (12). Also, BBS detected the highest number of independent rhino sign (202) compare with WK (137) and UK (65), and the highest cases detected (52) compare with WK (37) and UK (5).
The RPU BBS in this Q4 has involved in the 3 elephant conflict handling, which cause disturbance of some encroached areas. When they involved in the conflict in Pal 50 (27 – 30 November 2010), they have detected a birth of young elephant.

Conclusions and Recommendation:

In this period, the average number of field days per month of every person of RPU in BBS and WK has less than the Program required of 20 days/month.

RPU UK achieved 21.00, walked 513.79 km (previously 514.09 km in Q1, 499.78 in Q2 and 558.27 in Q3).
RPU WK achieved 16.50 (compare with previous Q1 was 18.04, Q2 was 17.51 and Q3 was 15.28) as the result of only 15 of all their 53 activities were patrols / surveys, while their other activities were involvement in collaborative operation to remove encroachment, drive elephant, trainings. Distance walked for patrol and survey was 382.70 Km (compare with previously in Q1 was 264.2 km, Q2 was 351.6 Km and Q3 was 191.3 Km).

RPU BBS has achieved 15.39 lower than previous Q1 17.48, Q2 was 16.89 and Q3 was 17.43, from their 22 patrols/surveys activities of all their 42 activities. Distance walked for patrol and survey was 558.2 Km (compare with previous Q1 was 1.206.5, Q2 was 766.5 Km and Q3 was 558.2 Km). The other activities were their involvement in collaborative operation to remove encroachments and investigations of cases and in wildlife-human conflict resolutions (elephant conflicts).

There was no direct sighting of rhino in BBS, WK and UK, and especially for BBS, the RPU encountered a larges number of rhino signs (181 footprints and 21 of other signs).

Based on the patrol and survey in Ujung Kulon, signs of fishing (5 cases) detected. There was a serious threats that had been anticipated by RPU together with Park Authority.
While in WK, 16 traditional deer poaching and 11 cases of encroachments activities mostly encountered. The RPU detected some domesticated water buffalo grazed in the area which rhino (and other big mammals) signs detected. It could be a serious threat for transferring buffalo disease to big mammals in the forest.
This should be a serious concern from the Park Administration and RPU.

In BBS, mostly illegal activities encountered by RPU was non mammals poaching (fishing and bird trapping) when they undertook patrol / survey. Meanwhile the Program must help to keep en eye and be aware of the abandoned encroachment areas in Way Kambas and Bukit Barisan Selatan from which people will usually do poaching on this or its adjacent area. Further, wildlife trade indications in both surrounding areas of WK and BBS are still occurring.

The Program had found many rhino footprints in this period but it can not be utilized to determine the number of rhino population. It still need to be analyzed with more sophisticated methods.

YAYASAN BADAK INDONESIA - YABI
Rhino Foundation of Indonesia - RFI

ANNEX-1:

QUARTERLY ACTIVITY AND PERFORMANCE REPORT

1 OCTOBER - 31 DECEMBER 2010
(Q4)

BUKIT BARISAN SELATAN NATIONAL PARK

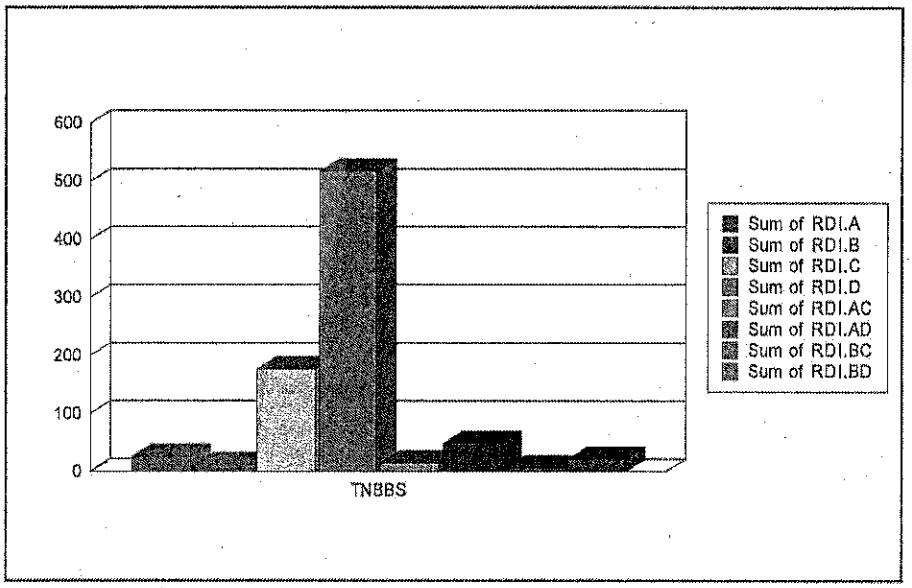
BASIC POPULATION PARAMETERS

Number of Footprints	Number of Locations with rhino signs					
	Footprints	Wallows	Feces	Feeding	Other Signs*	Direct Sighting
109	181	10	4	4	3	0

** Include Urine, Scratches, Rubbings, etc.*

During the 22 patrols/surveys in this period, 202 independent signs of rhino were encountered but no direct sighting

RHINO DENSITY INDICATORS



Rhino		RPU Field Presence		Density Indicators			
A	B*	C	D	A/C	A/D	B/C	B/D
Number of print locations	Number of Rhino Signs*	Field Days**	Distance Walked***	Rhino prints/ 100 days	Rhino prints/ 1000 km	Rhino signs/ 100 days	Rhino signs/ 1000 km
109	21	183	558,0	59,56	195,34	11,48	37,63

(B) The total number of sign (excluding footprints) of rhino found. ** Total number of RPU group field days during surveys only (excluding other activities). *** Total number of range in kilometer covered by RPU group during surveys activity.*

ILLEGAL ACTIVITIES ENCOUNTERED

Gaharu * Theft	Encroachment	Timber Theft	Forest Product Theft	Illegal Hunting		
				Rhino / Trap	Non Rhino (Mammals)	Other
1	16	3	1	0	3	28

* *Gaharu a component for incense) theft is listed separately, because it is a major threat in any forest in Indonesia*

In BBS, during the surveys and patrols a total of 52 cases of illegal activities were detected. The major cases encountered were bird trapping in the Southern part of NP, then 16 old encroachments. **No trap of rhino** encountered.
Record of cases as per attached in **Annex - 2,** which includes: date of incidence, date of detection, type of offences, place of occurrence, evidence (forest/wildlife produces recovered, Arms/other evidence, suspects, legal status and comments).

ENCOUNTERED ANIMALS

Patrol Area	√ = encountered					
	Rhino	Elephant	Tiger	Tapir	Other Mammal	Offences
SP3, Way mendati, Krengseng, Hulu way rilau dan sekitarnya	√	√	√	√	√	√
Pall 50, Jalan lintas bengkunat, Way Nipah, dan Peninggeman.						
Kubu perahu, Hulu way menterang, Hulu way tenumbang dsknya	√		√	√		√
Pemerihan, Kuyung arang						
Panji wayang, Bambu kuning, way ngambur, camnp cabe dsknya		√		√		
Gisting, kotaagung						
Kotaagung dsknya						
Panji wayang, Hulu way ngambur, Kubu kulit, way mendati dsknya	√	√	√	√		
Kupang hulu, way handap, siring huong, way ngambur pangkalan dsknya			√	√		√
Kubu perahu, hulu way krui, hulu way tenumbang dan sekitarnya		√	√	√		
Krui, Pahmongan, hulu mahnay balak, way krui dan sekitarnya			√	√		
Ujung Pandang, Blok VI, Hulu way pintau dsk	√	√	√	√		√
Panji Wayang, Hulu way ngambur bundik, Hulu way ngambur pangkalan dsk	√	√	√			√
Bunuk, Way ngambur pangkalan, Panji Wayang dsk	√	√	√	√		√

Pal 50, Pemerihan, Pasar minggu dsk						
Way nipah, Penyantun, Pedamaran dsk						
SP 3, Mendati, Way mendati, Anak way ngambur, Hulu way mendati, Suka marga, Suoh dsk	✓	✓	✓	✓		✓
Peninggeman, Hulu anak way canguk, Hulu anak way pemeriahan, Way canguk, Cawang haro, Way pemerihan dsk						
SP 3, Mendati, Pg.Kuyung, Hulu way rilau dsk	✓	✓	✓			✓
Panji Wayang, Way ngambur bundik, Hulu way telema dsk	✓	✓	✓			✓
Pal 50, Tlg.25, Plisihan, Tlg.banyu urip		✓	✓	✓		
Pal 50, Tlg.imam, km.21 dsk		✓	✓	✓		
Panji Wayang, Panama, Hulu way ngambur pangkalan, Hulu way ngambur bunuk dsk	✓					
Mendati, Krengseng, Pg.kuyung, Hulu way rilau dsk	✓	✓	✓	✓	✓	✓
Kubu perahu, Hulu way menterang, Hulu way tenumbang dsknya	✓	✓	✓	✓		
Panji Wayang, Way ngambur dsknya	✓	✓	✓	✓		
Jalan lintas bengkunat, Hulu way bamban, Pemerihan dsknya	✓	✓	✓	✓		
Sumbersari, Pekon sumberejo, Kec.bengkunat-belimbing						
Panji Wayang, Ngambur dsknya	✓	✓	✓	✓		
Way Handop, Siring huong 1, Siring huong 2 dan 3, Hulu way ngambur pangkalan, Hulu way ngambur bundik dsknya	✓	✓	✓	✓		
Rata Agung, Bidang I Liwa.						
Pal 50 dan sekitarnya		✓	✓			
Sumbersari, Pekon sumberejo, Kec.bengkunat-belimbing						
Sumbersari, Pekon sumberejo, Kec.bengkunat-belimbing						
Metro, Bandar lampung, Lampung timur dsknya						
Bumi perkemahan kubu perahu						

DETAILS OF RHINO SIGNS

Patrol Area	Footprints	Direct Sighting	Wallow	Feeding	Dung	Other Signs
SP3, Way mendati, Krengseng, Hulu way rilau dan sekitarnya	1	0	0	0	0	0
Kubu perahu, Hulu way menterang, Hulu way tenumbang dsknya	4	0	0	0	0	0
Panji wayang, Bambu kuning, way ngambur, camnp cabe dsknya	0	0	0	0	0	0
Panji wayang, Hulu way ngambur, Kubu kulit, way mendati dsknya	20	0	1	1	1	2
Kupang hulu, way handap, siring huong, way ngambur pangkalan dsknya	0	0	0	0	0	0
Kubu perahu, hulu way krui, hulu way tenumbang dan sekitarnya	0	0	0	0	0	0
Krui, Pahmongan, hulu mahnay balak, way krui dan sekitarnya	0	0	0	0	0	0
Ujung Pandang, Blok VI, Hulu way pintau dsk	0	0	1	0	0	0
Panji Wayang, Hulu way ngambur bundik, Hulu way ngambur pangkalan dsk	2	0	0	0	0	0
Bunuk, Way ngambur pangkalan, Panji Wayang dsk	6	0	0	0	0	0
Kubu Perahu, Way tenumbang, Hulu way mahnay balak, Pahmongan dsk	10	0	2	0	0	0
SP 3, Mendati, Way mendati, Anak way ngambur, Hulu way mendati, Suka marga, Suoh dsk	4	0	0	0	1	0
Peninggeman, Hulu anak way canguk, Hulu anak way pemeriahan, Way canguk, Cawang haro, Way pemerihan dsk	0	0	0	0	0	0
SP 3, Mendati, Pg.Kuyung, Hulu way rilau dsk	2	0	0	1	0	0
Panji Wayang, Way ngambur bundik, Hulu way telema dsk	1	0	0	0	0	0
Pal 50, Tlg.imam, km.21 dsk	0	0	0	0	0	0
Panji Wayang, Panama, Hulu way ngambur pangkalan, Hulu way ngambur bunuk dsk	39	0	0	0	0	0
Mendati, Krengseng, Pg.kuyung, Hulu way rilau dsk	4	0	1	0	0	1
Kubu perahu, Hulu way menterang, Hulu way tenumbang dsknya	4	0	2	0	0	0
Panji Wayang, Way ngambur dsknya	4	0	1	1	1	0
Panji Wayang, Ngambur dsknya	8	0	1	1	1	0
Way Handop, Siring huong 1, Siring huong 2 dan 3, Hulu way ngambur pangkalan, Hulu way ngambur bundik dsknya	0	0	1	0	0	0

PATROL DATA

Location	Activity	Start Date	End Date	Days	No of Person	Length (Km)	Remarks
Pemerihan, Kuyung arang	Wildlife conflict	05-Okt	11-Okt	7	4	0	A group of elephants in Pamerihan
Kubu perahu, Hulu way menterang, Hulu way tenumbang dsknya	Patrol /Survey	07-Okt	16-Okt	10	5	25	Signs of tiger, elephant and rhino. No rhino trap Identified bird trapping
Pall 50, Jalan lintas bengkunat, Way Nipah, dan Peninggeman.	Patrol	08-Okt	16-Okt	9	4	0	No illegal activity
Panji wayang, Bambu kuning, way ngambur, camnp cabe dsknya	Patrol /Survey	08-Okt	15-Okt	8	5	13,5	Signs of elephant and tapir
SP3, Way mendati, Krengseng, Hulu way rilau dan sekitarnya	Patrol /Survey	09-Okt	17-Okt	9	5	26	Signs of rhino (footprint, food, etc) Identified bird trapping. Active crop/plantation in the encroachment area by people from SP3
Gisting, kotaagung	Intelli-gence	14-Okt	20-Okt	7	5	0	Identified the owner of 1 piece tiger skin evidence is Mr. Ismanto from Sugiwaras, Pekon Tirom,
Kotaagung dsknya	Patrol	21-Okt	23-Okt	3	8	0	Arrested suspect Mr. Ismanto and Samsul , and evidence 1piece of tiger skin
Panji wayang, Hulu way ngambur, Kubu kulit, way mendati dsknya	Patrol /Survey	22-Okt	30-Okt	9	4	30,5	Rhino signs
Krui, Pahmongan, hulu mahnay balak, way krui dan sekitarnya	Patrol /Survey	22-Okt	30-Okt	9	5	23,5	No rhino signs. Signs of tiger and tapir
Kupang hulu, way handap, siring huong, way ngambur pangkalan dsknya	Patrol /Survey	23-Okt	01-Nop	10	4	24	No rhino signs Fishing Farm activity in the encroachment area
Kubu perahu, hulu way krui, hulu way tenumbang dan sekitarnya	Patrol /Survey	24-Okt	31-Okt	8	5	39,5	No rhino signs Signs of elephant, tiger and tapir

Pal 50, Pemerihan, Pasar minggu dsk	Wildlife conflict	04-Nop	08-Nop	5	3	0	Drove an elephant group from Pamerihan back to forest
Ujung Pandang, Blok VI, Hulu way pintau dsk	Patrol /Survey	06-Nop	14-Nop	9	4	23	No rhino signs
Kubu Perahu, Way tenumbang, Hulu way mahnay balak, Pahmongan dsk	Patrol /Survey	07-Nop	14-Nop	8	2	29	rhino signs (footprint, dungs, wallow) Elephant footprints and dungs Tapir footprints
SP 3, Mendati, Way mendati, Anak way ngambur, Hulu way mendati, Suka marga, Suoh dsk	Patrol /Survey	07-Nop	14-Nop	8	2	30	Signs of rhino, elephant, tiger, tapir, deer, wildpig etc. Identified illegal activities (encroachment, poaching, gaharu theft, bird trapping.
Bunuk, Way ngambur pangkalan, Panji Wayang dsk	Patrol /Survey	07-Nop	16-Nop	10	5	30,5	Rhino signs (footprint, wallows) No illegal activity
Peninggeman, Hulu anak way canguk, Hulu anak way pemeriahan, Way canguk, Cawang haro, Way pemerihan dsk	Patrol /Survey	08-Nop	11-Nop	4	1	0	Signs of animals
Panji Wayang, Hulu way ngambur bundik, Hulu way ngambur pangkalan dsk	Patrol /Survey	09-Nop	15-Nop	7	5	28,5	Footprints of rhino, elephant and tiger
Way nipah, Penyantun, Pedamaran dsk	Patroli	12-Nop	16-Nop	5	9	0	Identified old traditional gold mining in up stream of Way Bahima
Panji Wayang, Panama, Hulu way ngambur pangkalan, Hulu way ngambur bunuk dsk	Patrol /Survey	18-Nop	27-Nop	10	4	39,5	Rhino footprint estimated 1 female and 1 male in the same time
SP 3, Mendati, Pg.Kuyung, Hulu way rilau dsk	Patrol /Survey	21-Nop	27-Nop	7	4	15	Rhino footprint Other animal footprints
Pal 50, Tlg.imam, km.21 dsk	Patrol /Survey	25-Nop	30-Nop	6	5	15	Signs of elephant, tiger and tapir No poaching
Panji Wayang, Way ngambur bundik, Hulu way telema dsk	Patrol /Survey	26-Nop	30-Nop	5	4	16,5	Old rhino footprints Footprints of elephant and tiger

Pal 50, Tlg.25, Plisihan, Tlg.banyu urip	Elephant conflict	27-Nop	30-Nop	4	5	0	In adjacent protection forest, in pal 50. 1 birth baby elephant
Jalan lintas bengkunat, Hulu way bamban, Pemerihan dsknya	Patrol	07-Des	13-Des	7	1	25	Signs of elephant, tiger and tapir. Illegal activities / non wood forest product theft (dammar/copal, fish)
Kubu perahu, Hulu way menterang, Hulu way tenumbang dsknya	Patrol /Survey	08-Des	16-Des	9	5	30,5	Rhino signs (footprint, tilt of branch of tree, wallows). Signs of elephant, tiger snd tapir.
Way Handop, Siring huong 1, Siring huong 2 dan 3, Hulu way ngambur pangkalan, Hulu way ngambur bundik dsknya	Patrol /Survey	08-Des	17-Des	10	4	41,7	Signs of elehant and tiger No rhino signs Old activity of bird trapping burung.
Panji Wayang, Way ngambur dsknya	Patrol /Survey	08-Des	16-Des	9	5	42	Signs of rhino, elephant, tapir and tiger
Mendati, Krengseng, Pg.kuyung, Hulu way rilau dsk	Patrol /Survey	09-Des	18-Des	10	4	23	Signs of rhino, tapir and tiger
Metro, Bandar lampung, Lampung timur dsknya	Intelli – gence	11-Des	27-Des	17	1	0	Info of evidence
Rata Agung, Bidang I Liwa.	Collaborr ative operation	13-Des	18-Des	6	6	0	Destroyed plantation and camp, arrested 5 suspects to proceed to the police
Bumi perkemahan kubu perahu	Training	18-Des	19-Des	2	2	0	Well done
Sumbersari, Pekon sumberejo, Kec.bengkunat-belimbing	Collaborr ative operation	20-Des	24-Des	5	4	0	Well done
Sumbersari, Pekon sumberejo, Kec.bengkunat-belimbing	Collaborr ative operation	20-Des	24-Des	5	5	0	Well done
Sumbersari, Pekon sumberejo, Kec.bengkunat-belimbing	Collaborr ative operation	28-Des	31-Des	4	5	0	Arrested 6 suspects
Sumbersari, Pekon sumberejo, Kec.bengkunat-belimbing	Collaborr ative operation	28-Des	30-Des	3	5	0	Continued

Sumbersari, Pekon sumberejo, Kec.bengkunat-belimbing	Collaborr ative operation	28-Des	31-Des	4	4	0	Continued

- *There was no mileage measured in the other activities.*

GENERAL PERFORMANCE PARAMETERS

Number of general activities	42
Number of Patrol and Surveys	22
Distance Walked (Kilometers)	583,2
Distance Walked for Patrol and Survey	558,2
Number of Field Days	292
Number of Field Days for Patrol and Survey	183
Field Days per-person per-month	15.39

A total of 42 activities were conducted during the 4th quarter (October - December) of the year and among of them were 22 activities of patrol/surveys, which covers 558.2 km and field days 15.39 days per person per month. The field days in this quarter is lower than in previous quarter, beside their involvement to collaborative operation in the encroachment area, there was also their participation in elephant conflict solution by Park Ranger.

PROGRAM PERSONNEL

(Summary of Field Days Per-Person Per-Month 1 October - 31 December 2010)

Personnel	Days	Average Field days / month	
Agung S	55	18,33	*(3 Month)*
Agus Sulaeman	27	13,50	*(2 Month)*
Bahara	28	14,00	*(2 Month)*
Budiono	46	15,33	*(3 Month)*
Didin Kamaludin	42	14,00	*(3 Month)*
Edi Rusmanto	52	17,33	*(3 Month)*
Hendra Wijaya	41	13,67	*(3 Month)*
Heryanto	47	15,67	*(3 Month)*
Jalisi	42	14,00	*(3Month)*
Juni Effendi	5	5,00	*(1 Month)*
Madnurzen	52	17,33	*(3 Month)*
Maman Suherman	3	3,00	*(1 Month)*
Marsum	47	15,67	*(3 Month)*
Merli aroc Hulu	34	11,33	*(3 Month)*
Nang Jamadi	17	17,00	*(1 Month)*
Olih	43	14,33	*(3 Month)*
Rahman	39	13,00	*(3 Month)*
Romiyanto	47	15,67	*(3 Month)*
Samsurizal	46	15,33	*(3 Month)*
Saptono	47	15,67	*(3 Month)*
Sinyo Handoko	48	16,00	*(3 Month)*
Sudari	51	17,00	*(3 Month)*
Suharsono	57	19,00	*(3 Month)*
Syahroni	39	13,00	*(3 Month)*
Teguh Taryono	35	17,50	*(2 Month)*
Timbul TB	47	15,67	*(3 Month)*
Toho	52	17,33	*(3 Month)*
Uga Yogaswara	42	14,00	*(3 Month)*
Ujang S	3	3,00	*(1 Month)*
Zen Afrial	44	14,67	*(3 Month)*
Zulkifli	47	15,67	*(3 Month)*

Other personnels :

1.	Titus Ramadhani	Field Coordinator (Formerly was as Administrative and Finance staff of RPU BBS)
2.	Maman S.	Administrative and Finance staff of RPU BBS
3.	Nasarius S. Waja	Driver-1
4.	Suparmin	Driver-2
5.	Era Herawati	Cook-1
6.	Wawah	Cook-2
7.	-----	Office boy-1
8.	Rubianto	Office boy-2

海洋研究基金會計畫成果摘要

海洋研究基金會(Marine Research Foundation, MRF)所提綠蠵龜研究計畫，綜合數年資料，摘要如附：

海洋研究基金會為位於馬來西亞沙巴 Kota Kinabalu 地區之非營利研究組織，設立宗旨為經由研究、保育和教育活動，進一步瞭解海洋生態系及其功能，保育海洋動植物之多樣性及豐富度。

沙巴的海龜受法令保護，受威脅的主要原因為居民採集海龜卵、漁船誤捕及棲地消失。40 年來，大部分海龜研究主要重點為協助族群狀況有危機的海龜。沙巴的綠蠵龜可能是全東南亞最大的族群，但相關研究不足。

沙巴是東南亞地區綠蠵龜和玳瑁產卵地最密集的地方，主要集中在 Turtle Islands Park 的三個島，密度最高的是 Selingan Island (x > 3000 nests • year-1)，佔 52%。而 Gulisan Island 和 Bakkungan Island 分別佔 22%和 26%。另外，Sipadan island 也是產卵地密集的地方，但直到最近才發現海龜覓食族群。

東南亞海龜產卵族群的研究不少，但覓食族群的研究很少，缺乏海龜族群動態資料(成長、生存、性別比例)很難瞭解自然或人為的壓力對海龜族群的影響。

研究地點曼丹蘭利島(Mantanani island)位於沙巴西北部海岸外，有許多綠蠵龜。在 Mantanani island 發現當地的未成年海龜，是沙巴地區第一次發現覓食海龜族群。Turtle Islands Park 海龜經營管理計畫已進行 30 年，但因溫度較高，幾乎所有被移到孵化場的海龜卵都孵出雌龜。目前，也只有 20%的孵化場有遮陰。由沙巴離岸的小海龜性別比率懸殊，對未來海龜保育將有不良影響。瞭解 Mantanani island 覓食海龜族群的族群動態，可瞭解偏差的孵化性別比例對野生海龜族群長期的影響。

2006 年計畫成果報告，主要內容如下：

因馬來西亞政府改變申請研究海龜許可制度，因此 2005-2006 年無法取得 Turtle Islands Park 許可，計畫提案人 Dr. Nicolas J. Pilcher 曾來函詢問可否將研究地點改為 Mantanani island，我方同意。Mantanani island 只有 juvenile 海龜，但更合適研究族群動態。原提計畫預定研究孵育幼海龜死亡原因，更改地點後改研究 juvenile 族群動態，蒐集基本資料供後續死亡率研究之用，並調查性別比例。

總共進行 3 次野外調查，一次在 Layang Layang 環礁，兩次在 Mantanani island。共捕捉 56 隻海龜，進行檢測。此為本地區第 1 次由海中捕捉海龜並以腹腔鏡檢視，第 1 次有機會瞭解海龜生活史這個階段中的族群結構。本計畫研究報告將以「Population Structure of Green Turtles *Chelonia mydas* from Two Tropical Foraging Sites in Malaysia」為題發表於相關期刊。部分結果如下：

- 所有 Layang Layang 捕捉到的海龜背甲長(CCL)均在 65cm 以下，都是

juvenile，平均 52.0cm (SD = 6.44, range 40.5-63.8, n = 21)。Layang Layang 捕捉之海龜未測重量為。雌雄比為 62:38。

- 第一次取樣，所有 Mantanani 捕捉到的海龜皆為 juvenile，平均 49.2cm (SD = 5.92, range 40.0-61.2, n = 28)，平均重量 12.0kg (SD = 4.44, range 6.4-24.5, n = 28)。雌雄比為 90:10，明顯比 Layang Layang 高。

依據 2007 和 2008 年計畫結果所撰寫之研究報告已被 Journal of Herpetology 接受，標題為「Population Structure at a Foraging Sites off the Coast of Sabah (Borneo), Malaysia」，此為馬來西亞海龜覓食區，首次紀錄的生長和族群結構資料。主要內容如下：

共捕捉到 65 隻新的海龜和 32 隻以前捕捉標記過的海龜。這 32 隻中有 11 隻被捕至少 2-3 次。數據顯示 Mantanani island 附近水域海龜族群可能超過 100 隻。經由腹腔鏡檢視，發現有 52 隻雌龜，13 隻雄龜，性別比為雌：雄 80%：20%，和澳洲 Moreton Bay 1994 年族群結構研究之結果不同，Moreton Bay 性別比為雌：雄 67%：33%。

所有捕捉到的海龜背甲皆未超過 65 公分，都是 juvenile。這些海龜平均背甲長度為 47.5 公分(SD = 5.21, range 36.0-61.4, n = 72)，平均重量為 11.7 公斤(SD = 4.00, range 5.5-24.5, n = 73)

成長率部分，sample size 較小只有 7 隻。兩次捕捉間隔時間由 185 天至 329 天，平均生長率為一年 2.54 公分，比 1979 年調查澳洲南部大堡礁(Southern Great Barrier Reef)較大 juvenile 年生長率(1.43cm)高。與 2001 年美國 Florida 和 1979 年 Hawaii 類似大小海龜調查之年生長率相近。但比 1988 年巴哈馬(8.8cm)和 1981 年美國佛羅里達州(5.3cm)調查之年生長率低很多。

比較 30 件初次捕捉和再次捕捉的距離，範圍由 34.9 公尺至 1,740.9 公尺，平均 378 公尺。因所有初次捕捉海龜經過腹腔鏡檢視後，均在距離原捕捉處 1,000-1,500 公尺外釋放，由此推測這些海龜由原捕捉點移動之距離並不遠。

海洋研究基金會 2009 年所提「馬來西亞沙巴曼丹蘭利島綠蠵龜族群動態及成長研究計畫」，為延續計畫。計畫目標為經由腹腔鏡和水中研究，瞭解海龜族群基本資料如性別比例、新添族群量等，以更有效保育馬來西亞沙巴地區海龜。

本計畫的預計成果包括：

一、由水中捕捉 20-50 隻各年齡層及不同性別之海龜。
二、紀錄及分析海龜資料，包括標記、GPS 資料、日期、時間、主要特徵等。
三、重新標記之前捕捉到的海龜。
四、以腹腔鏡檢視 20-50 隻海龜成熟度(發育情形)和性別。
五、蒐集和分析 DNA 樣本，以瞭解族群來源。
六、分析海龜成熟度和性別比率。
七、將研究結果提供贊助單位、馬來西亞漁業和國家公園主管部門(分別為 Sabah Department of Fisheries 和 Sahah Parks)、報告發表於相關期刊。

八、為推廣海龜保育研究工作，海洋研究基金會也與 Sabah Department of Fisheries 和 Sahah Parks 合作，進行人才培訓工作。

依據 2006 至 2009 年計畫結果所撰寫之研究報告已刊登於 Journal of Herpetology (Vol. 44, No. 1, pp. 168-171, 2010)，標題為「Population Structure and Growth of Immature Green Turtles at Mantanani, Sabah, Malaysia」，主要內容如下：

幾乎所有東南亞海龜生物學研究都是產卵地相關研究，本研究係針對生活史中不同階段之未成年綠蠵龜覓食族群，地點為馬來西亞沙巴外海。標放研究提供地區性活動、生長和停留期間資料。腹腔鏡檢視提供性別和成熟度資料。結果顯示兩次捕捉間，海龜移動距離平均為 380 公尺，兩年期間捕捉資料顯示海龜大都停留在同一地區(即 exhibited site-fidelity)。所捕捉到者都是未成年海龜，背甲長度為 38-80 公分，平均 47.4 公分，生長率平均每年 3.6 公分。平均重量為 12.1 公斤。腹腔鏡檢視生殖腺(gonads)確定所有被捕海龜尚未成年，雄雌性別比為 1:4。

捕捉八次，每次 3 天，每天約 8-10 小時，共捕捉到 118 隻，75 隻為新海龜，43 隻為以前捕捉標記過的海龜。Catch Per Unit Effort (CPUE)為 1.48-1.84 turtles per hour。被再度捕捉的海龜中，28 隻(37.3%)為被再捕一次，11 隻(14.7%)為被再捕二次，4 隻(5.3%)為被再捕三次。

研究過程中沒法發現其他地區標記的海龜，43 件初次捕捉和再捕捉海龜之距離為 31-1,760 公尺，平均為 359 公尺，顯示有 site-fidelity 現象。雖然每次腹腔鏡檢視結束後，都將海龜載到捕捉地 1,000-1,500 公尺外，海龜都可遊回第一次被捕捉的地區。標放研究估計 Mantanani 淺海地區海龜族群約 187.3 隻。

再捕捉之海龜中，17 隻成長率比較明顯。兩次捕捉間隔時間為 47-661 天，平均生長率為一年 3.60 公分。比 Limpus 1979 年調查澳洲南部大堡礁較大 juvenile 年生長率(1.43cm)高。也比 Bresette and Corham 2001 年調查美國 Florida 類似大小海龜之年生長率(2.3-2.7cm)高。但比 Mendonca 1981 年調查美國 Florida 之年生長率(5.3cm)低很多。

MRF 2010 年所提「衛星追蹤保育馬來西亞綠蠵龜計畫」，為過去數年之延續研究。2011 年 3 月 2 日研究相關報導包括沙巴時報(Sabah Times)、每日快報(Daily Express)和婆羅洲郵報(The Borneo Post)。報導中說明 MRF 於 5 隻海龜裝設衛星發報器，調查重要遷徙路線、近海棲地、經營管理和保育活動。調查發現 Mantanani 有相當大的綠蠵龜族群，也是重要覓食區。遺傳基因研究發現這些海龜大部分源自蘇祿海(Sulu Sea)之海龜群島(Turtle Islands complex)，但也與越南和臺灣海龜有共同之基因來源。這些覓食海龜只在 Mantanani 停留 6-7 年，成年後之活動地區目前仍未知。瞭解海龜活動範圍有助於規劃保護區。3 份報紙都有說明林務局贊助部分計畫經費。提案人另提供 5 隻海龜之行動路線圖。計畫研究成果日後投稿 Journal of Chelonian Conservation and Biology 或 Marine Turtle Newsletter。

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A Sabah sea turtle with a satellite transmitter. See story on Page 2



Dr Pilcher (left) showing how a satellite transmitter is placed on a turtle



Dr Pilcher releasing one of the turtles

Scientists studying migration patterns of sea turtles in Sabah

KOTA KINABALU: The Marine Research Foundation (MRF) has deployed satellite transmitters on five juvenile turtles from Mantanani Island near here to identify the critical migration routes and near-shore habitats favoured by the turtles.

The study will eventually drive management and conservation activities for the turtles.

This work is funded in part by the Shell Malaysia Sustainable Development Grants programme, the Forestry Bureau of Taiwan, and the Mohammed bin Zayed Species Conservation Fund, said Dr Nicolas Pilcher, executive director of MRF, a non-profit conservation agency based in Sabah.

"Marine turtles in SE Asia are threatened through habitat loss and indirect capture in fisheries, and are in dire need of conservation action. With long maturation periods and low survival, they have extremely slow replenishment rates, and a population which has been depleted can take several centuries to recover.

"Understanding the needs of the turtles depends heavily on an understanding of the extent of habitat use and distribution, which can only be determined through complex research projects involving at-sea population dynamics, genetics, and satellite tracking," he said.

By tracking marine turtles through the SE Asian region, MRF aims to raise the collective awareness of their plight and to provide the concrete linkages at an international level on which Malaysia may develop conservation agendas linked with other neighbouring countries to which turtles migrate, including Indonesia, the Philippines, Taiwan and Vietnam.

Juvenile green turtles were captured during two recent research trips to Mantanani, and Sirtrack PT102 Satellite transmitters were affixed using a silicone base secured with fibreglass matting and resin following capture, measurements, laparoscopic examination and genetic sampling.

"The measurements allow us to determine growth rates, while the laparoscopic examination allows us to determine whether the turtle is male or female, along with reproductive development stage. The genetic sampling allows us to identify which nesting grounds these turtles came from in the first place," said Dr Pilcher.

The transmitters will send signals to an orbiting satellite each time the turtle surfaces for air, and the satellite will re-transmit the data to a receiving station on earth, which can then be accessed through computer and modem.

Dr Pilcher also noted that, turtles rarely remain on the surface for very long, so their surfacing must coincide with the satellite passing overhead, and because of this it is uncommon to receive a location from a turtle every day."

The tracking data will be uploaded to a database daily and tracking software will output graphic positioning data for management and education activities. (Check out the daily progress at www.seaturtle.org/tracking/?project_id=593).

Recent findings as part of MRF's work determined Mantanani was home to sizeable and immensely important foraging population of green turtles.

"Through genetics we know that many of these originate from the Turtle Islands complex in the Sulu Sea, but they also share genetic stock origins with turtles from Vietnam and Taiwan," said Dr Pilcher.

These foraging turtles only spend 6-7 years of their lives at Mantanani, and it is unknown where they spend the rest of their developmental years.

"It is critical that we know this so that we can develop networks of protected areas which are based on the true biology of the species.

"Without a clear understanding of the migration paths taken by sea turtles, and the habitats they require, conservation efforts will not be able to protect needed developmental and foraging habitats. More importantly however, is the need to determine if the current protected area schemes in place in varying SE Asian countries are sufficient to protect all life stages of marine turtles.

"Understanding the migration routes taken by juvenile turtles can enable the authorities to establish protected areas, and develop fishing and shipping zones to increase turtles' overall chances of survival," he added.

For further information contact Dr Pilcher on npilcher@mrf-asia.org

Study on sea turtle migration patterns

KOTA KINABALU: The Marine Research Foundation (MRF) recently deployed satellite transmitters on five juvenile turtles from Mantanani island to identify critical migration routes and nearshore habitats favoured by the turtles, management and conservation activities.

The work is funded in part by the Shell Malaysia Sustainable Development Grants programme, the Forestry Bureau of Taiwan, and the Mohammed bin Zayed Species Conservation Fund.

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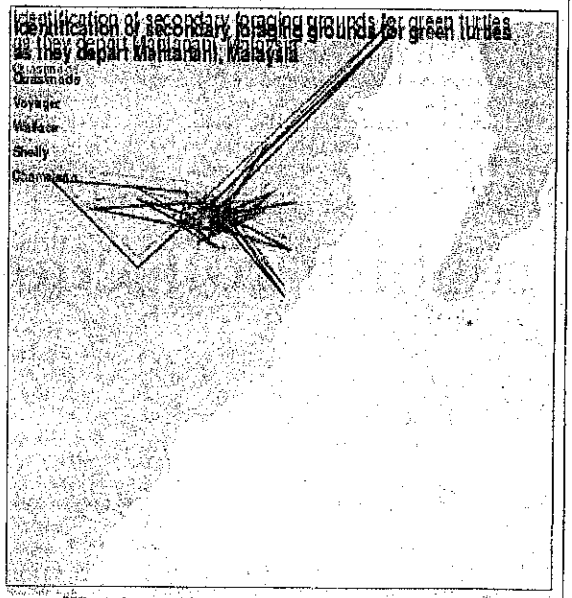
"Without a clear understanding of the migration paths taken by sea turtles, and the habitats they require, conservation efforts will not be able to protect needed developmental and foraging habitats.

"More importantly however, is the need to determine if the current protected area schemes in place in varying SE Asian countries are sufficient to protect all life stages of marine turtles. Understanding the migration routes taken by juvenile turtles can enable the authorities to establish protected areas, and develop fishing and shipping zones to increase turtles' overall chances of survival.



What the satellite trackings reveal near Mantanani.


A marine turtle.

Marine turtles in SE Asia are threatened through habitat loss and indirect capture in fisheries, and are in dire need of conservation action.

With long maturation periods and low survival, they have extremely slow replenishment rates, and a population which has been depleted can take several centuries to recover.

By tracking marine turtles through the SE Asian region, MRF aim to raise the collective awareness of their plight and to provide the concrete linkages at an international level on which Malaysia may develop conservation agendas linked with other neighboring countries to which turtles migrate, including Indonesia, the Philippines, Taiwan and Vietnam.

Juvenile green turtles were captured during two recent research trips to Mantanani, and Sirtrack PT102 Satellite transmitters were affixed using a silicone base, and secured with fiberglass matting and resin following capture, measurements, laparoscopic examination and genetic sampling.

"The measurements allow us to determine growth rates, while the laparoscopic examination allows us to determine whether the turtle is male or female, along with reproductive development stage.

"The genetic sampling allows us to identify which nesting grounds these turtles came from in the first place" said Dr. Pilcher.

The transmitters will now send signals to an orbiting satellite each time the turtle surfaces for air, and the satellite will re-transmit the data to a receiving station on earth, which can then be accessed through computer and modem.

Dr Pilcher also noted that "turtles rarely remain on the surface for very long, so their surfacing must coincide with the satellite passing overhead, and because of this it is uncommon to receive a location from a turtle every day".

The tracking data will be uploaded to a database daily and tracking software will output graphic positioning data for management and education activities.

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Scientists studying migration patterns of sea turtles in Sabah

KOTA KINABALU: The Marine Research Foundation (MRF), a non-profit conservation agency based in Sabah, recently deployed satellite transmitters on five juvenile turtles from Mantanani Island to identify the migration routes and nearshore habitats favoured by the turtles, which can then drive management and conservation activities.

This work is funded in part by the Shell Malaysia Sustainable Development Grants programme, the Forestry Bureau of Taiwan and the Mohammed bin Zayed Species Conservation Fund.

Marine turtles in South East Asia are threatened through habitat loss and indirect capture in fisheries, and are in dire need of conservation action.

With long maturation periods and low survival, they have extremely slow replenishment rates, and a population which has been depleted can take several centuries to recover. Understanding the needs of the turtles depends heavily on an understanding of the extent of habitat use and distribution, which can only be determined through complex research projects involving sea population dynamics, genetics, and satellite tracking.

By tracking marine turtles through the South East Asian region, MRF aims to raise the collective awareness of their plight and to provide the concrete linkages at an international level on which Malaysia may develop conservation agendas linked with other neighbouring countries to which turtles migrate, including Indonesia, the Philippines, Taiwan and Vietnam.

Juvenile green turtles were captured during two recent research trips to Mantanani, and Sirtrack PTT02 Satellite transmitters were affixed using a silicone base, and secured with fiberglass matting and resin following capture, measurements, laparoscopic examination and genetic sampling. "The measurements allow us to determine growth rates, while the laparoscopic examination allows us to determine whether the turtle is male or female, along with reproductive development stage. The genetic sampling allows us to identify which nesting grounds these turtles came from in the first place," said Dr Nicolas Pilcher, Executive Director of MRF.



Dr Pilcher and his team fixing a satellite transmitter on the back of a sea turtle.



A sea turtle fixed with a satellite transmitter.

The transmitters will now send signals to an orbiting satellite each time the turtle surfaces for air, and the satellite will re-transmit the data to a receiving station on earth, which can then be accessed through computer and modem. Dr Pilcher also noted that "turtles rarely remain on the surface for very long, so their surfacing must coincide with the satellite passing overhead, and because of this it is uncommon to receive a location from a turtle everyday".

The tracking data will be uploaded to a database daily and tracking software will output graphic positioning data for management and education activities. Daily progress can be checked at http://www.seaturtle.org/tracking/?project_id=593. Recent findings as part of MRF's work determined Mantanani was home to sizeable and immensely important foraging population of green turtles.

"Through genetics we know that many of these originate from the Turtle Islands complex in the Sulu sea, but they also share genetic stock origins with turtles from Vietnam and Taiwan," said Dr Pilcher.

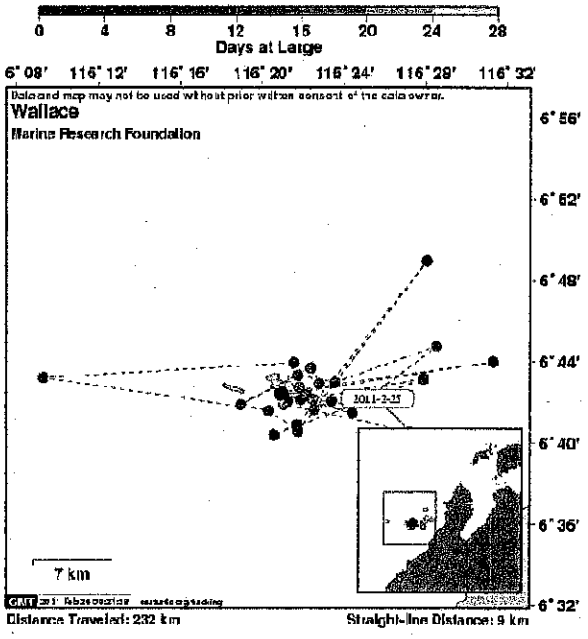
These foraging turtles only spend six to seven years of their lives at Mantanani, and it is unknown where they spend the rest of their developmental years.

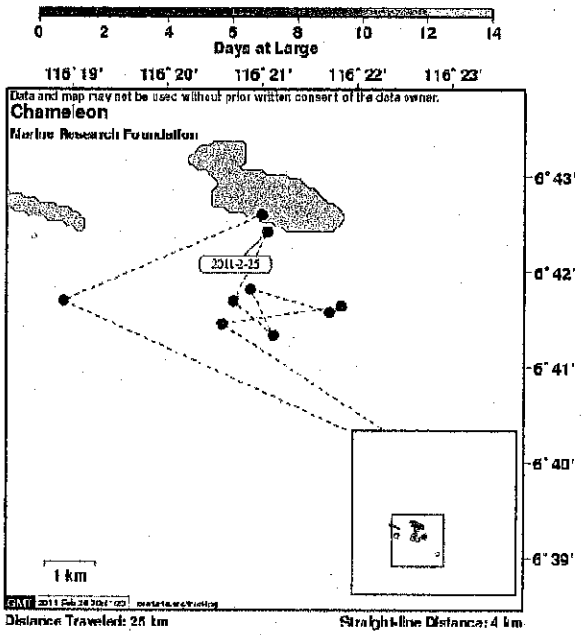
"It is critical that we know this so that we can develop networks of protected areas which are based on the true biology of the species," he said.

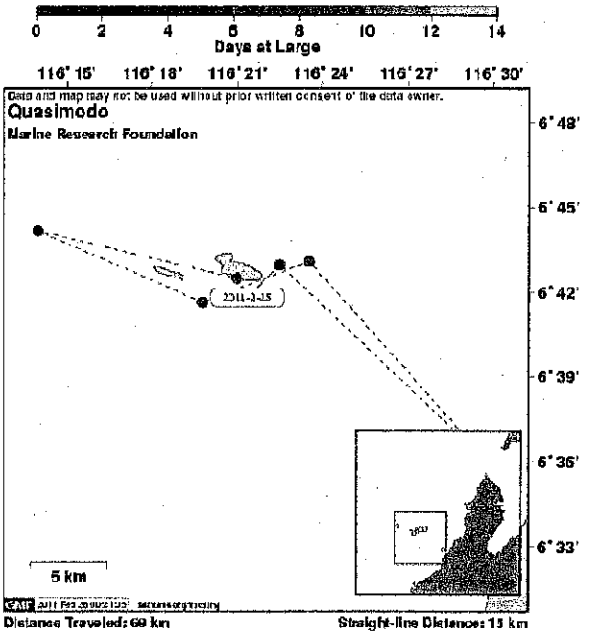
Without a clear understanding of the migration paths taken by sea turtles, and the habitats they require, conservation efforts will not be able to protect needed developmental and foraging habitats.

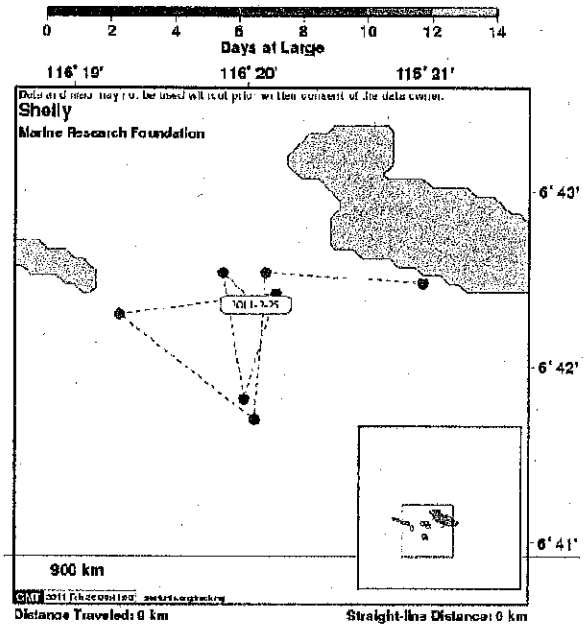
More importantly however, is the need to determine if the current protected area schemes in place in varying South East Asian countries are sufficient to protect all life stages of marine turtles.

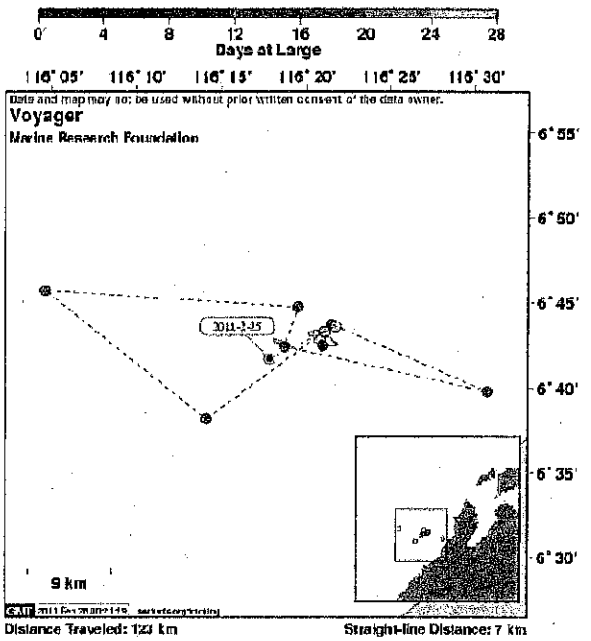
Understanding the migration routes taken by juvenile turtles can enable the authorities to establish protected areas, and develop fishing and shipping zones to increase turtles' overall chances of survival.



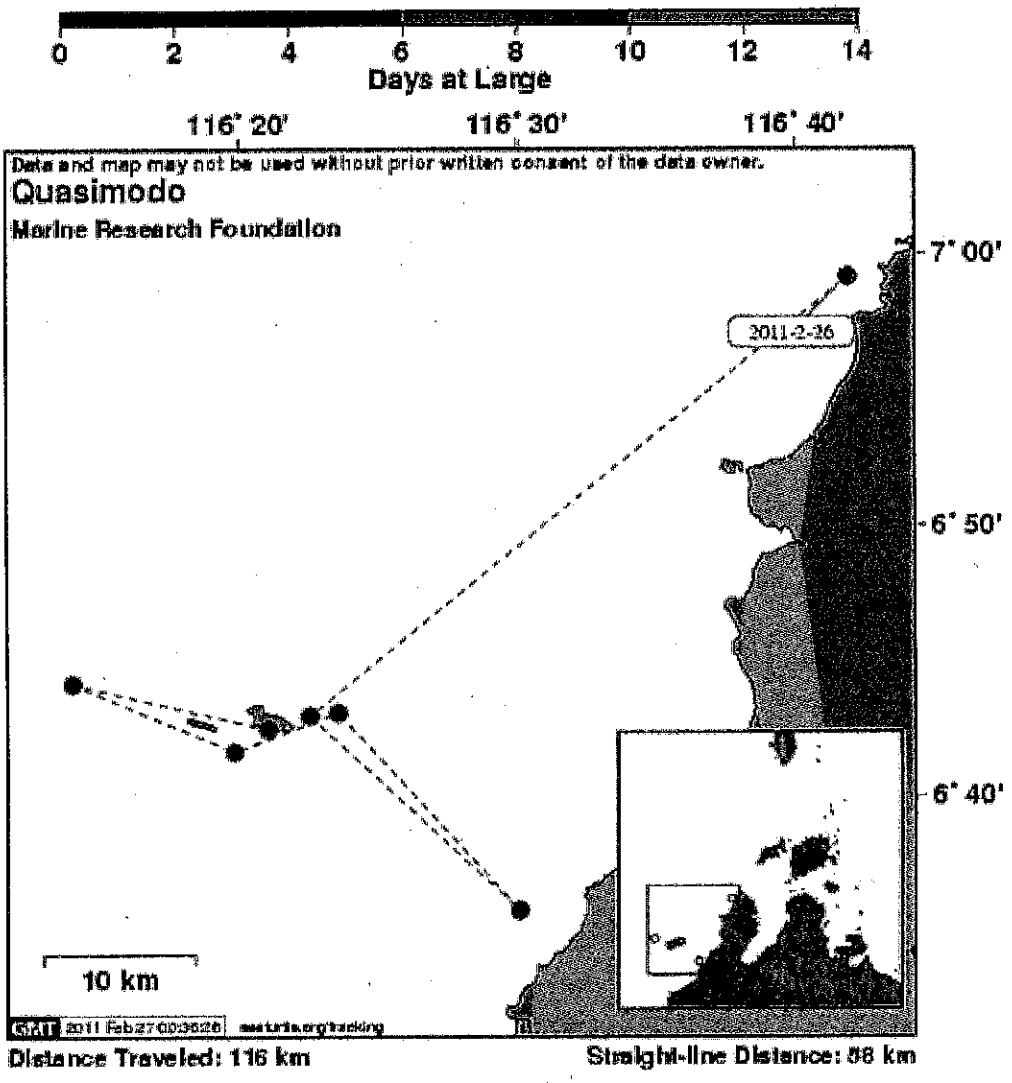








Tracks from turtles deployed with satellite transmitters off Mantanani island as at 27 February 2011 as part of the Marine Research Foundation's turtle conservation studies.


0 2 4 6 8 10 12 14
Days at Large
116° 20'
116° 30'
116° 40'
Data and map may not be used without prior written consent of the data owner.
Quasimodo
Marine Research Foundation
7° 00'
6° 50'
6° 40'
2011-2-26
10 km
GMT 2011 Feb 27 00:36:26
seaturtle.org/tracking
Distance Traveled: 116 km
Straight-line Distance: 58 km

俄羅斯唐秋沙保育計畫成果摘要

野鳥和濕地信託俄羅斯唐秋沙保育計畫，摘要如附：

野鳥和濕地信託為英國唯一以濕地保育為宗旨之民間團體，經營管理全國濕地遊客中心。WWT 以前的成功事蹟包括：

- 1962 年首次於夏威夷野放人工飼育之黃頸黑雁(Nene)，開啟全球族群復育契機。黃頸黑雁 1951 年，只剩 30 隻。
- 1969 年成功遊說冰島放棄在 Pink-footed Geese 主要繁殖地 Thjorsarver 蓋水壩的計畫。
- 1975 年復育 Martin Mere 濕地，該濕地於 1985 年被列入 Ramsar site (濕地公約指定保護區)。
- WWT 與土耳其合作研究 White-headed Duck，之後促成主要渡冬區 Burdur Golu 於 1993 年公告為保護區。
- WWT 與其他組織長期保護 Caerlaverock 地區的 Barnacle Geese。1948 年只有 300 隻，1999 年族群成長至 25,000 隻。
- 2000 年設立倫敦濕地中心(WWT London Wetland Centre)，為全球首都最大人造濕地保護區。
- WWT 的研究顯示 Carmarthen Bay 對保護黑鳧(Common Scoters)很重要， 因而促成 2003 年 Carmarthen Bay 被劃為英國第一個海洋特別保護區(Special Protection Area)。
- 2004 年 WWT 成為 Real World Learning Partnership 的創始會員，該組織宗旨為鼓勵政府允許教室外之教學活動。
- 2004 年倫敦濕地中心開始有學生來參加免費戶外教學活動，學習保護濕地之重要性。

2006 年「俄羅斯唐秋沙之調查及保育：教育宣導計畫」之緣起係因發現唐秋沙繁殖地附近居民偶而有射殺唐秋沙之情形，許多雌鴨誤觸漁網後淹死。漁民發現漁網上的唐秋沙，通常都是殺死後丟棄，很少將之釋放。因此，推動教育宣導工作，保育唐秋沙。計畫目標包括：

一、找出海上唐秋沙(雄鳥和亞成鳥)聚集地點，紀錄海洋棲地現況，估計每一地點之族群量，以及總數量。

二、捕捉無法飛行雄唐秋沙，並上腳環的可能性研究及選擇地點。

三、製圖列出調查路線中的污染源和有設刺網地區。

四、調查 Primorye 沿岸其他種類雁鴨，例如鴛鴦(Mandarin Duck)、磯雁(Common Pochard)、青頭潛鴨(Baer' Pochard)、鳳頭潛鴨(又稱澤鳧、Tufted Duck)、斑背潛鴨(Greater Scaup)、長尾鴨(Long-tailed Duck)、絨鴨(Eiders)、鵲鴨(Common Goldeneye)、黑海番鴨(Common Scoter)、斑臉海番鴨(Velvet

Scoter)、斑頭秋沙鴨(Smew)、海秋沙(Red-breasted Merganser)、川秋沙(Goosander)等。

本計畫預計成果包括：

一、製作唐秋沙海洋分佈圖。

二、紀錄唐秋沙海洋棲地現況，包括人類帶來的壓力。

三、規劃唐秋沙換羽期捕捉計畫。

四、製圖列出俄羅斯 Primorye 沿岸雁鴨主要停留地點，並撰寫詳細報告。

五、執行 Primorye 地區 Asia-Pacific flyway 經營管理計畫。

六、撰文刊登於野鳥和濕地信託(WWT)刊物 Wildfowl and Wetlands Bulletin。

2006 年工作報告摘要如下：

- 本計畫製作的保育唐秋沙海報上，有以俄文和英文列出林務局為贊助者，海報上其餘文字都是俄文。另與 10 個政府機構及民間團體合作分送海報，共計分發或張貼 283 張海報。40 張海報先由 Lazovskiy State Nature Reserve 收藏，以供未來簡報或演講時使用。其餘 177 張將分送到 Dalnegorskiy 等五個區域的城鎮。海報張貼之處包括政府單位、商店、餐廳、學校、大學、警察局和加油站。海報之發放有特別針對唐秋沙繁殖地附近的鄉鎮。
- 本計畫執行團隊，也與其他重要物種保育計畫(如 Eagle Owl、Amur Tiger 等)合作及交換經驗，也因此與一些地區的保育團體建立合作關係。Eagle Owl、Amur Tiger 等計畫都已運作多年，唐秋沙保育宣導計畫的推動才剛起步，因此學得了許多寶貴經驗。
- Primorye 的水鳥狩獵季由 3 月 26 日至 4 月 8 日，計畫執行團隊到主要獵區訪談部分獵人，得到被獵鳥種資料。另訪談漁民，蒐集漁網誤捕唐秋沙資料。
- 計畫執行團隊到 Lazovskiy 等區域的學校，演講唐秋沙保育共 6 次。
- 已草擬文稿寄給 Lazovskiy 的 Sinegor'e Newspaper，並完成 WWT 文章。

2007 年計畫進度報告摘要如下：

由 2001 至 2007 年，俄羅斯唐秋沙調查河流時間和調查河段長度，詳如下表。

Surveys for breeding pairs of Scaly-sided Merganser, Primorye, Russia.

River	**Survey period**	**Survey length, km**
Avvakumovka	Late April	41,9
Kievka	Mid-April	85
Krivaya	Mid-April	12,5
Lazovka	Mid-April	18
Margaritovka	Late April	16,5
Pavlovka	Early April	23,5
Vasil'kovka	Late April	40

我國贊助經費大都用來準備第 1 次日本海沿岸的調查工作，購買了調查船隻(Fregat-390 M)和所有須要的器材，研究人員防水制服外套和 logo。穿制服調查是為了吸引一般民眾對鳥類調查團隊的注意，進而進行宣導。

2008 年秋季調查俄羅斯唐秋沙密度和性別比例詳如下表：

Date	River	Survey length, km	Sex ratio M:F	Density, birds/km
1/10/08	Kievka	6.2	1.17:1	4.17
2/10/08	Kievka	16.5	3:1	0.49
2/10/08	Krivaya	7	unknown	0.71
13/10/08	Avvakumovka	6.7	unknown	0
14/10/08	Vasilkovka	4.2	0:15	3.57
21/10/08	Kievka	11.8	0.67:1	1.27
25/10/08	Kievka	14.2	1:1	0.14
2/11/08	Kievka	7.5	2.3:1	2.40
3/11/08	Kievka	10.4	1:1	2.88
5/11/08	Kievka	15.6	0.63:1	0.83

2008 年 4 月 1-8 日開放雁鴨狩獵，很遺憾發現有獵人偷打俄羅斯唐秋沙，以前製作的海報已讓大家瞭解俄羅斯唐秋沙受法令保護，但獵人將所有獵得雁鴨羽毛拔除，以防被警察發現。因此，教育保育宣導仍須繼續加強。

2000-2009 年主要成果包括，共調查 24 條河流，估計俄羅斯唐秋沙繁殖對數約有 1,300 對。2000 年開始人工巢箱計畫，於 13 條河流設置 180 個人工巢箱，由人工巢箱孵育出之幼鳥逐年增加。另調查 78 個巢之繁殖成功率，上腳環的鳥有 41 雌鳥，17 雄鳥，47 隻幼鳥。另有 24 之雌鳥配戴地理標誌系統，研究遷徙路線。蒐集 40 件樣品， 進行 DNA 分析等。

2009 年贊助「俄羅斯唐秋沙國際物種行動計畫研討會」，計畫報告摘要如下：

研討會之目的為研擬俄羅斯唐秋沙保育策略，初稿內容包括一般性物種描述，各國保護此物種之國家報告，族群分佈、數量、使用棲地、面臨的威脅，以及保育措施等。2010 年 3 月，已受邀國家包括澳洲、北韓、韓國、中國大陸、中華民國、日本、英國和俄羅斯等，包括研究人員、調查人員和保育界人士等。

俄羅斯唐秋沙國際物種行動計畫研討會於 2010 年 4 月 27 至 5 月 3 日於俄羅斯海參威(Vladivostok)附近召開，共同研議唐秋沙國際行動計畫。由 Lazovskiy State

自然保護區、WWT 與 IUCN-SSC/Wetlands International Threatened Waterfowl Specialist Group 主辦。前三天於 Vlad Motor Inn Hotel, Vladivostok 進行行動計畫研討會。後兩天於 Lavozovskiy State Nature Reserve 內的 Kievka 河野外考察。研討會議程請參考計畫報告。

共有 21 位專家學者參與研討會，其中包含超過 20 年經驗的保留區管理者。東亞澳洲遷徙路線夥伴團體(East Asian Australasian Flyway Partnership, EAAFP)的首長與科學家也來參加。此外，俄羅斯的自然管理官方代表與 Lazovskiy State 自然保護區官員也都代表開場致詞。俄羅斯籍計畫執行人 Dr. Diana Solovyova 來函請林務局推薦人選參加，我方推薦臺灣大學方偉宏老師參加。

此次研討會由林務局和野鳥和溼地信託贊助。唐秋沙國際物種行動計畫為第一個由 EAAFP 領導下實行的計畫。此次研討會指出唐秋沙所面臨的關鍵性威脅因子，主要的知識缺口，以及列出針對這些問題所需採取的行動之優先順序。這對解決唐秋沙繁殖地所面臨的主要威脅(獵捕及溺斃)的前景看好。然而主要越冬地的危害(汙染和水壩)屬地景層次，將很難減少。

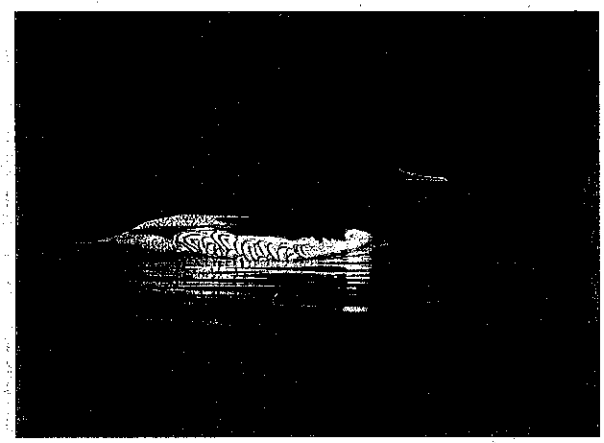
針對族群分佈擴及數個原產國的物種，主要的保育方法就是國際物種行動計畫。方能確認主要威脅、最主要的物種消失因素以及減少或減輕對族群威脅的可能行動。其中重要的關鍵為邀請專家與有興趣的國家舉行研討會。這能確保得到最新的數據、對最主要威脅及保育行動達成共識，使各國能達成協調方法。

行動計畫之研擬預計 2011 年定稿，草案將請所有參加研討會人員表示意見，也將徵詢受邀但無法參加者之建議，另外相關國家和國際保育團體或專家意見也將納入考量。2010 年 12 月 EAAFP 會議中決定設立由原產國組成之國際工作小組(International Task Force)，負責監督此行動計畫之執行。EAAFP 將正式採納本計畫以確保此物種在其他國家的有關當局也受到相當重視。

研討會參加者一致認為研討會成果豐碩，籌辦過數次行動計畫會議之 WWT 職員也讚許研討會運作順暢。此為各國唐秋沙專家第一次齊聚一堂交換意見和資料。行動計畫之研擬，對唐秋沙保育工作有重大影響。雖然 EAAFP 也採納其他三個計畫，但本行動計畫為第一個由 EAAFP 體系完成者，EAAFP 認同此程序，未來研擬計畫也將採取此模式。

Conservation of the Endangered Scaly-sided Merganser *Mergus squamatus*

Workshop to develop an International Species Action Plan



Progress report to
Conservation Division, Forestry Bureau, COA, Taiwan

Peter Cranswick, Dr Diana Solovyova, Dr Sergey Vartanyan & Dr Valery Shokhrin

December 2010

Summary

The Scaly-sided Merganser is globally Endangered. It breeds primarily in Far East Russia and winters in China, though its range also encompasses the Republic of Korea, the People's Democratic Republic of Korea, Japan and Taiwan.

A key tool for the conservation of migratory species across their range is an International Species Action Plan. An action planning workshop for the conservation of the Scaly-sided Merganser was held in Vladivostok, Russia, from 27 April to 2 May 2010. It was attended by 21 experts on the species and in conservation and action planning, including senior staff of the East Asian-Australasian Flyway Partnership (EAAFP). The workshop was funded by the Conservation Division of the Forestry Bureau, Council of Agriculture, Taiwan, and the Wildfowl & Wetlands Trust.

The workshop identified the key threats facing the species, the major knowledge gaps, and prioritised the major actions needed to address these problems. This revealed encouraging prospects for addressing major threats (hunting and drowning in nets) on the breeding grounds, although threats on the main wintering grounds (pollution and dams) are operating at landscape scales and will be more difficult to reduce.

The action plan is in development, and following consultation with species experts and officials from the range states and other partners to the agreement, will be finalised in 2011. The plan will be formally adopted by the EAAFP, to ensure that this species is high on the agenda of the relevant authorities in those countries.

All participants concluded that the workshop had been particularly successful. In addition to the development of the action plan, the workshop has realised many other benefits, particularly in fostering new working relationships between experts from different countries, which will be instrumental in the successful implementation of the action plan.

Introduction

The Scaly-sided Merganser is among the rarest ducks in the world with a declining population estimated at 4,500 individuals. The species is listed as 'Endangered' by IUCN and is listed in the national Red Data Books of Russia, China, and the Republic of Korea. Most of the population breeds in Far East Russia and winters in China, though the precise distribution at this time is poorly known. Smaller numbers are also found in the Republic of Korea and the People's Democratic Republic of Korea, particularly during passage periods, while there are irregular records also from Japan and Taiwan. The reasons for a decline during the 1960s to 1980s include habitat loss, due to logging of the flood-plain forests, illegal shooting and bycatch in gill-nets, primarily in the breeding areas.

A key conservation tool for threatened species, particularly those whose distribution stretches across several range states, is an International Species Action Plan. This identifies key threats, agrees which are the most important factors causing or likely to cause declines, identifies significant gaps in the knowledge and understanding of the species, and agrees potential actions to reduce or mitigate the threats. A key step in the preparation of the plan is a workshop of experts and interested parties. This ensures that the latest available data are to hand, ensures consensus on the most important threats and key actions, and enables a coordinated approach across all countries.

A workshop was held near Vladivostok, Russia, in April 2010 to develop an international action plan for the Scaly-sided Merganser. The workshop was generously funded by a grant from the Forestry Bureau, Council of Agriculture, Taiwan, and by the Wildfowl & Wetlands Trust, UK. This report summarises the key activities and outcomes of the workshop.

Workshop

The workshop took place from 27 April to 3 May 2010. It was hosted by the Lazovskiy State Nature Reserve, the Wildfowl & Wetlands Trust, and the IUCN-SSC/Wetlands International Threatened Waterfowl Specialist Group.

The first three full days were based at the Vlad Motor Inn Hotel, Vladivostok, to develop the action plan. This was followed by a 2-day field excursion to the Kievka River in the Lazovskiy State Nature Reserve.

The workshop was attended by 21 participants. These were primarily experts on the Scaly-sided Merganser, including many scientists and regional or reserve managers who have been actively working on the species, in some cases for up to 20 years. Experts in action plan development attended from the UK to facilitate the workshop and draft the action plan. The chief executive and the scientific officer of the East Asian-Australasian Flyway Partnership (EAAFP) – a major agreement which aims to protect migratory waterbirds, their habitats and the livelihoods of people dependent upon them – also attended the workshop. The Scaly-sided Merganser action plan is the first to be developed under the auspices of the EAAFP.



In addition, representatives of the local authorities in Russia, responsible for nature management, also gave introductory and welcoming presentations, as did officials from the Lazovskiy State Nature Reserve.

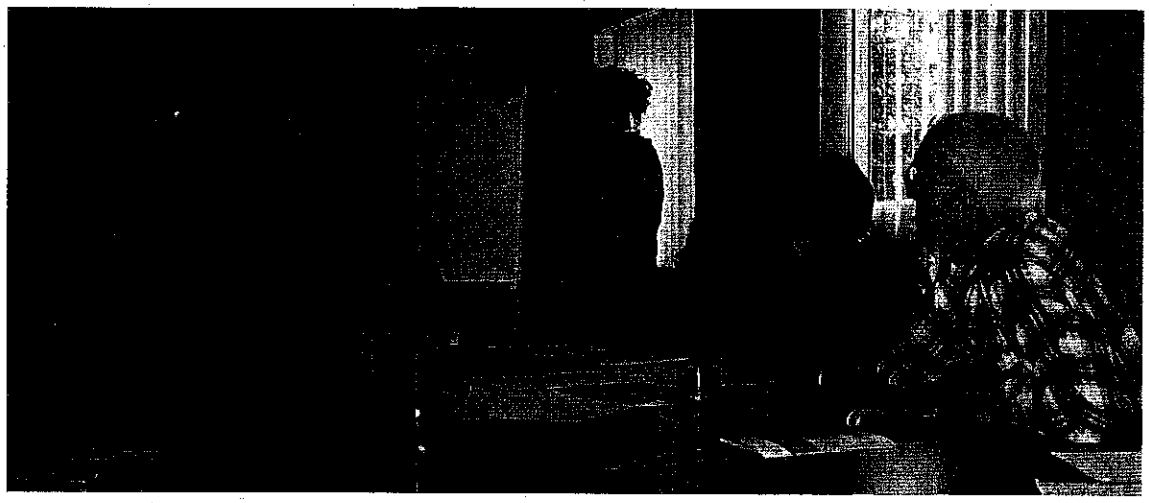
Participants at the workshop

Country	Participants
Australia	1
DPR Korea	2
PR China	3
R Korea	4
Russia	8
Taiwan	1
United Kingdom	2
Total	21

Workshop process and findings

The workshop began with a series of presentations. These provided an overview of the Scaly-sided Merganser's conservation status, biology and major threats, followed by presentations from the delegates from the range states to provide further detail from each of their country's perspective.

The presentations were followed by the development of a problem tree. All delegates identified the main threats facing the species (*eg* drowning in fishing nets) and resolved the root causes for the threats (*eg* the drivers for why people fished in those areas). Each threat was ranked in terms of its importance, details provided on where and when the threat was greatest, any changes over the last ten years were noted, and the potential for this issue to pose a threat in the next ten years was discussed.



Key knowledge gaps were identified for the species – highlighting gaps, for example, in our understanding of the species' biology, but also in our ability to understand how threats impact upon the species or what the future trend was likely to be.

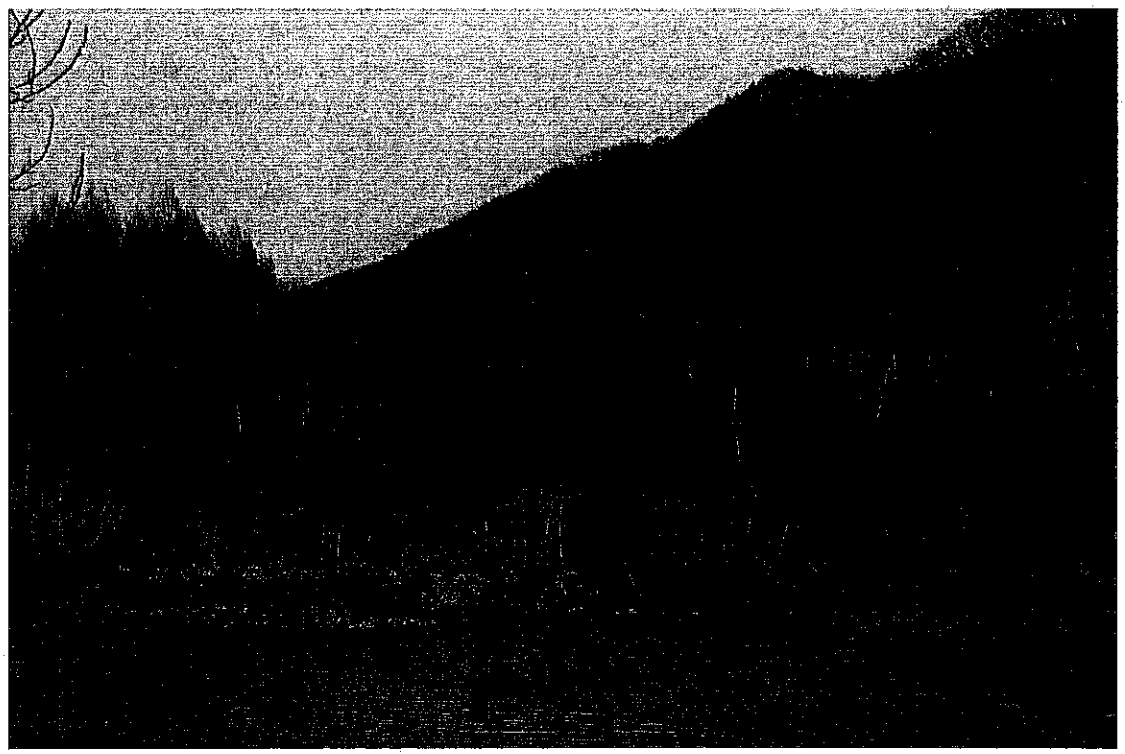
The problems and gaps were then turned into an objectives tree, identifying the key actions that could be taken to improve the species' fortunes. These were ranked according to priority, and the key stakeholders who should be involved in developing and implementing the actions were identified.

Analysis of threats showed that hunting and drowning in nets comprised the major threats on the breeding grounds. There appeared to be generally good prospects that these issues might be addressed and the threat reduced. Key threats on the wintering grounds were identified as pollution and damming of rivers. These operated over landscape scales and will be much more challenging to reduce.

Field excursion

The excursion was centred on the Kievka River, one of the core breeding rivers for the species in Primorye.

Following a prolonged period of snow and rain, river levels were very high, and Scaly-sided Mergansers were absent from several of their normal locations on the rivers, though several birds were seen by all participants. Several artificial nestboxes were checked for breeding females by the team from the Russian Scaly-sided Merganser Project. This provided valuable demonstration and training to delegates from elsewhere, to see the techniques in use for catching and processing birds. Several participants also experienced boat-based river surveys (this technique is used to determine numbers of breeding pairs), though opportunities were limited owing the high water levels in the rivers. During the field excursion, a natural nest site was located (only the eighth to be discovered by the team in ten years of fieldwork), and two geolocators were recovered from females (once processed, the data from the logger will identify the individual's wintering location).





Next steps

The action plan will be finalised in 2011 so that it can be formally adopted by the EAAFP. The draft plan will be circulated to all workshop participants, additional experts who were invited but unable to attend the workshop, and relevant national and international conservation NGOs and other expert groups. A subsequent draft will be circulated to officials of the range states and all EAAFP partners in advance of the meeting.
At the EEAFP Meeting of Parties in Cambodia, December 2010, it was agreed to establish an International Task Force, comprising members of the range states, to oversee implementation of the plan.

Conclusions

All participants commented that it had been a productive and successful workshop. WWT staff, who have organised several action planning workshops, felt this workshop had proceeded particularly smoothly and effectively.

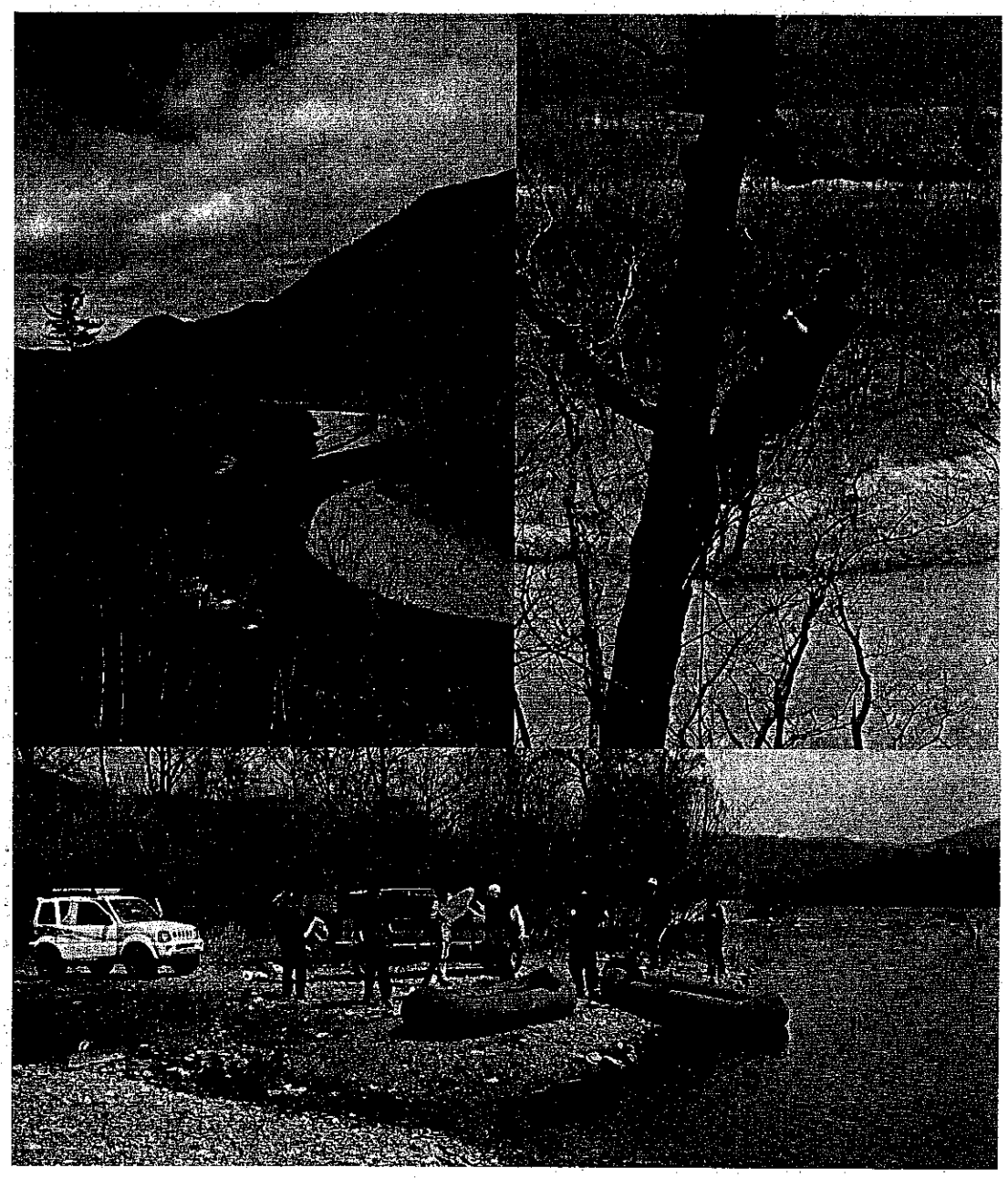
The workshop provided the first opportunity for the groups involved in Scaly-sided Merganser work in different countries to meet and exchange information and ideas. The workshop undoubtedly marks a great step forward for the species' conservation, fostering new international working partnerships and increased enthusiasm to tackle the problems facing this species.

One particular positive outcome is that the action plan has been produced with the official endorsement of the EAAFP. This will ensure that the species is promoted highly on the political agenda of the range states. (In addition, it was agreed that EAAFP would include a side stand at the next Meeting of Partners, specifically focussing upon threatened species and the action plans adopted by the partnership.)

Further, although three existing plans have also been adopted by the EAAFP, this is the first to be developed under the Partnership. The EAAFP officers have endorsed this process as the model for the development of future plans, no doubt influenced by the successful and positive nature of the workshop.

The ultimate success of the action plan will be measured by its implementation. (A project proposal is already in preparation between the DPR Korea, Russian, Chinese and UK experts to undertake preliminary surveys of potential breeding areas in DPR Korea.) All indications are that the workshop has provided the ideal start for that process.

PA Cranswick, Wildfowl & Wetlands Trust, Slimbridge, Glos GL2 7BT, UK
Dr D Solovyova, Dr S Vartanyan & Dr V Shokhrin, Scaly-sided Merganser Project



Liang-Ruey Ke
Assistant Director
Taipei Representative Office in the UK
50 Grosvenor Gardens
London
SW1W 0EB

16 December 2010

Dear Liang-Ruey Ke

I acknowledge the receipt of $5,000 from the Taiwan Forestry Bureau, Council of Agriculture, towards our project for 2011 - "Conservation of the endangered Scaly-sided Merganser *Mergus squamatus*: in Russia".

Without your generous support this globally threatened species would undoubtedly been in a much worse conservation status. I thought this would be an opportune moment to provide you with an update on the whole project which has now been running for 11 years.

Firstly, regarding funding, since 2006 the Taiwan Forestry Bureau, Council of Agriculture, has provided a total of $30,000 towards Scaly-sided Merganser conservation as follows:

Year	Amount	Project Title
2006	$5,000	Surveys and conservation of the Scaly-sided Merganser in Russia: information and education program
2007	$5,000	Surveys and conservation of the Scaly-sided Merganser in Russia: evaluation of the effect of information and education program
2008	$5,000	Surveys and conservation of the Scaly-sided Merganser in Russia: evaluation of the effect of information and education program
2010	$10,000	Scaly-sided Merganser action planning workshop
2011	$5,000	Conservation of the endangered Scaly-sided Merganser *Mergus squamatus*: in Russia
Total	**$30,000**	

Over the same time period, the Wildfowl & Wetlands Trust have contributed:

Year	Amount	Project Title
2006	$4,525	Locating of wintering grounds and stopover sites of Scaly-sided Merganser
2007	$6,760	Surveys and conservation of the Scaly-sided Merganser in Russia
2008	$7,830	Surveys and conservation of the Scaly-sided Merganser in Russia
2009	$10,329	Surveys and conservation of the Scaly-sided Merganser in Russia
2010	$11,194	Scaly-sided Merganser action planning workshop
2010	$9,077	Surveys and conservation of the Scaly-sided Merganser in Russia
Total	**$49,715**	

The total raised since 2006 is now $113,973 so our two organisations have provided 70% of the funds which have resulted in the stabilisation and increase of this globally threatened species. Further information on the success of this long term project is provided below.

Yours sincerely

Peter Cranswick
Head of Species Recovery

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MAIN RESULTS OF A TEN-YEAR CONSERVATION PROGRAMME FOR SCALY-SIDED MERGANSER PROJECT IN RUSSIA, 2000-2009

Breeding population estimations and trend

A total of 24 rivers has been surveyed in the Primorye for Scaly-sided Merganser pairs and/or broods between 2000 and 2009 - some rivers were visited only once or twice during this period, while others became model stretches. Annual counts of breeding pairs took place along the Avvakumovka, Lazovka, Kievka, Krivaya, and Margaritovka rivers; the Pavlovka, Iman, and Vasilkovka Rivers were surveyed once every 2-4 years. This is the first time that Scaly-sided Merganser breeding population dynamics have been monitored on a long-term basis and along several model stretches. The Primorye breeding population was estimated at 1,300 breeding pairs, the largest Scaly-sided Merganser population in the world. Breeding pair density varied from 0 to 0.9 pairs / km among rivers and years. Despite a high variability in breeding pair numbers, certain favorable rivers had stable high densities, while others largely held zero or near zero densities. The breeding population trend on the Kievka River is increasing while it is decreasing on both the Margaritovka and Avvakumovka River although all trends are non-significant ($R^2<0.25$). The breeding population of the Kievka basin rose from 50 pairs in 2000 to 77 pairs in 2006 and dropped slightly to 58 pairs in 2009. At the same time, the number of broods in this basin increased from 27 broods in 2000-02, 40 in 2003-06 and 36 in 2007-09. This seems to be an effect of artificial nest program.

Artificial nest program and Scaly-sided Merganser "incubators"

The artificial nest program was started in 2000. A total of 180 artificial nests were erected along 13 rivers of the Primorye in 2000-2008. Rivers with different logging history – with logged and un-logged forest on the banks - were selected to check whether nest sites were limiting on logged rivers. We found that placing artificial nests improved the breeding habitat for Scaly-sided Merganser and other animals. Occupation of artificial sites by Scaly-sided Merganser was significantly higher on logged than un-logged rivers ($t=4.08$, d.f. 97, $p<0.01$). Three different types of nest were used (open tubes, goldeneye nest boxes and long nest boxes).

Initially the two river basins with the highest pair density were developed as so-called Scaly-sided merganser "incubators" – the Kievka basin and Pavlovka River. Eleven artificial nests were placed in the Kievka basin in 2001, 13 added in 2003, 23 in 2004 and 33 in 2008. Twenty artificial nests were placed on the Pavlovka River in 2004. The proportion of young hatched from artificial nests in the Kievka basin has increased over the years (Table 1). The Pavlovka incubator didn't work so efficiently due to habitats there being less destroyed and therefore no compensation is needed.

Table 1. Increase in Scaly-sided Merganser productivity due to artificial nests in the Kievka basin, Primorye.

Year	# AN	# AN available for ducks	# AN occupied by SSM	Total # SSM pairs per basin	% pairs nesting in AN	No. clutches hatching in AN (%)	Total # broods per basin	# ducklings hatched in AN	% broods hatched in AN	Max % ducklings hatched in AN
2004	24	17	4	55	7.2	3 (75%)	40	34	7.5	14
2009	63	60	12	58	20.7	11 (91.6%)	38	103	28.9	47

Reproductive biology
A total of 78 Scaly-sided Merganser nests were investigated during this project - more than the total number of nests ever found prior to this project. The nest site characteristics of seven new wild Scaly-sided merganser nests were described. Egg size and weight, clutch size, egg and nest survival, and reasons for clutch mortality were studied. Egg laying chronology, incubation constancy and duration were investigated using geolocating loggers. The main egg and chick predator was Shrenk's Rat Snake and female and egg depredation by Sable was reported. Nest success was found to be higher in nest tubes (86.8%) than boxes (65.2%), with nest success in wild cavities intermediate (76.9%).

Catching and recoveries
We ringed 41 females, 17 males and 47 newly-hatched ducklings in 10 years. The species had never been ringed before this project. No males or ducklings were recovered, but 12 of 26 females ringed at the nest (46%) were retrapped. This is surprisingly low as females were expected to have high survival and nest site fidelity. The longest period of observation of an individual female was five years.

Migration ties and migration strategy
Twenty four females were equipped with British Antarctic Survey geolocating loggers in 2006-09. Eight of these were subsequently recaptured with a total of 13 year-round records obtained. Seven females wintered in the Yangtze valley in South China and one in Central China. A high site fidelity to wintering areas is typical for Scaly-sided Merganser females - two females monitored for more than one winter wintered in the same area as they had the previous year. Another wintered within the Yangtze valley over three winters. Scaly-sided Merganser females reached their winter grounds by two, rarely one, migration jumps from their breeding sites. In autumn females staged in South and North Korea, and in Northern China – for durations from a few days to up to two months. Two females moved to the north of breeding area in autumn. Spring migration was quick and occurred mainly in one jump.

Moult
Moulting areas are poorly understood in this species. Stable isotope ratios (N_{15}, C_{13}, H_2) in combination with geolocating were used to determine moult areas. We found brood rearing females moulted with their broods on breeding rivers. Exact timing of female moult is still unclear, probably August-September. All unsuccessful females moulted at sea, two of them close to their breeding river and one 1,000 km north of her breeding river (Kievka). Males moulted at sea probably very far north of breeding areas. A number of males (if not all of them) returned to their breeding rivers in late autumn in October-November where pair formation took place.

Molecular study
Forty samples collected over the whole Primorye plus three from the Changbai Mountains (China) were analyzed for mt-DNA. Four haplotypes were found in Scaly-sided Merganser males and only two in females. This confirmed our suspicions that Scaly-sided Merganser breeding females have high site fidelity and high natal site fidelity. The breeding populations of the Primorye and Changbai Mountains are seemingly exchanging genes. Molecular phylogeny of mergansers was studied. mt-DNA molecular distances suggested the Scaly-sided Merganser is closely related to the Goosander - as predicted by behavioural and ecological similarities.

Threats and education program
We determined the main sources of Scaly-sided Merganser mortality as bycatch in fishing nets and shooting on breeding rivers. Natural predation rate also seems to be high on breeding rivers. An information program for local people, fisherman, hunters and children included a poster campaign and talks elsewhere wherever possible.

非洲保育基金會巨猿保育計畫成果摘要

非洲保育基金會(African Conservation Foundation, ACF)保護大猩猩和黑猩猩計畫數年成果，摘要如附：

本計畫在喀麥隆環境暨森林部(Ministry of Environment and Forestry)支持下，由非洲保育基金會和環境和鄉村發展基金會(Environment and Rural Development Foundation, EruDeF)合作執行。喀麥隆森林暨野生動物部(Ministry of Forestry and Wildlife) 2005 年曾經提供支持本計畫執行之信函。

非洲保育基金會設立於 1999 年，在英國、坦尚尼亞和喀麥隆設有辦公室，該基金會主要宗旨包括：

一、執行野外計畫，支持非洲當地之保育行動。
二、尋求生物多樣性保育與當地社區人民生計結合的方式。

上述計畫執行方法或活動包括：

一、調查和生物監測。
包括調查設計和執行，蒐集和分析資料等。
二、引進野生動物農場，作為替代生計策略。
依據本計畫之前的調查和分析，野生動物農場(Wildlife Farming)是建立小型產業的可行方法，不但可提供村民食物，也可創造收入來源。ACF 和 EruDeF 將提供相關訓練協助村民，並協助設立社區基金。
三、以鼓勵參與策略擬定方式，研擬以社區為主之土地利用計畫。
主要目的為保護巨猿棲息地和生態敏感區，並區隔農業用地，經由社區參與尋求保護、保育、傳統利用、人民生計和經濟發展間之平衡。ACF 和 EruDeF 將運用 GIS 資料，協助村民擬定土地利用計畫。
四、經由教育宣導提倡巨猿保育。
辦理環境教育相關會議或活動，協助學校成立野生動物相關社團，出版巨猿相關海報、摺頁或其他宣導品。

2005 年所提「喀麥隆西部巨猿研究和保育計畫」是先驅計畫，包括族群調查，教育及訓練當地社區永續經營森林資源，尋求替代謀生方式，擬定永續經營和保育計畫等。ACF 網站有列出贊助者，林務局 logo 也列在上面。我國贊助此計畫之後續正面發展包括：

- 研究調查成果促使 IUCN 於 2006 年將研究地點納入喀麥隆和奈及利亞保育

克羅斯河大猩猩地區性行動計畫(Regional Action Plan for the Conservation of Cross River Gorillas in Cameroon and Nigeria)。

- 喀麥隆政府規劃研究 Lebialem 高地納入保護區系統之可行性。
- 與美國 University of Maryland 商討合作研究黑猩猩族群基因。

2005 年至 2006 年計畫主要成果包括：

- 2005 年 12 月和 2006 年 10 月間，紀錄 120 個巨猿巢區(40 gorilla nest sites, 80 chimpanzee nest sites)。
- Bechati-Fossimondi-Besali 森林區，平均每群隻數(gorilla: 13.05, chimpanzee: 6.78)，Mak-Betchou 森林區，平均每群隻數(chimpanzee: 16.72)。
- 在研究區發現 11 個巨猿頭骨、2 根大腿骨。
- 採集到 15 份毛髮 sample、8 份糞便 sample。
- 調查期間數次觀察到黑猩猩和大猩猩，例如近距離遇到 35 隻 chimpanzee，遠距離看到一群 chimpanzee (包括 3 隻 infant)，近距離追蹤 4 隻大猩猩等。
- 除黑猩猩和大猩猩外，另紀錄到其他 10 種大型哺乳類動物。
- 人類活動部分，發現 560 個陷阱、29 個獵人、28 段獵徑、60 個彈殼、67 個農場，另聽到 25 次槍聲。
- 紀錄研究地區之植被及棲地類型，另與英國皇家植物園(Royal Botanic Gardens, KEW)和喀麥隆植物標本館(National Herbarium of Cameroon)合作，採集 141 份植物標本。
- 擬定森林經營管理策略，研擬保育巨猿行動計畫。
- 人才培訓方面，辦理 GIS/GPS 訓練班，調查人員參加各類訓練課程。針對當地機構或社區，辦理 4 次相關研討會和訓練班。
- 教育宣導方面，辦理 30 次社區會議，共 3,218 人參加。到 5 個學校辦理保育宣導活動，共有 1,050 位學生參與。協助 5 個學校設立保育社團。
- 替代性謀生方式部分，召開 35 次會議，協助設立兩個社區基金(Community Funds)，2006 年 9 月起，召開 11 次基金管理會議。

2007-2008 年是第 2 階段計畫，研究調查地區為 Mak-Betchou 森林區、Upper Nkongho-Mbo 森林區和造林租借地(UFA11002)。計畫執行有助於保護這兩種瀕臨絕種猿類，2007 年至 2008 年初計畫主要成果包括：

- 於 Bechati-Mone Forest Corridor 發現 4 個新的大猩猩可能分佈區。
- 經由實驗室 DNA 測試，證實 Lebialem forest 有大猩猩。
- 於 Lebialem highlands 2 處受干擾棲息地，進行巨猿築巢生態學比較研究。
- 製作完成 Bechati 和 Mone 兩處 Forest Reserve 間之巨猿遷徙路線圖。
- 附近共有 10 個村莊，已於 9 個村莊設立森林管理委員會。

- 於 4 個村莊建立永續發展計畫及社區財務機制。
- Bechati-Fossimondi-Besali 森林區，開始進行社會經濟研究。
- 經由社區會議和至學校宣導方式，提升 Bechati-Fossimondi-Besali 森林區居民對保育議題之瞭解。

2008 年計畫成果包括：

- Bechati-Fossimondi-Besali 森林區，發現 5 個大猩猩巢區，7 件大猩猩覓食遺跡，4 個大猩猩腳印，2 次黑猩猩叫聲，1 件黑猩猩覓食遺跡。大猩猩和黑猩猩的目擊率(encounter rate)分別為 0.3 signs per/km 和 0.06 signs per/km。另發現 3 塊農田，顯示林區有部分人為干擾，目擊率為 0.06 signs per/km。
- UFA11002 森林區，沒有發現大猩猩。發現 1 處黑猩猩巢區，有 4 個巢。目擊率為 0.2 signs per/km。此區以前有大猩猩之記錄，因族群很小，有可能已遷移至附近森林，需再進一步調查才能確認。另發現 22 條打獵小徑和 16 個陷阱，顯示打獵活動頻繁，目擊率為 2.5 signs per/km。
- Mak-Btchou 森林區，沒有發現大猩猩。黑猩猩部分，發現 4 個地面巢，54 個樹上巢，1 個很新的腳印，2 次叫聲。目擊率為 2.03 signs per/km。另記錄到叢林象 8 件新排遺，2 個新腳印，2 次叫聲，目擊率為 0.4 signs per/km。總共記錄到 10 種動物。記錄到的人類活動主要是狩獵，包括陷阱、彈殼、槍聲、獵人小屋、獵徑、彎刀痕跡，目擊率為 1.6 signs per/km。另農業活動目擊率為 0.4 signs per/km。
- Nkong 和 Bangang 森林區，Nkong 林區沒有發現大猩猩和黑猩猩。Bangang 林區發現數件大猩猩覓食遺跡。黑猩猩部分，發現 7 個巢區(7 個地面巢，21 個樹上巢)。此 2 林區均發現密集農業活動，主要栽植物種為棕櫚、可可和大焦，也有發現伐木行為。
- 2009 年 12 月 5 至 10 日，辦理巨猿追蹤研究訓練班。
- 在 Bechati-Fossimondi-Besali 森林區附近 9 個村莊設立森林經營管理機構 (Forest Management Institution, FMI)。
- 替代性謀生方式部分，在 Mmockbie 和 Mmockgie 新設兩個社區基金 (Community Funds)。
- 在 Fossimondi、Andu 和 Menji 辦理保育教育宣導課程或活動。

2009 年「Lebialem-Mone 地區克羅斯河大猩猩和奈及利亞-黑猩猩保育計畫」，計畫報告，摘要如附：

- 社區參與計畫共 9,540 人參加。
- 辦理各類訓練班，包括生物監測和 GPS 使用、資料分析、GIS 製圖、社會經濟學研究方法、野外調查等。

- 針對不同地區及對象，辦理 3 次大猩猩保育教育宣導活動。
- 完成村莊資源圖，標示黑猩猩和大猩猩棲地和土地利用型態等，此地圖將森林分區，包括
  1. Primary Forest (大猩猩棲地核心區)
  2. Secondary Forest (緩衝區，主要是靠近 Primary Forest 的廢棄農地)
  3. Tertiary Forest (人類居住區)
  4. Intensive agroforestry (農田)
- 於 Bechati 規劃設立保護區，並完成保護區全圖、分區規劃圖及 3-D 地圖。
- 保護區初步劃定界線之範圍約有 8,000 餘公頃，另外將有 5,000 公頃緩衝區。
- 建立社區發展模式，設立諮詢委員會。
- 完成「我們的森林和社區的未來(The Future of Our Forests and Communities)」報告。
- 大猩猩分佈和生物監測調查發現 Bechati-Lebialem 森林和 Ashukem-Bokwa 山區為大猩猩密集活動區。大猩猩面臨的主要威脅為野味(bushmeat)貿易、森林變更為農地、年青人高失業率、村民對森林和野生動物相關法規認知不足等。
- UFA11002 和 Mak-Betchou 林地調查結果顯示有相當數量之黑猩猩，但沒有發現大猩猩出現的證據。
- 於 Lebialem-Mone 林地設立森林保護基金(Forest Protection Fund)。
- 辦理替代謀生方式訓練，例如訓練 Lebialem 地區 120 名獵人養蜂。
- 完成 Mak-Betchou 和 Upper Nkongho-Mbo 兩處林地之社會經濟調查。

本計畫主要目標為經由研究、保育、教育計畫和研擬生物多樣性經營管理策略，保育喀麥隆西南部 Lebialem-Mone 地區稀有的大猩猩和黑猩猩亞種，並持續進行長期教育宣導、鼓勵社區參與推動保育計畫等。

Lebialem 高地，面積 1,323 km^2，平均年雨量超過 2,000mm，本區 2 個主要氣候型態包括雨季(4-9 月)和旱季(10-3 月)。Lebialem 有 355 種以上鳥類棲息於此，其中約有 50 個特有種，15 種為面臨威脅物種。棲息於中海拔的瀕臨絕種哺乳類包括大猩猩、黑猩猩、鬼狒(Drill)和 Preuss's monkey (*Preuss guenon*)。2004 年的調查，記錄到以前未被發現且極稀有的大猩猩和黑猩猩亞種，即克羅斯河大猩猩(另譯跨河大猩猩或十字河大猩猩 Cross River gorilla, *Gorilla gorilla diehli*)和奈及利亞-喀麥隆黑猩猩(Nigeria-Cameroon chimpanzee, *Pan troglodytes vellerosus*)。此項發現顯示大型猿類動物並非僅限於 Sunderland-Groves 地區，故有必要進一步調查這兩種亞種的現況、族群數量、分佈及基因組成。兩種動物稀有的原因包括棲地破碎化及人類造成的壓力。大猩猩和其他哺乳類受威脅的原因包括森林惡化、商業伐木、棲地破碎化、非法獵捕和野味貿易。Cross River gorilla 族群量不到 300 隻，是全球面臨最大危機的靈長類動物。Nigeria-Cameroon chimpanzee 族群

量不到 6,000 隻，是最受威脅的黑猩猩亞種，分佈地區最少，族群量也最小。

2005 年至 2008 年計畫目的包括：

一、評估大猩猩和黑猩猩亞種之現況、分佈、目擊率(encounter rate) 相對豐富度等資料，作為保育措施之參考。主要調查區包括 Mak-Betchou、Upper Nkongho-Mbo、UFA11002 forest blocks 和 Bechati-Mone Forest Corridor。
二、經由訓練和社區基金方式，為村民尋求替代性謀生方式。
三、研擬以社區為基礎之土地利用計畫。
四、加強環境教育，於當地社區宣導巨猿保育觀念。
五、繼續與喀麥隆森林暨野生動物部協商，將這些森林區之保護位階提升至社區經營之保護區。

依據前 3 階段之成果，2009 年計畫重點地區為 Lebialem-Mone Forest Landscape (前稱 Bechati-Mone Forest Corridor)，執行工作包括：

一、與喀麥隆森林暨野生動物部和當地相關人士合作，設立由社區經營管理之法定保護區。
二、發展以社區為基礎之土地利用計畫。
三、提升社區居民對保育大猩猩和黑猩猩的瞭解和認知。
四、支持替代謀生方式，包括野生動物農場和生態旅遊。

經過多年努力，計畫進入另一階段，2010 年所提為「喀麥隆西部 Lebialem-Mone 地區建立大猩猩保護區計畫」，摘要如下：

克羅斯河大猩猩名列全球面臨最大危機的 25 種瀕臨絕種靈長類動物之一，過去數年的調查發現奈及利亞和喀麥隆邊界克羅斯河大猩猩僅有 250-300 隻，分佈在 12,000 平方公里範圍內，棲地破碎化造成有發現大猩猩出沒的地區分為 11 處，且每地相隔 10 公里以上。最近新發現 Bechati 地區克羅斯河大猩猩次要族群有 40-60 隻，本計畫預定建立 Bechati-Mone 森林廊道(Bechati-Mone Forest Corridor)，連結 Bechati 地區和主要族群 Takamanda 地區，設立大猩猩保護區 (Bechati Gorilla Sanctuary)。

2010 年計畫執行成果摘要如下：

一、推動社區野生動物保護區 Tofala Hill Wildlife Sanctuary 之公告設立。
- 辦理地區性推動保護區設立研討會，並邀請政府單位參加。
- 2010 年 7 月設立保護區推動小組。

- 2010 年 8 月至 2011 年 1 月，召開 4 次技術研討會，草擬技術報告，此為喀麥隆設立保護區之第一要件，已完成報告初稿。
- 派出 3 組人員，於 2010 年 12 月製作完成保護區範圍圖。
- 預定保護區正式取名為 Tofala Hill Wildlife Sanctuary (前稱 Bechati-Lebialem forest)。

二、社區野外調查人員於 Bechati -Fossimondi-Besali、Bokwa-Etoko Mile 22、Andu 等森林，支援政府人員執法和大猩猩監測工作。

- EruDeF 成功遊說政府單位於 2010 年 10 月派駐 6 位工作人員，補足已懸缺 2 年之職務，並於保護區預定地辦理 2 次查緝和教育活動。
- 2010 年 1 月起，每月進行生物監測，並辦理訓練班。
- 記錄到 7 群大猩猩，每群分別有 1,2,3,4,5,7,8 隻，總計 30 隻。另外，多數黑猩猩群約有 1 至 21 隻，最大的一群有 35 隻，總計 285 隻。

三、辦理教育宣導活動

- 草擬巨猿保育教育課程教材，並送政府單位審查，為當地學校編纂之大猩猩和黑猩猩保育教育手冊正撰寫中。
- 於保護區預定地附近 10 個村莊設立環境教育社團，並推動學校相關社團之設立。
- 與喀麥隆主要報紙 The Post Newspaper 談妥，於 2011 年每月刊登計畫執行相關報導。
- 2010 年 2 月與 Lebialem 社區電台簽訂 MOU，每週播放 30 分鐘保育巨猿和其他環境保育議題之節目。
- 雇用人員自 2010 年 7 月起，每月出版電子通訊，並接受網站設計和管理訓練。同時每月撰文刊登於全國性報紙 The Sun and Post Newspapers。

五、加強保護 Bechati-Mone Forest Corridor。

- 進行生物監測和森林調查。
- 於 Bokwa 和 Etoko mile 222 辦理教育宣導活動。
- 於政府單位討論 UFA11002 租地未來之經營管理方向。
- 2011 年 2 月完成本區全面性之生物多樣性和森林資源調查。

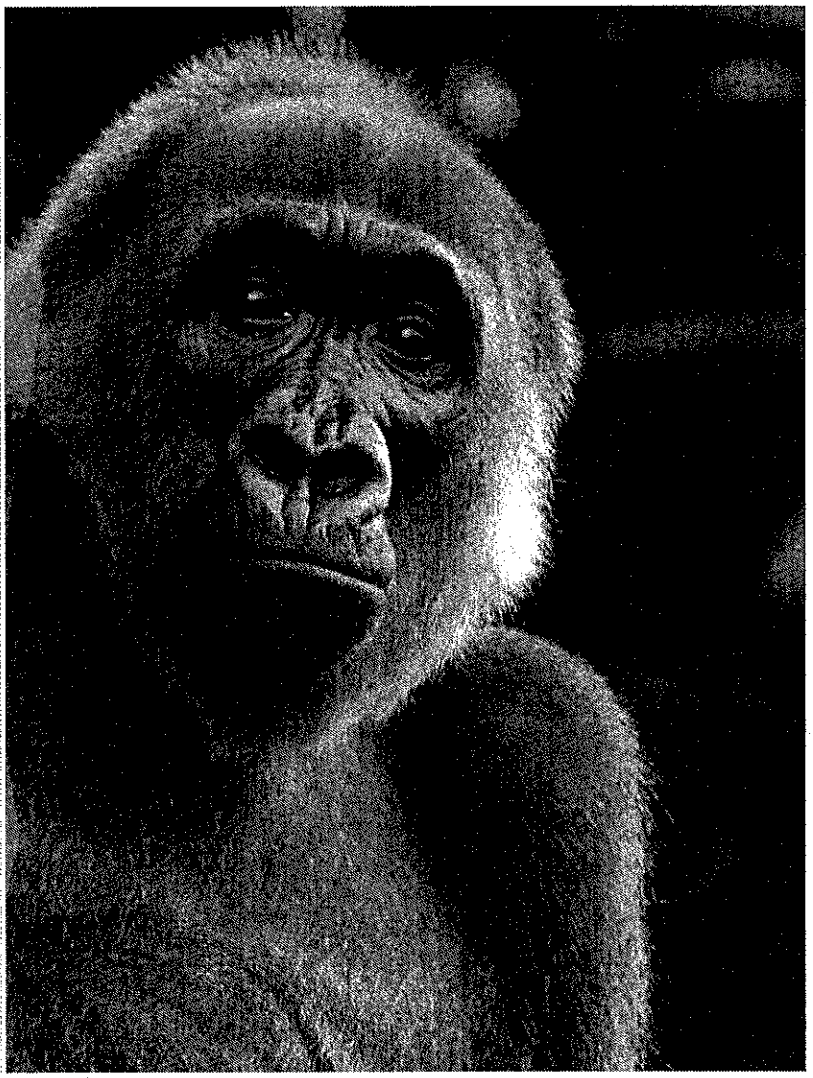
五、於 Bechati-Lebialem 森林附近 13 個社區，運用森林保護基金，訓練及支援微經濟，改善人民生計。

- 為 13 個村莊的替代生計方式排定優先順序，包括家畜、漁業養殖、改善小農之產量、改善棕櫚油生產、非林木森林副產品之交易、養蜂等。
- 重組當地社團朝永續生計方向發展，主要包括 Tofala Hill 婦女會、Tofala Hill 獵人協會、Tofala Hill 農會、鄉鎮森林經營管理委員會等。上述社團將與該鄉鎮主管單位簽訂 MOU 保護大猩猩和黑猩猩。
- 強化 Menji 和 Anya-Lewoh 森林保護基金功能，於 Buea 設立上開基金。
- 為生態守護員(eco-guard)建造豬舍養豬，終結打獵和設陷阱行為。
- 截至目前共訓練 Lebialem 149 名獵人改行養蜂，提供 321 個巢箱。

2011

Western Cameroon Great Apes Research and Conservation Program

Community-based Management and Conservation of Cross River Gorillas in the Lebialem-Mone Forest Landscape, Western Cameroon



Western Cameroon Great Apes Research and Conservation Programme

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1 ACKNOWLEDGEMENTS

The project partners are greatly indebted to many organizations and individuals who contributed their time, expertise and resources during the implementation of the project activities in South West Cameroon.

The Western Cameroon Great Apes Conservation Program has been made possible through grants provided by the Conservation Division of the Forestry Bureau, COA, Taiwan. This project could not have been realized without the generous aid of the people of Taiwan. Their continuous support will be the key for the survival of the critically endangered Cross River Gorillas and Nigeria-Cameroon Chimpanzees.

The overall Lebialem-Mone Forest Landscape Conservation Program has been made possible through financial support from US Fish and Wildlife Service (USFWS) and Fauna & Flora International (FFI). Other financial and technical support was provided to this program by WWF CARPO, Tusk Trust, and Global Vision International. The project team wishes to thank the donors for their vital support.

We greatly appreciate the support from the staff of the Regional Delegation of Forestry and Wildlife for the South West, the local and traditional administration, community members and community representatives.

2 SUMMARY

The main goal of our project is to conserve Cross River gorillas and Nigeria-Cameroon chimpanzees and protect their habitats through research and the implementation of a community model for great apes conservation management. With core financial support from the Conservation Division of the Forestry Bureau, COA, Taiwan, the USFWS and FFI, we have continued to fine-tune the development of this community model around the Bechati-Lebialem forest area and conducted bio-monitoring surveys across the Lebialem-Mone Forest Landscape.

The Bechati-Lebialem Forest and the Bechati-Mone Forest Corridor harbour two great ape species namely the Cross River gorilla and the Nigeria Cameroon chimpanzee. Other endangered species present include the drill, preuss guenon, bush baby, water chevrotain, elephants and buffalo.

The results of the project in 2010 included the completion of the formation of the community forest governance structures (except the forest adjacent women association), completion of the great apes distribution surveys, initiation of the bio-monitoring and forest surveillance of apes, launching of the livelihoods initiative with focus on beekeeping and hunters, school conservation education and the introduction of the forest protection fund as well as the support to the Lower Mundani Farmers Cooperative Palm Oil marketing project. Over 267 chimpanzees were censured and over 30 gorillas.

The main constraints encountered by the project were the concerns of people in some local villages that the project was focussing too much on the conservation aspects, rather than on development. Other constraints were insufficient funds to support all the activities, limited staff support, and limited means of transport.

The key actions for 2011 will include the creation of the proposed Tofala Hill Wildlife Sanctuary, consolidation of conservation education, livelihoods and local economic development support, forest protection fund development, law enforcement and wildlife education, bio-monitoring and ecotourism as well as supporting the community forest governance associations.

The initiation of an ecotourism program based on gorillas and chimpanzees will not only generate employment but also funds to support local development. Ecotourism will be one of the key development opportunities in this area.

3 INTRODUCTION

From 2004, the Forestry Bureau, Conservation Division, Government of Taiwan, has supported Cross River gorilla and Nigerian-Cameroon chimpanzee conservation in The Lebialem Highlands of South West Cameroon by providing a number of grants. These grants have complimented those from other partners to establish an effective conservation presence in the area and ensure that the gorilla subpopulations living there receive as much support as other populations in the Cameroon-Nigeria border region.

Major successes at this site include since 2004:

(i) Completed surveys of the Bechati-Mone Forest Corridor, with the location of a gorilla subpopulation at Ashukem & Bokwa Hills;

(ii) Launch of bio-monitoring of gorillas in Bechati-Lebialem forest and Ashukem & Bokwa Hills;

(iii) Creation of community management structures at Bechati-Lebialem forest;

(iv) Establishment of village land management plans and agreements;

(v) Preliminary demarcation of the Bechati-Lebialem forest as a conservation area;

(vi) A further habitat expansion of gorilla range in Bechati-Lebialem forest found to include the Nkandu and Ndumbin forests in Ndungated and Nwametaw villages; and

(vii) Production of the report "Discussing the Future of Our Forest and Communities" that incorporates the vision of local communities into long-term conservation management of the area.

In 2010, conservation actions focused on i) the creation of the planned wildlife sanctuary at Bechati-Fossimondi-Besali forest, ii) research and biomonitoring, and iii) great apes conservation education.

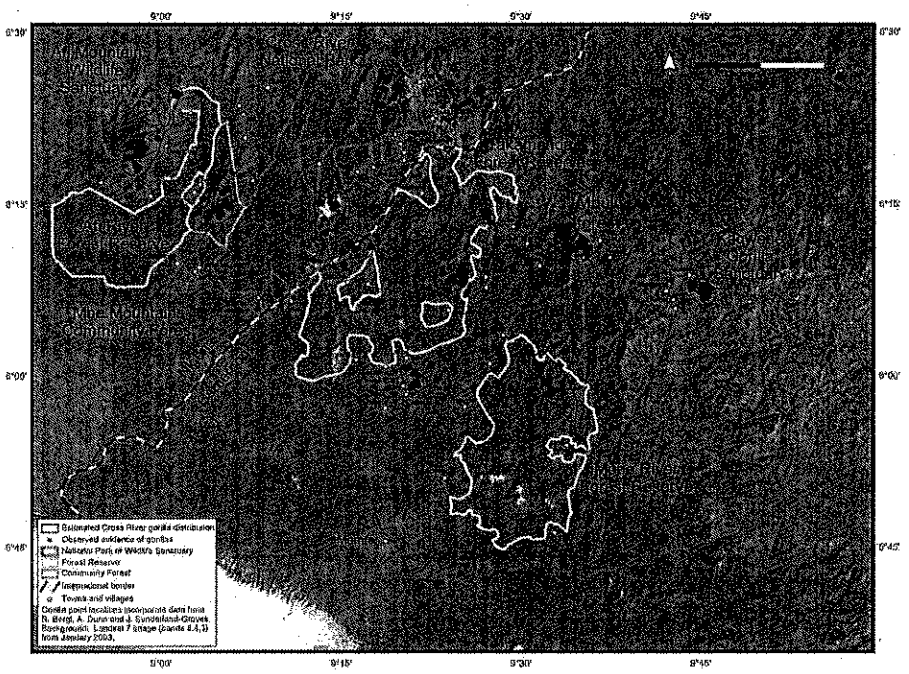
In order to develop a community model for gorilla conservation that is consistent with the aspirations of the local people, the project team focused on such factors as landowners education, community management, local economic incentives, appropriate compensation schemes for farmers to be dislodged from core gorilla habitats and integration of the conservation plans into the local and landscape-wide rural development plans being prepared by the government funded RUMPI Rural Development Project.

Furthermore, protecting gorilla habitat will require public support (notably from those currently causing the destruction) and effective law enforcement to contain forest fragmentation and poaching. Public support has been promoted in the following main ways: (i) developing economic alternatives that are compatible with the maintenance of the natural ecosystems; (ii) through educational programs targeting the groups that most influence the ecosystem; (iii) building the institutional capacity of local communities to engage in co-management; (iv) assisting landowners to obtain property maps of their lands and providing appropriate compensation schemes for those losing farms in core and adjacent gorilla habitats.

4 THE PROJECT AREA

4.1 Distribution map of Cross River subpopulations

Distribution map of Cross River subpopulations known in 2006 (R. Bergl, 2006) with the Bechati-Lebialem subpopulation in the Southeastern corner (Figure 1).



Approximate distribution of the Cross River gorilla in Nigeria and Cameroon.

4.2 Relief and Climate

The Bechati-Lebialem forest is located in the Lebialem Highlands. The Lebialem highlands have a number of mountain ranges notably the Marital range (2303m) and Magha Hill (2510m) in the Northern most part, Nyi Fongonkem (1700m), Nyitebong (1560m), Nyi-Fobongoh (1200), etc. The area runs from a low-lying area of 180m in the Mamfe basin to the height of 2510m on the Western side of Mount Bamboutous in Western Cameroon.

The Lebialem Highlands region is one of the most accidental landscapes with very fragile ecosystems, within the western highlands of Cameroon characterized by several isolated peaks and steep valleys.

The Lebialem Highlands cover a land area of 1323 km2 with an annual average rainfall of over 2000 mm that usually comes in torrential down pours. There are two climatic seasons namely the rainy season (April to September) and dry season (October to March).

4.3 Fauna

The Cross-Sanaga-Bioko Coastal Forests ecoregion supports one of the highest rates of animal species richness in Africa, especially in terms of forest-restricted mammals, birds and butterflies. The

Lebialem Highlands of which Bechati-Lebialem forest is part is also part of this eco-region are especially rich in endemic biodiversity species. Over 355 bird species have been recorded, among which 50 species are endemic to the afro-montane highlands and 15 species are globally threatened.

The low to mid-level elevation is home to endangered primates as the Drills (*Mandrillus leucophaeus*) and the Preuss guenon (*Cercopithecus preussi*), as well as the critically endangered Cross River gorilla (*Gorilla gorilla diehli*) - the rarest of the gorilla sub-species - and chimpanzees (*Pan troglodytes vellerosus*) - also the most endangered chimpanzee subspecies in Africa (with a population numbering less than 6500. The Bechati-Fossimondi-Besali forest or Bechati-Lebialem forest currently represents the most southern extension of the Cross River gorilla population.

4.4 Vegetation

The Lebialem Highlands are part of the Hygrophilous Coastal Evergreen Rainforest, and because of the transition from lowland forest to montane savanna, the area is particularly diverse in terms of habitats and floristic biodiversity. The vegetation types found in this biome are associated with high rainfall levels (White 1983). Lebialem is part of the Cross–Sanaga–Bioko Coastal Forest ecoregion, an area of 52 000 km2 (Olsen et al. 2001). Locally, the vegetation runs from tropical lowland rainforest, through the piedmont vegetation, to the submontane and montane vegetation around Mmuock and Fomenji. The project area encompasses four low-mid attitude forest blocks and 10 sub-montane and montane forest sites of ecological significance.

4.5 Population

The population living around the Bechati-Lebialem Forest and Bechati-Mone Forest Corridor is estimated at 52900 living in 31 villages. With a surface area of 65000ha, the current population density is estimated at 0.81persons per ha. The population density at Bechati-Lebialem forest is estimated at 2.8 persons/ha while it is estimated at 0.36 in the Bechati-Mone forest corridor. This indicates that there is a higher population pressure on the Bechati-Lebialem forest habitat than in the proposed Bechati-Mone forest corridor. The local inhabitants are principally involved in farming, hunting, fishing and collection of non-timber forest products. Palm oil production is the main source of income here from traditional varieties that are historically more than 50 years old.

5 PROJECT RESULTS AND OUTPUTS

5.1 Gazettement of the Tofala Hill Wildlife Sanctuary as a Community Wildlife Sanctuary

The project's long-term goal is to secure the survival of the Cross River gorilla in South West Cameroon. In 2010, together with the government of Cameroon we launched the process of creating the proposed Tofala Hill Wildlife Sanctuary (formerly Bechati-Fossimondi-Besali forest). In support of the creation of the wildlife sanctuary, the following outputs were achieved namely:

- A regional workshop for the creation of a sanctuary at Bechati-Lebialem forest was organized and hosted by the Regional Delegation of Forestry and Wildlife for the South west



Participants after workshop



The South West Regional delegate MINFOF addressing participants

- The planned Sanctuary creation team was named in July by the Regional Delegate for Forestry and Wildlife for the South West: Regional Chiefs of Wildlife and Protected Areas, Forestry and Market Information Systems, GIS Officer and Regional Delegate for MINFOF and Executive Director, GIS Assistant, Protected Area Development Coordinator, Socio/economist for ERuDeF.



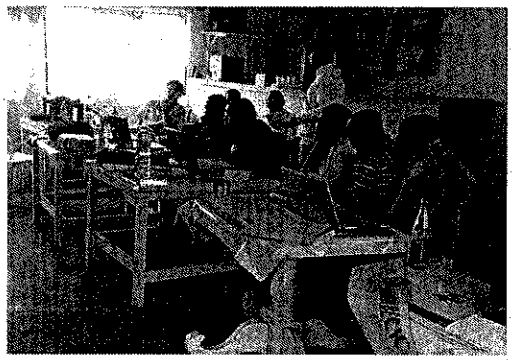
Members of the sanctuary creation team

- Four technical workshops were held between August 2010 and January 2011 to prepare the Technical Report, the first requirement for the creation of a protected area in cameroon. A first draft of the Technical Report was obtained by January 2011. (please refer to the attached copy of Technical report).





First session on technical note in Kumba-Regional level.





Review of Technical Note at Bwitingi

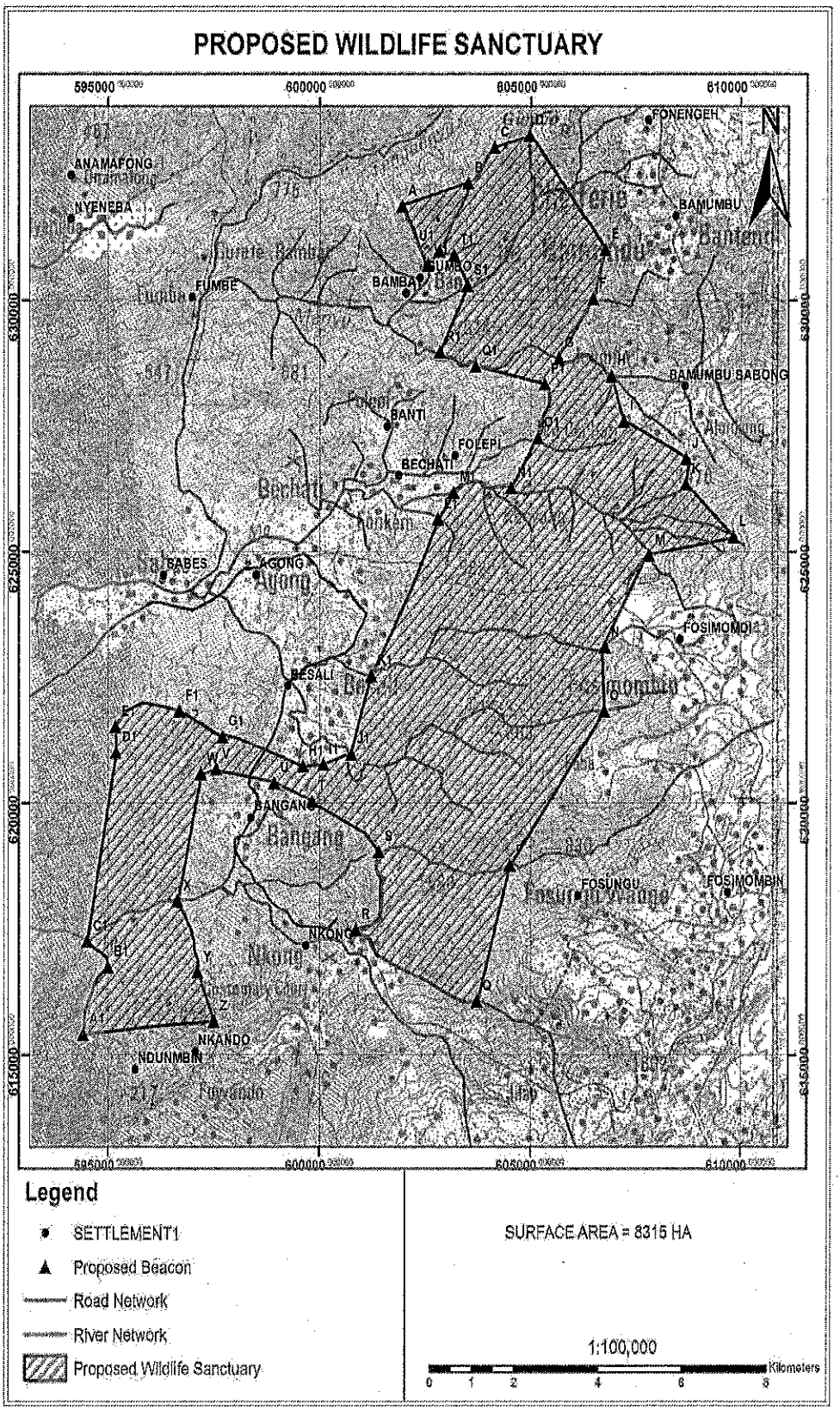




Participants at Workshop in Menji

Deliberating on Technical Note in Menji

- The map for the Sanctuary was fine-tuned by the end of December 2010 after 3 field teams by a joint delegation of MINFOF and ERuDeF.



- The name of the proposed sanctuary was concluded as the **Tofala Hill Wildlife Sanctuary** (formerly Bechati-Lebialem forest)

5.2 Supporting law enforcement by the Ministry staff and bio-monitoring of gorillas through community field assistants in the Bechati-Fossimondi-Besali forest, Bokwa-Etoko Mile 22 Forest and Andu Forest

5.2.1 Law enforcement

Under the period under review, ERuDeF succeeded in lobbying MINFOF in posting 6 forestry and wildlife staff into the Lebialem division to fill the vacant positions existing here for the last couple of years. This success occurred in October 2010. With support from ERuDeF, the Divisional MINFOF team has now conducted 2 major law enforcement and wildlife education field missions around the proposed Tofala Hill Wildlife Sanctuary. Furthermore, ERuDeF has also supported the MINFOF team in a joint bio-monitoring mission in the proposed Tofala Hill Wildlife Sanctuary to evaluate the ecological status of the gorillas and chimpanzees as well as the threats they face.

5.2.2 Training of Bio-monitors (Rangers)

In order to monitor the status and distribution of apes as well as to improve on the understanding of their ecology, a monthly bio-monitoring exercise was instituted in the Bechati-Fossimondi-Besali forest block of the Lebialem-Mone Forest Landscape in January 2010. This involved the training of local field rangers (bio-monitors) on the recce wildlife survey method, identification of large mammals, identification and differentiation of ape signs as well as data recording on designed data sheets and collection of GPS points of ape signs using GPS. Due to limited finances, the bio-monitoring schedule was designed to last for 15 days each month with a field staff assisting the local bio-monitors for 7 days each month.

The aim of the tracking and bio-monitoring exercise is to ensure regular tracking and monitoring of changes in the ecology and status of the Cross River gorillas as well as Nigeria-Cameroon chimpanzees. This will improve the understanding of their ecology in this area and enhance conservation efforts.





Local field rangers discussing their findings after tracking.

Young plantation in Bechati.

The main method used during the tracking exercise was the guided reconnaissance walks and data collected included mainly direct and indirect observations of apes' signs (nests, feeding signs, dung, vocalizations and tracks).

The Bechati-Fossimondi-Besali forest has been partitioned into 3 forest sites which correspond to the 3 bio-monitors, and each forest site has been divided into 15 working sections which tie to the number of working days per bio-monitor per month. This is to ensure that almost all the forest is being surveyed in 15 days.



ERuDeF Bio-monitoring team, Diehli Initiative team and with international volunteers leaving for the forest

Each month, field staff spent seven days in the field with the bio-monitors, after which they sit together to discuss the results, difficulties encountered and possible solutions before they begin monitoring in the next month. The field staff often goes with a camera and other working materials if needed to take photos of any signs encountered and assist the bio-monitors. This is all in a bid to improve on the bio-monitors monitoring abilities and data quality.

5.2.3 Survey Results

According to the results recorded across the year, during the dry season, there was disparity in signs associated with altitude range, with more signs recorded at higher altitudes while in the rainy season, there was even distribution of ape signs in relation to altitudinal range. This could be due to a kind of seasonal influence (gorillas in this area have been observed to inhabit the higher altitudes during dry periods and move down to the lower dry altitudes during periods of rainfall).

Also the presence of secondary vegetation, a typical habitat preferred by gorillas is a characteristic of the Fossimondi forest range (located at a higher altitude) during the dry season compared to the

Bechati and the Besali forest ranges (at lower altitude). This might have influenced the distribution of gorillas, as they migrate to areas of secondary vegetation.

Secondary vegetation and fruits were present throughout the forest as plants flourish in the rainy season which could have contributed to the even distribution of observed signs, with no altitudinal influence.

Gorillas as well as chimpanzees in this forest construct both ground and tree nests. During the dry season, mostly ground nests are constructed at lower altitudes while tree nest are preferred at higher altitudes with a few ground nests also constructed.

In the rainy season both tree and ground nests are constructed throughout the forest range, with a general increase in the construction of tree nests. Increase in arboreal nest construction during the rainy season has also been reported by Sunderland-Groves et al, (2009) in the Kagwene sub population of gorillas.

There was an observed general increase in nest counts and nest construction throughout the rainy season, with highest number of nests recorded in June. The increase in rain intensity and frequency, leaving an almost constantly wet forest floor might have led to the need for nest construction to prevent sleeping on a damp forest floor as is suggested by Comiskey et al (2003).

More feeding signs are observed during the rainy seasons, especially in the period when fruits are flourishing and more feeding signs are also recorded in secondary forest for the gorillas. Gorillas frequently feed on Afromomum spp, banana (Musa spp) stems, raffia and some fruits are left on the ground.

The record of ape trails is lower in the dry season and it is difficult to differentiate the trails in this period as the forest floor is very dry, such that only faint or no foot prints are left.

Observation of chimpanzees' signs, including their nests were recorded at regular intervals in the in the forest. There was an increase in chimp nesting in the rainy season, with an increase in both tree and ground nests.



Gorilla feeding sign on Afromomun spp fruits in Besali .



Gorilla feeding sign on Raffia bamboo stem in Besali .

The number of observations for both chimps and gorillas increased with time. This might have been due to an improvement in the mastering of the monitoring techniques by the bio-monitors, thus increasing their efficiency as well as the total forest area covered per month.

In the Bechati-Fossimondi-Besali forest block, gorillas and chimpanzees occupy the same habitat. This makes it difficult to estimate densities using nest counts as it is difficult to distinguish gorilla nests from those of chimpanzees in the areas that gorillas and chimpanzees inhabit sympatrically (Sanz et al., 2006).

Gorillas frequently build nests in trees as do chimpanzees, and only well trained researchers and trackers can distinguish nest builders confidently at fresh nest sites (Blom et al., 2004). With constant and long term monitoring, some of the above factors like distinguishing different ape nests and signs will be eliminated.

From the data recorded, assuming that there are no two groups of the same size and that chimpanzee and gorilla nests were confidently distinguished, number of chimpanzee and gorilla groups was sorted as well as group sizes. The numbers of individuals per group were further added to give the number of individuals in the forest range. Though this is not very accurate, it gives a picture of the ape population in this forest block.

According to the results obtained, there are gorilla groups of 1,2,3,4,5,7,8 individuals per group. This gives a total of 30 gorillas. For chimpanzees, group sizes range from 1 to 21, without a group of 8 individuals, and a large group of 35 individuals, giving a total of 285 chimpanzees. However, long term monitoring will enable more ecological variables such as nest site preference, slope selection and food types as well as seasonal influence on these variables.

5.2.4 Human Activities

It is evaluated that human pressure is still a major threat to wildlife conservation, as hunting trails, snares, farmlands and gun shells were seen at regular interval during the monitoring exercise. The main pressure now being forest conversion into farmlands, as new farms are opened in the forest especially each farming season. Though during monitoring, encountered snares were destroyed, gun shells and shots are increasingly recorded, indicating that gun hunting is still high and mostly carried out at night, making it difficult to track down the hunters.

5.2.5 Constraints and Opportunities

Constraints recorded so far in the field included the absence of a digital camera, thus photos of these apes and other related evidence could only be taken during the period that a field staff is present in the field.

With the heavy rains in August to October, tracking was difficult as the Bio-monitors do not have rain coats and rubber shoes to use in the forest. This also made transportation of field staff to the area difficult as the roads at this period become virtually inaccessible with a car. Communication with local bio-monitors was also difficult and sometimes impossible as the field staff do not have satellite or even normal cell phones, coupled with the low network coverage.

Despite these constraints, some preliminary successes have been recorded, especially that the bio-monitors tracked and collected quality data with improvement in forest coverage and number of observations as time progressed. However, if resources were available to extend monitoring time to cover the whole month and provision for a field staff to spend the whole month with the bio-monitors in the field instead of spending only a week, monitoring could be more effective and more variables will be easily studied and compared as well as reduction in human pressure.

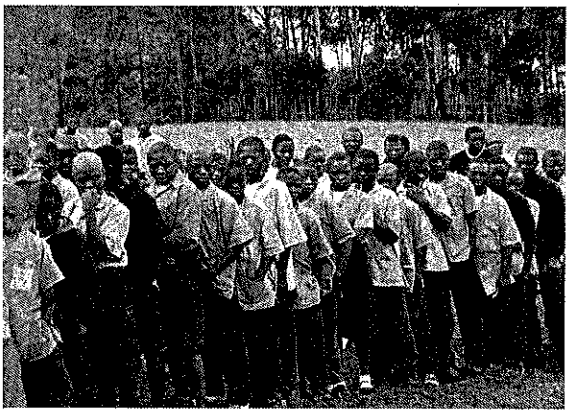
5.3 Conducting public information and education programs

5.3.1 Great apes conservation education

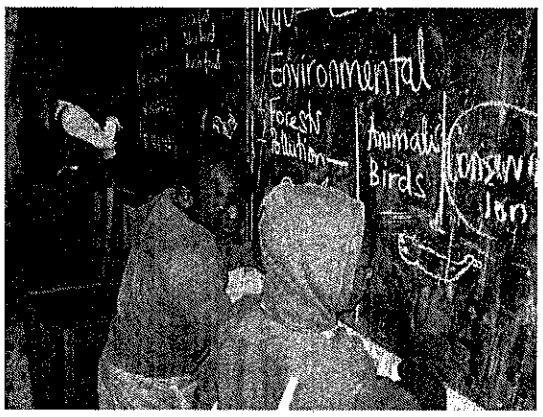
A draft great apes conservation education curriculum has been made and submitted to the Regional Delegation of Secondary Education for review. A conservation education manual is under production for the local schools focused on gorillas and chimpanzees. Finally, environmental education clubs have been created in 10 villages surrounding the proposed Tofala Hill Wildlife Sanctuary. A network of school clubs is currently under creation.



G.S.S Banteng Environmental Club conservation



G.S.S Magha students receiving lectures on



Animal Drawing contest in G.S Marita after a conservation education lecture



Environmental Club G.S Marita

5.3.2 Communication and public education

Communication has been improved during this period through regular publication in the national newspapers of the project activities. ERuDeF is working with the most prominent national daily "The Post Newspaper" to get into a collaboration that will enable this national daily to publish on a monthly basis features of the project implementation activities throughout 2011 and beyond. A project staff was also trained in cyber tracking communication. A draft MoU with Lebialem Community Radio at Menji initiated in 2010 has been concluded in February to run a weekly 30-minute programme on great apes conservation and other environmental conservation issues in the region.

A communication officer has been recruited and is currently receiving training in website design and management. She is assisting in the production of monthly e-newsletters since July 2010. So far 7 editions of the monthly e-news have been produced alongside regular news features of the project in the national dailys "The Sun and Post Newspapers".

5.4 Enhancing the protection status of the Bechati-Mone Forest Corridor

Core activities to enhance the protection status of the important Bechati-Mone Forest Coridor included bio-monitoring and forest surveillance surveys, community education activities in Bokwa and Etoko mile 222, meetings with the team at the Regional Delegation of forestry and Wildlife in Buea to determine the future direction of the management of this former logging concession (UFA11002). Furthermore, with additional support from FFI, UK, a comprehensive biodiversity and forest resource survey of the corridor was launched and is just recently completed.

5.5 Training and supporting targeted micro-businesses in order to enhance the livelihoods of the 13 forest adjacent communities around the Bechati-Lebialem forest through the proposed Forest Protection Fund.

5.5.1 Livelihood Support Activities

The key outcomes during this period included:

1. **Prioritization of livelihoods in 13 villages**. The main ones included livestock, fish farming, improved agricultural production in small holder farms, improved oil palm production and processing, marketing of non-timber forest products and beekeeping.
2. **Reorganization of the local communities into organized associations towards sustainable livelihood development**. The key ones formed included the Tofala Hill Area Women's Association, the Tofala Hill Area Hunters' Association, Tofala Hill Area Farmers' Association and Association of the Village Forest Management Committees (the Forest Management Council of the proposed Tofala Hill Wildlife Sanctuary).

3. The **Forest Protection Fund** is being strengthened through community mobilization and emphasis focused during this period on two of its units at Menji and Anya-Lewoh as well as at the pilot unit in Buea.



Reorganization of the Lewoh Women's Cooperative (lewocos)



Reorganizatio Forest Protection Fund



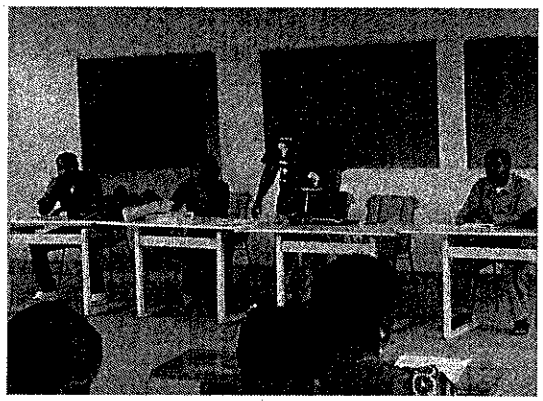
Annual Meeting of the Forest Protection Fund



Participants at Biodiversity Community Trust (BCT) launching



Members of Lewocos and ERuDeF staff after meeting



Meeting with Lewoh Women's Cooperative

4. One of the key livelihood and income generating initiatives that received greater attention was the launching of the **oil palm regeneration and processing project** with additional funding from the Man and the Environment, a France-based charity. Over 10 ha of small holder farms will be regenerated and 2 palm oil processing mills with capacity to produce over 4000l of improved palm oil daily under construction in two of the key villages in Nkong and Besali around the proposed Tofala Hill wildlife sanctuary.
5. Each of these associations and respective villages' administration will sign **MoUs** with the local MINFOF administration under preparation to increase their effective commitment and engagement towards the protection and conservation of gorillas and chimpanzees.
6. Furthermore, the local **eco-guards are further being supported** with piggery units to enable them put a final stop to hunting and trapping.

5.5.2 The Lebialem Hunters' Beekeeping Initiative

The Lebialem Hunters' Beekeeping Initiative (LHBI) is one of ERuDeF's ongoing locally-led alternative livelihood programs in the Bechati-Fossimondi-Besali Forest Landscape of the Western Highlands of Cameroon. The pilot phase of the project was conceived by ERuDeF on the 12th November 2007 as a conservation strategy to low income forest adjacent communities whose persistent unfriendly environmental practices have rendered forest resources susceptible to environmental degradation and extinction. A thorough evaluation of the pilot and an investigative review of the local honey market were conducted in April and May 2008.

The aim of the LHBI is to reduce financial dependence on bush meat and the volume of species harvested by providing hunters with an alternative income source through beekeeping. The objectives of the project are to: (i) train hunters in beekeeping and supply them with the necessary equipment and technical support, (ii) establish cooperatives in participating communities and a beekeeping association in Lebialem to enable collective marketing of honey and bee products, (iii) implement a conservation education programme using films to explain to communities why emphasis is being placed on reducing reliance on bush meat and why the harvesting of threatened species is being discouraged and (iv) evaluate the effectiveness of beekeeping as an economic alternative to bush meat hunting.

To date the project has trained 149 hunters as beekeepers and established Common Initiative Groups (CIGs) in eight communities. An estimate of 321 hives and harvesting equipments has been provided accompanied with increased rates of organic honey production.

Goals of the CIGs is to establish a beekeepers' cooperative to form an organised network of producers, processors and distributors that can collectively market honey and beeswax products to obtain a fair price thus eventually creating a self-financing initiative in the region.

- In all the 8 communities visited, it was realised that no CIG meeting has been organised since March 2009 and the poor colonisation rate was heavily attributed to their inability to frequently organise meetings. It was analysed that, if meetings were held every month

members would have the opportunity to diagnose problems faced by each member with respect to hive colonisation and processing of honey and beeswax.

- To improve on the colonisation rate, swarm catchers were constructed. The top bars of the catcher had the same dimension as that of the hive.
- They were also advised to target December 2010 as a strategic period to get all their hives colonised and to maximise swarming seasons such as July, August, September and October as being peak periods when hives get highly colonised.
- All the 8 CIGs agreed to organise meeting on the 30th of each month beginning June 2010 and promised to assist members in ensuring that their hives get colonised, harvested, train them on honey and beeswax processing.
- In each of the 8 communities strategic honey sales points were chosen by the members as key areas to market their honey. The price for a litre was maintained at 2,500FCFA.
- Membership fee to commit to the CIG by new members was also agreed averagely at 3,000 FCFA with harvesting fee 500FCFA in other to maintain the equipments being provided to them.

Table 1: Number of hives provided and colonised per Common Initiative Group (CIG)

Name of Community/CIG	No. of hives provided	No. colonised
1)MEHUBEE (Menji)	16	6
2)ATOHUBEE (Atongeh)	20	7
3) BEFOBA (Bechati, Folepi, Banti)	17	11
4) ANHUBEE (Andu)	19 (1 destroyed by ants)	4
5)BANHUBEE (Bangang)	10	6
6)FOTRABEE (Fossimondi)	10	8
7) BEHUBEE (Besali)	21	17

8) EHUBEE (Egumbo)	6	*nil
Total		

*A zero rate of colonisation in Egumbo was as a result of the fact that they were only being supported with hives in May 2010.

5.5.3 Honey harvesting

Harvesting of honey combs took place in 6 communities notably Bechati, Besali, Andu, Atongeh, Bangang and Fossimondi. Hunters effectively took the lead while the trainer, David Amingu played a supervisory role to ensure that unripe combs were not harvested.

The highest quantity of honey harvested was registered in Fossimondi (10litres) by Pa Nkemoudouh Thomas and the colour of the honey was white typical of that found in Oku in the North West Region. In Menji, no harvesting took place due to the non compliance of the President, Pius Atem. It was realised that, the CIG consisted of civil servants and his family relatives. As a consequence, Prisco was assigned to draw up a list of prominent hunters and trappers in Menji in order to facilitate the process of establishing a new CIG.



Photo 2: Honey harvesting in Besali by BEHUBEE CIG

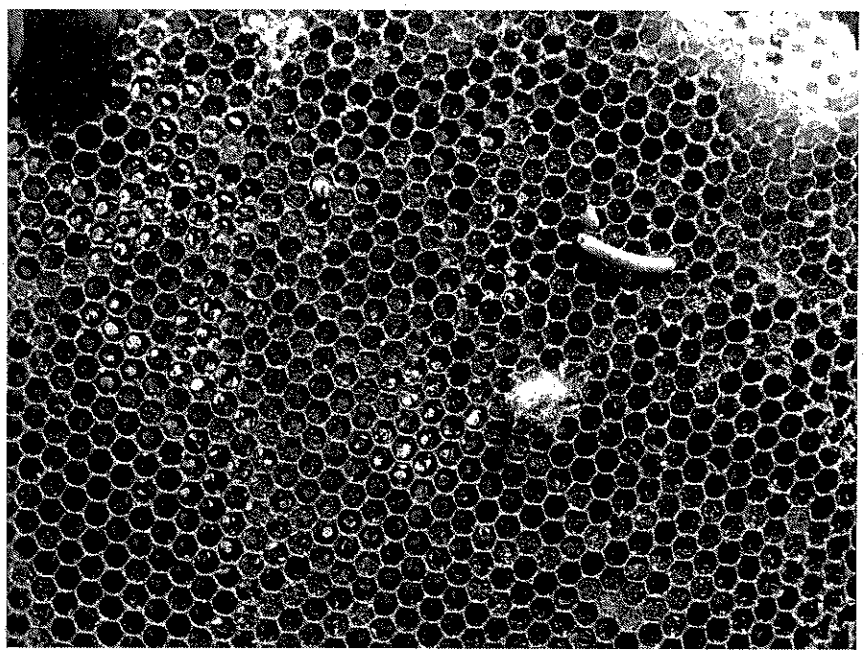


Photo 3: Brood comb in Besali

5.5.4 Honey Processing

The equipments used in the processing of honey were as follow; a clean large container; a sheet of nylon mosquito mesh; a strong rubber and a fork a plastic or polyethylene cover.

Procedure:

1. Fasten the mosquito mesh over the container with the rubber.
2. Scratch the combs with a fork and place the honeycombs on the wire mesh so that honey can trickle into the container.
3. Cover the honeycombs and container with a plastic and secure it fast to the container with another rubber. Covering the honey prevents the scent of the honey from leaching out thereby avoiding the presence of more bees around the container.
4. Leave the honey and container in the sun thereby, employing the sun's heat to melt down the combs.

During the honey processing phase, the need for members to maintain hygiene was strongly emphasised as it involves working directly with the hands. To improve on the organic content of the honey, all combs containing brood cells were immediately discarded to avoid contamination of the honey. The combs were reserved for the processing of beeswax.



Photo 4: Honey processing in Bechati by BEFOBA CIG

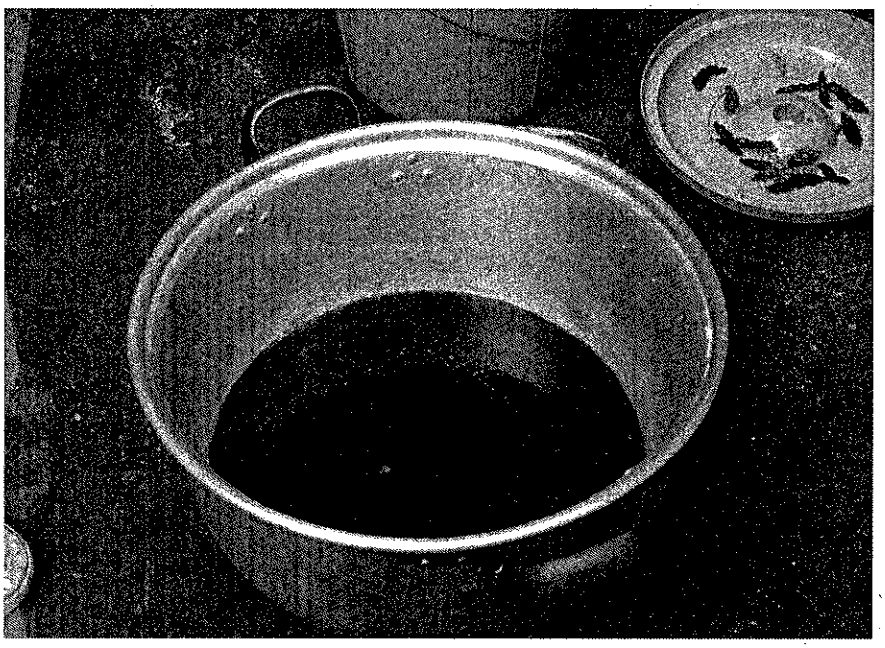


Photo 5: Processed organic honey in Bechati by BEFOBA CIG

5.5.5 Honey Drink Extraction

In preparing honey drink the following procedures were strictly followed:

- The just extracted honey combs were washed in clean water immediately after the members hands were washed with soap.

- The chaffs were sieved from the liquid with the help of a clean white mesh into a clean plastic bottle. The honey drink was poured into a tangui bottle ready to be consumed. Equally, palm wine or lemon juice can be mixed into it and left to ferment for 12 hours or more to obtain wine. The longer the drink the more the fermentation process and alcoholic content.

5.5.6 Beeswax Extraction

Beeswax was extracted as follows:

-The crushed honeycombs were washed in water until they are free of dirt and honey.

-Water was put into an old pot on the fire with the crushed combs. The content was stirred to ensure that it doesn't stick on the walls of the pot.

-It was heated, removed, and poured into a bag. The bag containing the unprocessed beeswax was further pressed with help of two sticks into a bucket/bowl of water. The wax solidified on the surface of the water as it cools.

-The solid wax was processed again to remove remaining dirt. It was melted in a pot with residue of the dirt settling at the bottom of the pot. It was later placed in a plastic plate after smearing the plate with soap or honey to prevent the wax from sticking as it hardens. The wax got cooled in the plate and was removed after solidifying.

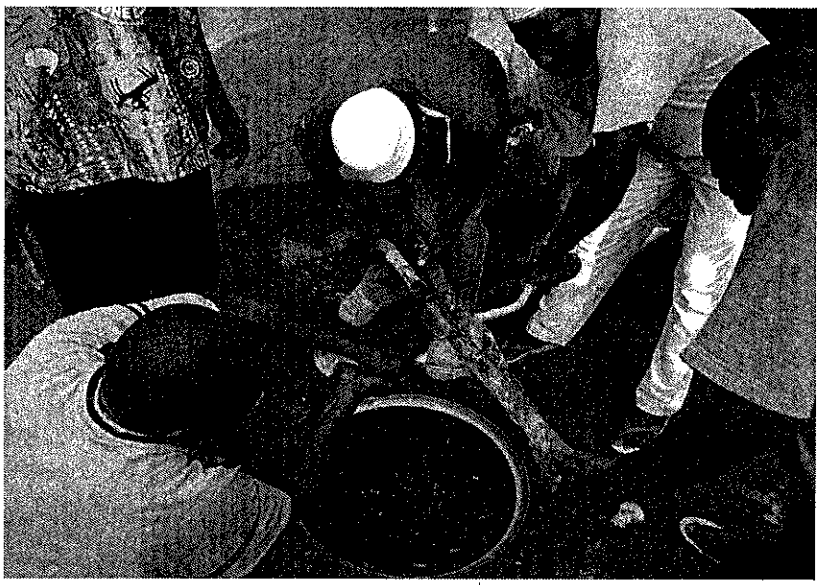


Photo 6: Beeswax processing in Bechati by BEFOBA CIG

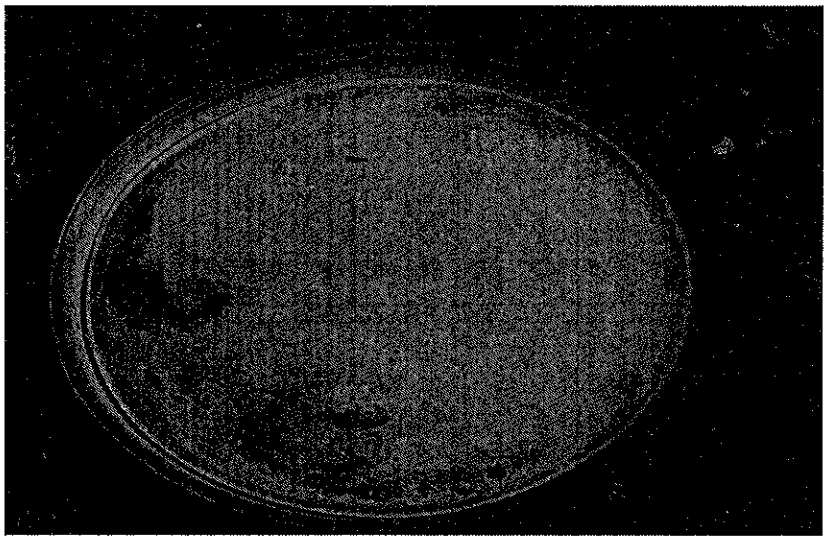


Photo 7: Solidified beeswax to be heated in Bechati by BEFOBA CIG

6 CONSERVATION CHALLENGES AND OPPORTUNITIES

6.1 General Discussion

The implementation of the planned project activities as planned will lead to the following results:

(i) Upgraded protection status of the Bechati-Lebialem forest through the gazettement of the proposed community wildlife sanctuary;

(ii) Enhanced viability of the recently discovered gorilla subpopulation at the Ashukem & Bokwa Hills that serves as genetic connectivity between the gorillas at the proposed Bechati-Lebialem wildlife sanctuary and the Takamanda National Park complex;

(iii) Increased awareness among all the stakeholders on the threats facing the gorillas, and the need and ways to protect them and their habitats;

(iv) Enhanced operational capacity of the protection and monitoring team through the recruitment and training of eco-guards;

(v) Reduced dependency of the local communities on the forest and forest resources at the proposed Bechati-Lebialem wildlife sanctuary;

(vi) Enhanced the technical capacity of erudef; and

(vii) Improved understanding both locally and nationally of the importance of Cross River gorilla conservation.

6.2 Local Livelihoods

The major challenge of the beekeeping project remains limited funding opportunities to develop the apiculture market as well as extending the same activity and set up a honey compressing machine in each of the four forest blocks in which its biodiversity conservation work cuts across.

While poaching is being contained around the Bechati-Lebialem forest area, the farmers now constitute the main stumbling block to the creation of the Wildlife Sanctuary due to the presence of their farms in and out of the core conservation area given the historical communal ownership of the forest.

Consequently, the project will continue to focus on sustainable land management education as key to affecting further changes in behavior within the local communities and the broader public. The proposed project will complete the signing of village and individual land management agreements and formalize the signing of the collective land management agreement among all the 13 villages surrounding the Bechati-Lebialem forest.

This project will also continue to focus on the upgrading the protection status of the Bechati-Mone Forest Corridor.

7 Conclusion

From our project it became clear that human pressure is the biggest single threat to great apes conservation in the Lebialem-Mone Forest Landscape. This threat need to be addressed to ensure the continuous presence of this fragile but important population of great apes in this forest landscape. The need for further surveys and continued presence in this forest area is also a preliminary recommendation which will go long way to guarantee the survival and growth of the Cross River gorilla population.

A community based integrated conservation and development approach will remain the most successful method for the sustainability of this project as the project will fail to succeed without the support and involvement of the local community inhabiting the adjacent area of the forest blocks.

8 Financial Report

The financial report is currently being prepared and will be included in the printed version.

生而自由基金會計畫報告摘要

生而自由基金會(Born Free Foundation, BFF)為國際性民間團體，主要關切議題為野生動物保育和動物福利。生而自由基金會保育計畫，報告摘要如附：

生而自由基金會「支援坦尚尼亞社區保育計畫」，2009 年 10 月至 2010 年 3 月計畫執行情形摘要如附：

一、氣候

- 10 月涼爽多風且非常乾燥(雨量很少)，風大到可將屋頂和表土吹走。
- 11 月炎熱，旱象解除(部分保護區有降雨)。
- 12 月雨量較多，範圍較大。
- 1 和 2 月持續下雨，唯次數減少。
- 3 月雨量加大，大地轉綠。

二、食物和水

- 10 月食物和水稀少，11 月匱乏情形稍緩，12 情況改善，1 和 2 月繼續改善，3 月植被繁茂。

三、遷徙和植物

- 10 月牛群通常留在南方，計畫地區幾乎無綠色植被。羊群通常留在原地。
- 12 月大部分家畜都遷回北方。因本月牧草豐盛，南部牛群也大都北遷，南部植生也有因而有更新機會。

四、人和野生動物之衝突

- 乾季時，多數野生動物死亡，家畜被襲次數較少。1 月開始，食肉動物(尤其是大型貓科動物)開始獵食家畜。3 月期間，Engasurai、Embonget 和 Sinya 地區牛隻被獅子侵擾或被殺害案件頗多。
- 大象數量很少，住家附近作物也少，此地野生動物和農業無衝突情形。

五、巡邏人員(conservation fieldmen)

- 旱季時人員流動性較高。
- 發現的動物屍體平均年齡由 2.9 日降低至 1.8 日。改善主要原因是有 16 人負責巡邏 70,000ha 地區。林務局贊助了半數巡邏人員經費，因而保護野生動物豐富的 Sinya village，保護範圍也擴充到肯亞邊界和 Amboseli National Park。

六、訓練和方法論

- 原訂巡邏人員教育訓練計畫將延至 2010 年 7 或 8 月，原因如下：
  1. 盜獵案增多，巡邏人員需加強警戒。
  2. 為維持遷移家畜及家庭不遷居的傳統，為提供充足糧食和維護健康，巡邏人員已疲於奔命。
- 於 Sinya、Leremeta 和 Oldepessi 設立兩個巡邏區。資料顯示這段期間整

個保護區野生動物數量減少，唯有 Tingatinga 和 Engasurai 兩地野生動物接近長期的平均值。

七、野生動物

- 大象數量減少，可能因為太乾旱而移至他處。這兩年長頸鹿、eland 和獵豹數量維持穩定，比其他東部非洲地區較佳。
- 獅、花豹、鬣狗、胡狼族群數量接近紀錄數量。獅子增加情形尤其明顯。
- 耐旱草食動物東非長頭羚羊(gerenuk)、彎角羚(Kudu)和劍羚(oryx)族群達到破紀錄數量，其他草食動物數量也比平均值高。

八、動物屍體和盜獵

- 發現破紀錄的 39 件動物屍體，不過只有 3 案是蓄意殺害。除少數幾例原因不明外，其餘原因大都是乾旱造成的營養不良。此 6 個月期間只發現 3 案大象屍體，上 6 個月發現 8 案大象屍體。
- 39 件動物屍體詳情列於報告第 7 頁，包括 13 件溺斃斑馬(掉進居民挖掘的井裡)、初生數天的 11 頭斑馬和 1 頭長頸鹿因乾旱而死、3 天大的幼象被盜獵者殺害、一歲大的 gerenuk 被食肉動物獵殺等。

九、未來 6 個月計畫

- 再設立 2 個巡邏區。
- 辦理巡邏人員教育訓練計畫。
- 提供書籍和文具箱給 3 個國小的保育社團。
- 提供巡邏用腳踏車(目前腳踏車數量不足，以共用方式處理)。
- 提供巡邏人員至 West Kilimanjaro village 服務。

生而自由基金會「吉力馬札羅西部(West Kilimanjaro)保育計畫-支援坦尚尼亞野生動物及社區」，2010 年 4 月至 9 月計畫執行情形摘要如附：

此段時間，人和野生動物衝突案件有限，動物屍體和盜獵部分：

- 發現 2 天大之斑馬屍體，係被獵食動物殺死。
- 發現 1 具 hyena 屍體，已開始腐爛，死因無法判斷。
- 發 3 天大之斑馬屍體，因骨骼都還在，非盜獵者所為。
- 發 3 天大之 gerenuk 屍體，死因不明。
- 9 月發現 2 天大之長頸鹿屍體，現場只發現頭和下肢，應係被盜獵。

生而自由基金會「吉力馬札羅西部(West Kilimanjaro)保育計畫-支援坦尚尼亞野生動物及社區」，2010 年 10 月至 2011 年 3 月計畫執行情形摘要如附：

一、氣候

- 10 月炎熱、乾燥、灰塵多，11 月有少量降雨，12 月雨量較大，1 月停止下雨，造成今年短雨季更短。

- 3 月長雨季開始，雨量不大，但各地分佈均勻。

二、食物和水

- 農業主要為小型灌溉蔬菜田，產量不多但對社區有益。3 月開始準備耕作，此時牛奶產量高於平均值，牛群雖少，但很健康且生出許多小牛。
- 如果節省使用，水資源通常都夠用， 3 月的雨量使水資源變豐沛。

三、遷徙和植物

- 9 月水和草地有限，牛群被移到離聚落很遠的地方。
- 12 月當地水和牧草充足，3 月牧草豐盛，足夠所有家畜使用，不需遷移至遠處。

四、人和野生動物之衝突

- 當家畜至遠離聚落處尋覓牧草時，家畜被襲案增多，但沒有特別不正常的情況。1 月 Ildoinyo 小隊發現 2 頭獵豹殺死 2 頭羊。
- 大象數量很少，沒有發現破壞農田作物情形。
- 3 月狀況良好，野生動物分散各地，可在聚落附近放牧家畜，野生動物和人的衝突減少。

五、巡邏人員(conservation fieldmen)

- 巡邏人員健康良好，不需雇用替代人員。每月約巡邏 2 次。
- 發現的動物屍體平均年齡為 2.5 日，發現 4 具動物屍體。

六、訓練和方法論

- 原訂巡邏人員教育訓練計畫原訂 9 月，因選舉延期。
- 12 月 WMA 和 WKCP 簽訂 MOU，紙本工作內容提供相關人員。新購 7 部巡邏用腳踏車。

七、野生動物

- 大象數量持續減少，可能移至環境狀況較好的肯亞 Amboseli 地區。4 年來長頸鹿和 eland 族群數量多，維持在接近最高紀錄量。
- 獵豹數量維持穩定，但不是最多。獵豹經常獵食小型家畜，但社區沒有採取報復行動。
- 18 月來獅、花豹、鬣狗、胡狼族群數量穩定，沒有多大變化。鬣狗數量增多。此段期間，獵食性野生動物和放牧人員的衝突很少。
- 沒發現河馬，可能 Amboseli 濕地有足夠覓食區。野水牛遷徙到高地，草食動物數量維持在最高紀錄數量，但牛羚數量減少 30%。
- 穿越線資料和巡邏資料比較大致相符，黑斑羚(impala)、東非長頭羚羊和彎角羚(Kudu)族群數量穩定，劍羚(oryx)、牛羚和象族群數量減少。

八、動物屍體和盜獵

- 動物屍體發現次數創新低，因為沒有盜獵事件，環境狀況良好。
- 10 月 2 日發現 1 具死了 1 天的長頸鹿屍體，死因不明，已被獵食動物咬食，可能是被花豹殺害。
- 12 月發現死了數天的 eland 屍體，死因不明，沒有盜獵的跡象。

- 1 月發現死 3 天的斑馬屍體，死因不明，沒有盜獵跡象，認定自然死亡。
- 2 月發現死了 3 天的黑斑羚屍體，死因不明，認定自然死亡。

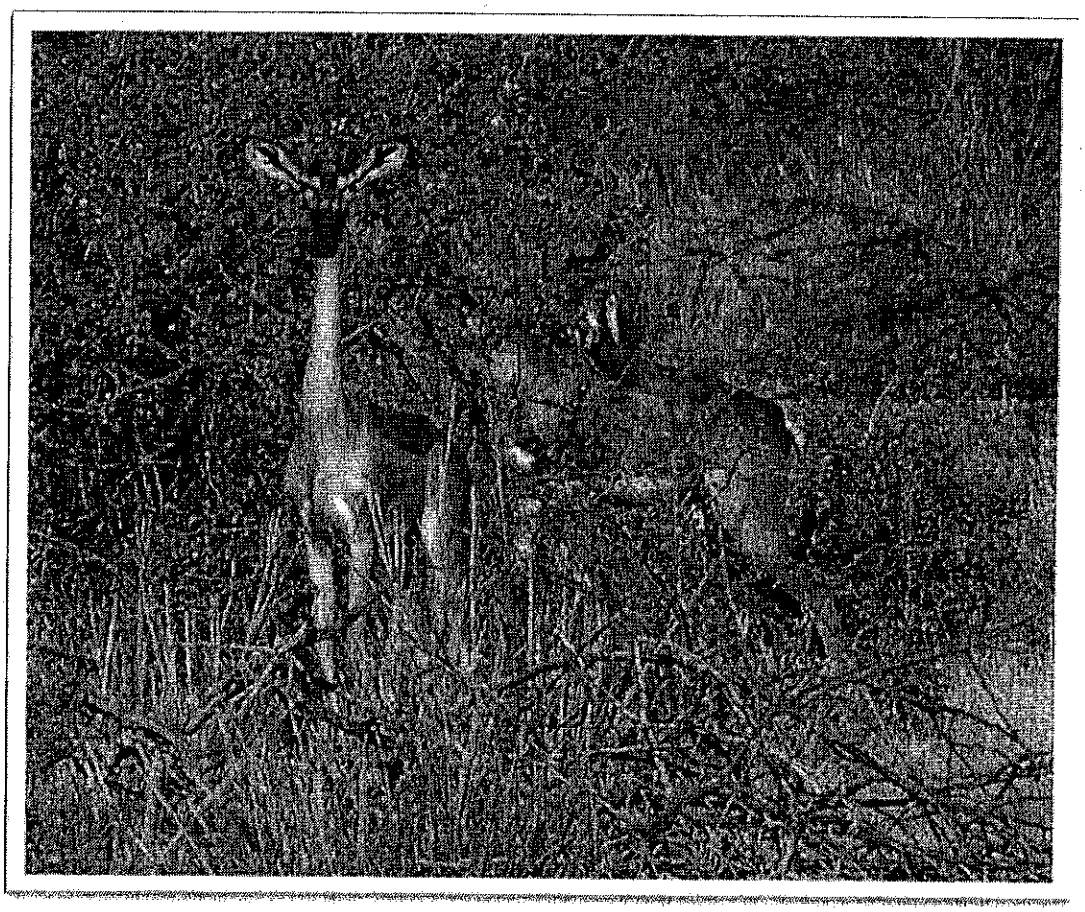
九、未來 6 個月計畫

- 2011 年 8 月前辦理教育觀摩。
- 與國小的保育社團討論保育活動事宜。
- 與 West Kilimanjaro 其他村落就安排巡邏案交換意見。
- 請 WMA 說明執行 MOU 的情形。
- 巡邏人員每月參與社區獵物巡邏(village Game Scouts)一次，加強其工作能力。
- 鼓勵所有贊助者到計畫區視察。

THE WEST KILIMANJARO CONSERVATION PROJECT

22nd BI-ANNUAL REPORT

April to September 2010



Gerenuk: One of the species that thrived in the drought

Supported by:
Born Free Foundation, UK
Humane Society International, Australia
Taiwan Forestry Bureau, Conservation Division

Compiled by Nicholas Martyn

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A hand dug water hole in Sinya

Overview and Comment

Weather

The long rains extended well into April with widespread, gentle showers. During May the showers became lighter and less frequent. There was no useful rain from June to September but unusually the temperature, instead of dropping for some months after the long rains, remained high for most of the period. By the end of September the land was dry and strong winds sometimes swept large dust clouds into the air.

Food and Water

In addition to the natural pans, the two main rivers of the project area, Engare Nairobi and Engare Nanyuki, flowed far across the plains thus giving numerous water resources up to August. From then to the end of the period water was limited but sufficient for all but extensive irrigation.

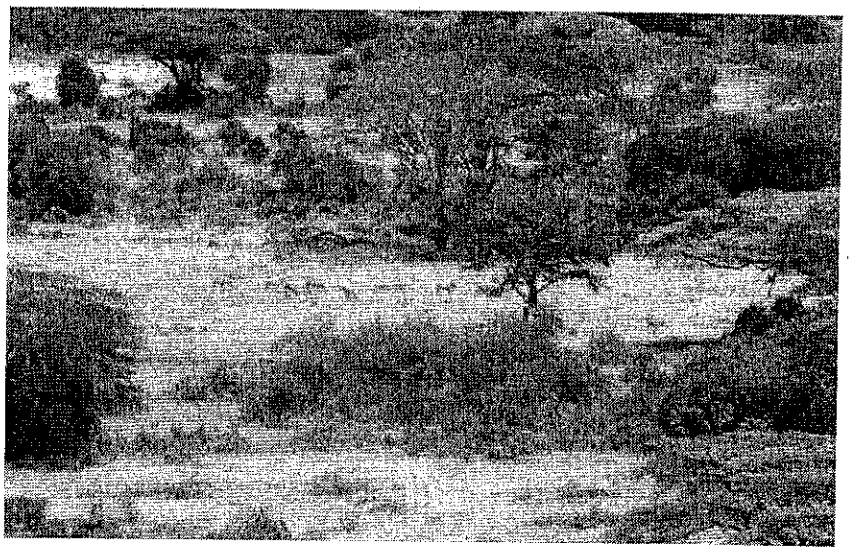
Shortly before the start of this period many people planted gardens of maize and beans. As the rain reduced in May irrigation from Engare Nairobi and Engare Nanyuki became important. Most farmers received a reasonable harvest but it was not the bumper crop that might have been achieved for had they planted earlier.

The livestock were very fat due to the plentiful vegetation and general good health however there was limited milk as there were few cows and most of the surviving cattle needed a few of months to recover from last year's drought before being mated.

Migrations and Vegetation

The period started with excellent grazing and browsing over the whole project area. By June the pasture was almost entirely dry but it was still plentiful and remained so until the end of the period.

The ideal vegetation allowed all animals and people to remain in their favoured areas so there was little need to migrate. An exception to this was the continued presence of lions that had moved from Amboseli last period due to lack of prey and buffalo, also from Amboseli, that seem to prefer the West Kilimanjaro grass, when it is sufficient.



Wildlife at peace in Sinya

Human-Wildlife Conflict

There was very limited conflict this period. This was fortunate as drought usually gives predators ample food that allows them to multiply but then they experience a shortage of weak prey when it rains again. As usual there were occasional incidents of small livestock predation. For example, in April, the Ildoinyo fieldmen found 2 cheetah eating a goat. Of more concern was the increased lion population and the frequent threat to livestock at night. This is made worse by the very limited fencing used for most kraals, especially in the Sinya area.

The gardens were disturbed less than usual due to wildlife, especially elephant, staying far from the settlements.

Fieldmen

The fieldmen were in good health and their normal work routine returned to normal with everyone completing the 8 patrols per month. The team was stable with no changes in personnel. A major concern has been the inflation rate and the need to increase the honorariums to maintain their value.

The average age of carcass increased from 1.8 to 2.5 days but as only 4 carcasses were observed this data is not reliable.

Training and Methodology

The remaining transects were completed this period and by June the last of the villages, Endoinyo Mali, started recording data. This is to produce a standardized data analysis through which trends can be identified.

WKCP cooperates with the Enduimet WMA and the CBO running its activities. This year a reshuffle and elections for the new office bearers is due. In September, village representatives to the CBO were elected but by the end of the period selection of the executive committee and top WMA leadership were still pending. The WKCP looks forward to cooperating with the new team and hopefully taking conservation in the West Kilimanjaro area another step forward.



Fieldmen help with cooking before a meeting

The fieldmen's educational trip, planned for August, was postponed due to the imminent national and local elections.

The written job descriptions for project personnel were finalized and due for signing. The written MOU between WKCP and the WMA was postponed awaiting the new board but it has been made clear that the document is a matter of urgency and importance.

Conservation Clubs

There were no meetings in April due to the new school timetable. Following this there were exams and long holidays so it was August before the discussions could continue but, disappointingly, by the end of this period there was still no clear conclusion as to how the conservation clubs could be accommodated. One possibility would be for occasional, longer meetings on the weekends.

Wildlife videos and/or dvd's are still being sought.

Visits Made

Project coordinator, Joseph Lendiy, visited African Environments director and Tazama member Melly Reuling in Arusha in July to discuss the project, conservation and the area in general. By way of recognition of the good work done by the fieldmen she gave all a one-month honorarium bonus.

Project Coordinator, Joseph Lendiy, visited Arusha every month for administration but made no other trips.

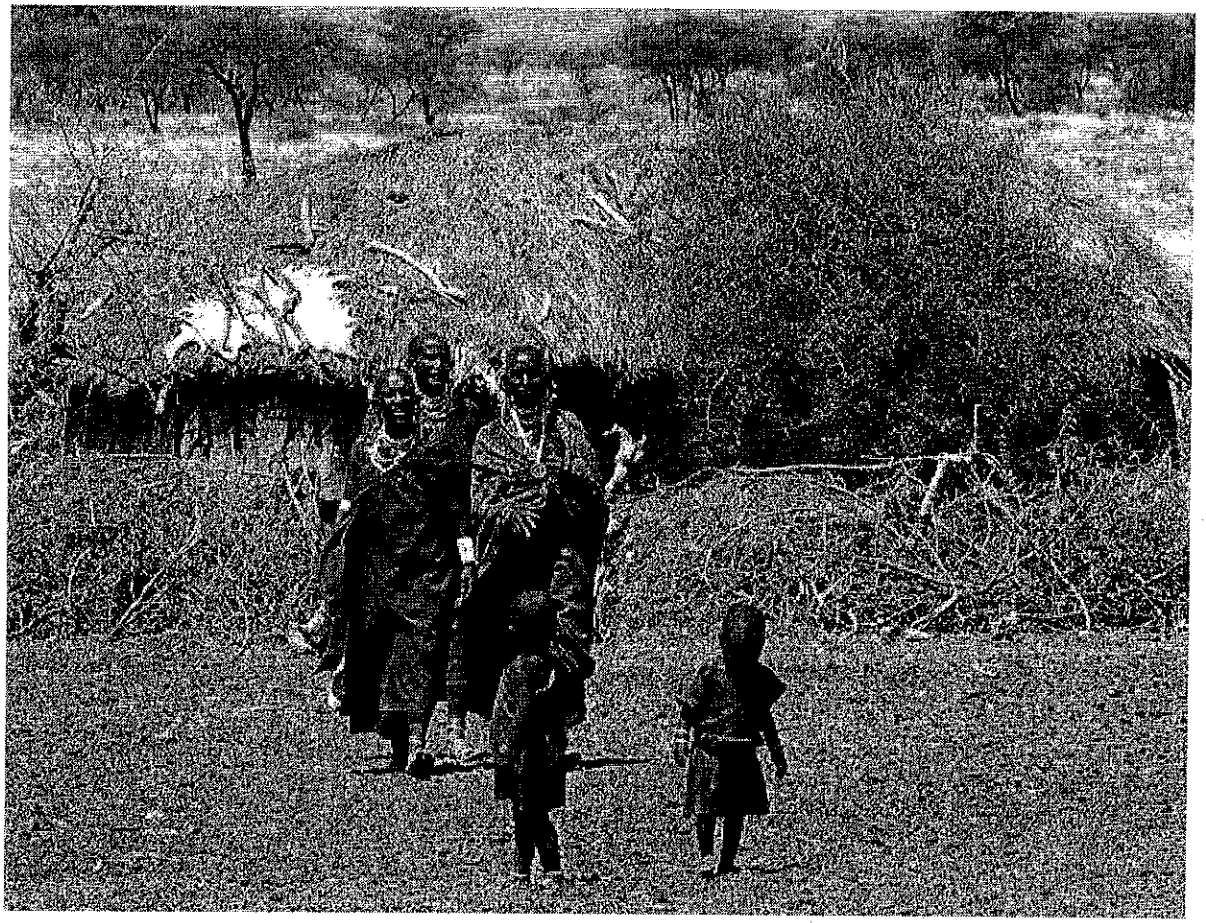
Visitors Received

There were no special visitors this period.

Tourism

Tourism is established in the project area but is at a low level. In June, Oltepesi village received 12 tourists. There is a cultural centre called Orpopong'i at the edge of the Tingatinga settlement but in most cases the visitors either visit for the day or don't venture into the wildlife areas and are therefore not counted by the fieldmen.

The main tour operator for the area is Kibo Safari's Ltd. and their clients mostly visit the Sinya area. In addition to non-consumptive photographic and cultural tourism, the western and northern sections of the project area form part of two separate hunting blocks. Tourist vehicles are often seen from a distance but it is not always clear if they are visiting or just passing through.



There is more than wildlife to attract a visitor to West Kilimanjaro

Environmental Monitoring Data and Analysis

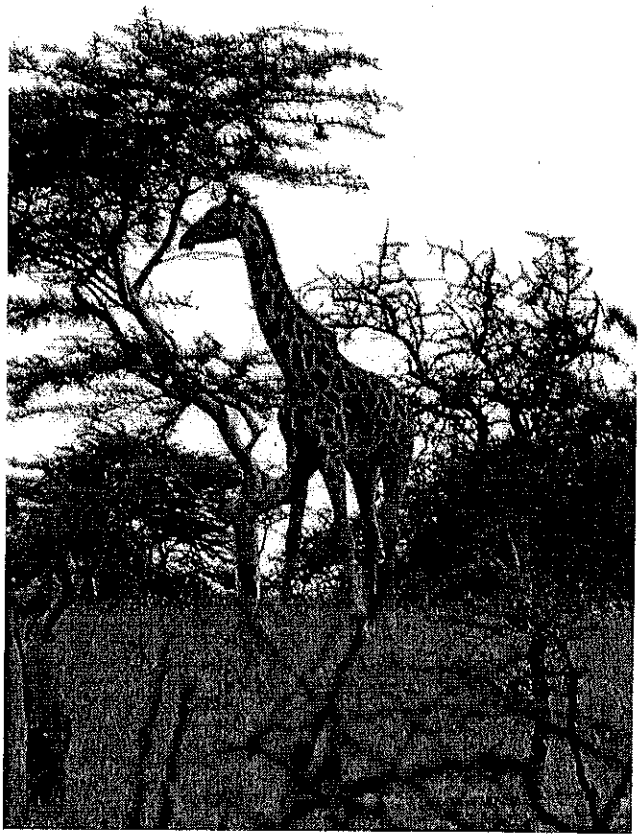
Key Species

Elephant numbers dropped again but as there was no sign of human-elephant conflict, no poaching and plentiful vegetation and water it can be concluded that the elephants had congregated in Amboseli N. P. across the border in Kenya. During ideal conditions in the past this has been the case and it would be interesting to learn from other researchers if their data concurs.

Observations of giraffe have been remarkably steady over the last 3 years at about 8 per patrol. It might be that this is the area's natural holding capacity and that they are so well adapted to the area that extreme weather conditions have little impact on their wellbeing.

Cheetah and eland populations have also been fairly constant over the last few years but they are a little below the record levels observed in 2006.

There has been no noticeable impact of the large translocation of herbivores into Amboseli N. P. suggesting that the project was a success.



Giraffe must be the stars of West Kilimanjaro

Predators

In contrast with much of East Africa the lion population has continued to grow and tracks were found in Tingatinga for the first time in many years. Fortunately they have kept out of serious trouble with people and livestock.

Leopard, hyena and jackal observations were all at record levels with each team seeing the elusive leopard, during the day, once per month on average. The limited predation of livestock suggests wildlife is well balanced in the area but the pastoralists must also be very vigilant and proactive in protecting their animals because a frequent reaction to human-wildlife conflict is poisoning or hunting and this really achieves nothing productive but can be dangerous.

Herbivores

Towards the end of the rainy season buffalo returned again. They were first seen near to the Kenya border, indicating they came from Amboseli N. P. Later in the period they were seen in the Tingatinga area, about 40km to the south-west.

Gerenuk, kudu, oryx and warthog are all at record levels. The first 3 are dry area specialists and don't compete directly with domestic livestock. The plains grazers such as zebra, wildebeest, Thompson's and Grant's gazelle have healthy populations but are a little below record levels due to the recent drought. They can all breed quickly and the ideal conditions this period should lead to increased numbers over the next year.

Transects

Transect data was generally consistent with patrol records except that the population of grazers appeared a little stronger, perhaps due to the new transects, and oryx slightly fewer but they are few and localized so the data is less reliable.

The data also gives an indication of the favoured environments for the different species of wildlife. For example, Ngereyani is preferred by zebra, wildebeest and Grant's gazelle but Thompson's gazelle prefers Leremeta. Lions are most common in the north-east but leopards like the south-west.



Transects are 4km long and use natural features as markers

Carcasses and Poaching

There were a record low number of carcasses, just 10% of these found last period, and not a single elephant carcass. There was one case of poaching, a giraffe in Tingatinga during September, which will have to be followed up because the culprits apparently escaped with the meat.

In summary, the carcasses found are listed below:

- A 2-day-old zebra carcass was found in Engasurai. It had been killed by predators.
- The hyena carcass found in Endoinyo Mali was rotting and no longer intact so the cause of death could not be assessed.
- A 3-day-old zebra carcass found in Ngereyani was decayed but as all the bones were present poaching was discounted.
- A 3-day-old gerenuk carcass found in Ngereyani was not poached but the exact cause of death was unclear.
- In September a 2-day-old giraffe carcass was found in Tingatinga. Only the head and lower limbs were found on site indicating it was almost certainly poached.

Charcoal

There were no reports of charcoal burning. Perhaps people had enough to eat and were busy with other jobs.

Raw Data Summary - Overview

	Apr to Sep 10						Ary. Data Summary from Sep 1999																	
	Apr	May	Jun	Jul	Aug	Sep	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th	21st	22nd	Total
Patrols, total	64	64	64	64	64	64	36	34	33	32	33	28	32	30	32	32	48	48	48	56	60	64	64	64	5347
Patrols, checked	14	13	13	12	11	12	9	8	8	8	9	9	8	9	10	9	16	15	12	11	11	12	14	13	1253
Fieldmen																									
Salaon Oyoko	S	S	S	S	S	S								S	S	S	S	S	S	S	S	S	S	S	516
Mbeo Lormate	S	S	S	S	S	S																	S	S	50
Koreka Monjoi	S	S	S	S	S	S								S	S	S	S	S	S	S	S	S	S	S	495
Kele Paangu	S	S	S	S	S	S								S	S	S	S	S	S	S	S	S	S	S	495
Magil Kishoyan	S	S	S	S	S	S								S	S	S	S	S	S	S	S	S	S	S	495
Kida Mukanda	S	S	S	S	S	S								S	S	S	S	S	S	S	S	S	S	S	495
Lekitaki	S	S	S	S	S	S															S	S	S	S	192
Tikortan Naigwana	S	S	S	S	S	S	S	S	S	S	S	S	S	S		S	S	S	S	S	S	S	S	S	1021
Osekai Nairoua	S	S	S	S	S	S											S	S	S	S	S	S	S	S	396
Kayongo	S	S	S	S	S	S															S	S	S	S	162
Koreka Monjoi	S	S	S	S	S	S															S	S	S	S	168
Ngoya Ngashukoo	S	S	S	S	S	S											S	S	S	S	S	S	S	S	328
Kokai Ngimbish	S	S	S	S	S	S											S	S	S	S	S	S	S	S	328
Ringore	S	S	S	S	S	S															S	S	S	S	168
Kiamowa	S	S	S	S	S	S															S	S	S	S	168
Nkodikod Lemusaa	S	S	S	S	S	S											S	S	S	S	S	S	S	S	328
Key Species																									
Elephant, seen	36	33	36	55	52	34	35	36	40	74	62	112	91	99	117	113	122	162	155	106	94	60	62	41	11349
spoor	33	32	40	36	36	34	145	150	170	192	221	237	281	233	254	171	96	94	69	49	48	44	43	36	17951
Giraffe, seen	536	417	467	465	527	378	141	124	102	103	163	191	170	158	203	244	367	382	410	455	469	451	467	465	32904
Spoor	32	7	13	4	9	23	145	205	193	151	283	287	285	226	275	231	164	92	81	60	59	62	43	15	19178
Eland, seen	115	106	100	124	97	110	69	74	62	65	131	97	90	77	104	145	194	91	121	141	134	130	120	109	14203
Spoor	28	17	14	13	19	25	69	90	95	89	144	138	123	113	146	163	87	51	62	39	41	35	41	19	10281
Cheetah, seen	7	3	10	5	10	13	4	2	1	2	4	3	1	2	14	20	13	9	6	9	9	7	8	8	800
Spoor	16	20	29	29	29	20	14	11	12	8	9	11	9	12	30	33	24	17	15	15	17	22	16	22	1897
Carcases																									
Hours old	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	1	1	1	1	0	0	0	79
Days old	1	1	1	0	1	1	3	1	1	1	1	2	3	0	1	0	2	1	1	2	3	5	6	1	213
Weeks old	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	19
Months old	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7

Raw Data Summary (cont)

	April to Sep 10						Average Data from Sep 1998																	
	Apr	May	Jun	Jul	Aug	Sep	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th	21st	22nd	Total
Visitors																									
Photographic	4	0	0	0	7	0	3	12	21	9	4	9	0	10	0	8	13	3	6	1	1	1	1	2	46
Hunting	0	0	0	0	0	0	7	1	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	7
Camping	0	0	0	0	0	0	0	4	0	0	6	6	6	4	14	0	0	1	0	0	0	0	0	0	3
Driving	0	0	12	12	0	0	0	0	0	0	0	0	0	1	1	0	1	2	0	0	0	0	0	4	30
Unknown/other	0	0	0	0	0	0	0	2	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	7
Environmental																									
Charcoal	0	0	0	0	0	0	0	0	39	25	7	9	11	10	0	0	3	6	0	9	9	5	5	0	131
Other Wildlife																									
Buffalo	0	14	0	0	0	0	0	0	0	0	0	0	0	5	0	1	17	6	9	4	0	0	0	2	265
Bushbuck	0	1	2	3	5	1	0	1	0	0	0	0	0	0	0	4	2	3	6	3	2	2	3	2	240
Gerenuk	212	194	238	134	202	170	116	101	127	117	129	181	136	87	102	169	202	101	135	103	109	147	177	192	18813
Grants gazelle	771	503	629	566	609	469	364	361	213	234	268	312	360	326	218	481	695	713	716	701	653	624	626	591	58840
Hippo	1	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	2	47
Hyena, seen	2	0	1	8	5	2	1	1	1	2	1	0	2	1	8	9	8	2	2	1	1	1	2	3	280
Spoor	66	67	79	69	68	78	76	45	47	41	36	25	37	49	30	38	48	42	33	66	62	53	64	78	5571
Impala	220	222	301	150	214	221	186	165	318	200	243	249	237	180	210	199	321	248	193	214	203	236	224	221	26789
Jackal	68	67	92	53	66	70	19	17	11	9	7	10	11	5	28	41	47	29	25	42	46	45	57	69	3542
Kudu, lesser	62	53	66	51	58	74	67	67	56	48	66	51	57	43	64	61	46	32	36	49	55	56	63	64	6653
Leopard, seen	10	8	6	12	2	6	2	2	2	1	1	1	0	1	3	3	6	6	6	4	6	4	6	8	421
Spoor	34	24	17	24	25	28	5	4	6	3	2	5	4	4	7	13	35	14	16	13	10	14	16	25	1210
Lion, seen	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	0	0	0	2	2	49
Spoor	32	29	15	11	6	10	0	0	1	1	0	0	1	2	2	1	3	5	3	3	3	4	8	17	363
Oryx	65	50	58	49	72	85	8	24	17	13	15	14	5	6	46	58	38	63	58	53	46	41	72	63	4100
Thompsons g.	812	901	679	634	854	835	463	541	502	383	435	525	587	396	364	439	696	741	873	909	821	869	871	819	73622
Warthog	65	44	62	55	22	32	22	9	10	9	12	13	10	25	35	32	31	37	37	43	46	48	45	50	3204
Wildebeest	1445	1017	1253	816	961	789	671	432	302	173	417	329	290	360	362	611	1110	1016	1080	1032	1022	859	946	1066	84813
Zebra	1624	1069	1319	950	976	1037	1087	800	662	604	1092	1171	1166	820	831	848	1217	1404	1380	1212	1198	1101	1179	1173	136099

Raw Data Summary - Transects

	Total - Apr to Sep 10								Av per patrol Apr to Sep 10								Total - to Sep 10								Av per patrol Apr 07 to Sep 10							
	Ti	En	Ng	Em	Il	Le	Ol	Ma	Ti	En	Ng	Em	Il	Le	Ol	Ma	Total	Ti	En	Ng	Em	Il	Le	Ol	Ma	Ti	En	Ng	Em	Il	Le	Ol	Ma	Total
Buffalo	6								1	0	0	0	0	0	0	0	0.1	24	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.1
Bushbuck			2						0	0	0	0	0	0	0	0	0.0	0	0	19	0	0	0	0	5	0	0	0	0	0	0	0	0	0.1
Bush pig									0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Caracal									0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Cheetah, seen					4				0	0	0	0	1	0	0	0	0.1	0	3	3	0	4	0	0	0	0	0	0	0	1	0	0	0	0.1
spoor		1			3	3		3	0	0	0	0	1	1	0	1	0.2	5	5	7	0	3	3	1	3	0	0	0	0	1	1	0	1	0.3
Eland, seen	46	13	5	4	7			2	6	2	1	1	1	0	0	0	1.6	338	137	96	22	7	0	7	2	8	3	2	1	1	0	1	0	2.6
spoor	6	3	9	10				1	1	1	2	2	0	0	0	0	0.6	71	55	90	14	0	0	3	1	2	1	2	0	0	0	0	0	0.5
Elephant, seen	14	1	10						2	0	2	0	0	0	0	0	0.5	177	72	126	0	0	0	0	0	4	2	3	0	0	0	0	0	1.1
spoor	10	6	4	6	9	5	2	2	2	1	1	1	1	1	0	0	0.8	65	49	68	14	3	5	2	2	2	1	2	0	1	1	0	0	0.8
Gerenuk		52	50	21	34	12	9	13	0	9	8	4	6	2	2	2	4.0	55	194	295	26	34	12	22	13	1	5	7	1	6	2	2	3	3.1
Giraffe, seen	60	65	77	75	77	37	17	42	13	9	13	13	13	6	3	7	9.6	396	328	463	130	77	37	29	42	9	8	11	3	13	6	2	8	7.6
spoor	4	5	3	2		3			1	1	1	0	0	1	0	0	0.4	84	74	101	3	0	3	2	0	1	2	2	0	0	1	0	0	0.8
Grants gazelle	23	65	88	49	64	98	37	60	4	11	15	8	11	16	6	8	9.9	166	382	838	93	84	98	37	60	4	9	20	2	11	16	3	10	9.4
Hippo									0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Hyena, seen									0	0	0	0	0	0	0	0	0.0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Spoor	3	7	12	8	11	16	2	6	1	1	2	1	2	3	0	1	1.4	35	41	79	13	11	16	7	6	1	1	2	0	2	3	1	1	1.1
Impala	49		13				12	14	8	0	2	0	0	0	2	2	1.6	250	196	117	8	0	0	12	14	8	8	3	0	0	0	1	3	2.2
Jackal		2	8	4	18	3		3	0	0	1	1	3	1	0	1	0.8	10	35	57	12	18	3	1	3	0	1	1	0	3	1	0	1	0.9
Kudu, lesser	4	9	10	8	4				1	2	2	1	1	0	0	0	0.7	8	20	97	11	4	0	1	0	0	0	2	0	1	0	0	0	0.3
Leopard, seen				1				1	0	0	0	0	0	0	0	0	0.0	0	5	4	1	0	0	0	1	0	0	0	0	0	0	0	0	0.1
spoor		2	2	4	4	6		1	0	0	0	1	1	1	0	0	0.4	6	17	16	4	4	6	0	1	0	0	0	0	1	1	0	0	0.4
Lion, seen									0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
spoor	4					3		4	1	0	0	0	0	1	0	1	0.2	4	0	0	0	0	3	0	4	0	0	0	0	0	1	0	1	0.2
Oryx		12			16				0	2	0	0	3	0	0	0	0.5	6	82	223	8	16	0	0	0	0	1	5	0	3	0	0	0	1.2
Serval									0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Thompsons g.	80	27	23	125	100	157	4	64	13	5	4	21	17	26	1	11	12.1	359	646	196	265	100	157	20	64	9	15	5	6	17	26	2	13	11.6
Warthog	7	8	8	4				4	1	1	1	1	0	0	0	1	0.6	60	68	84	12	0	0	0	4	1	2	2	0	0	0	0	1	0.7
Wildebeest	22	87	107	157	84	94	51	18	4	16	18	26	11	16	5	3	12.8	286	533	933	319	84	94	79	18	7	13	22	5	11	16	7	4	10.7
Zebra	151	96	156	184	165	121	36	81	25	16	26	31	28	20	6	14	23.7	994	960	1490	375	165	121	56	81	24	23	35	9	28	29	5	18	20.0

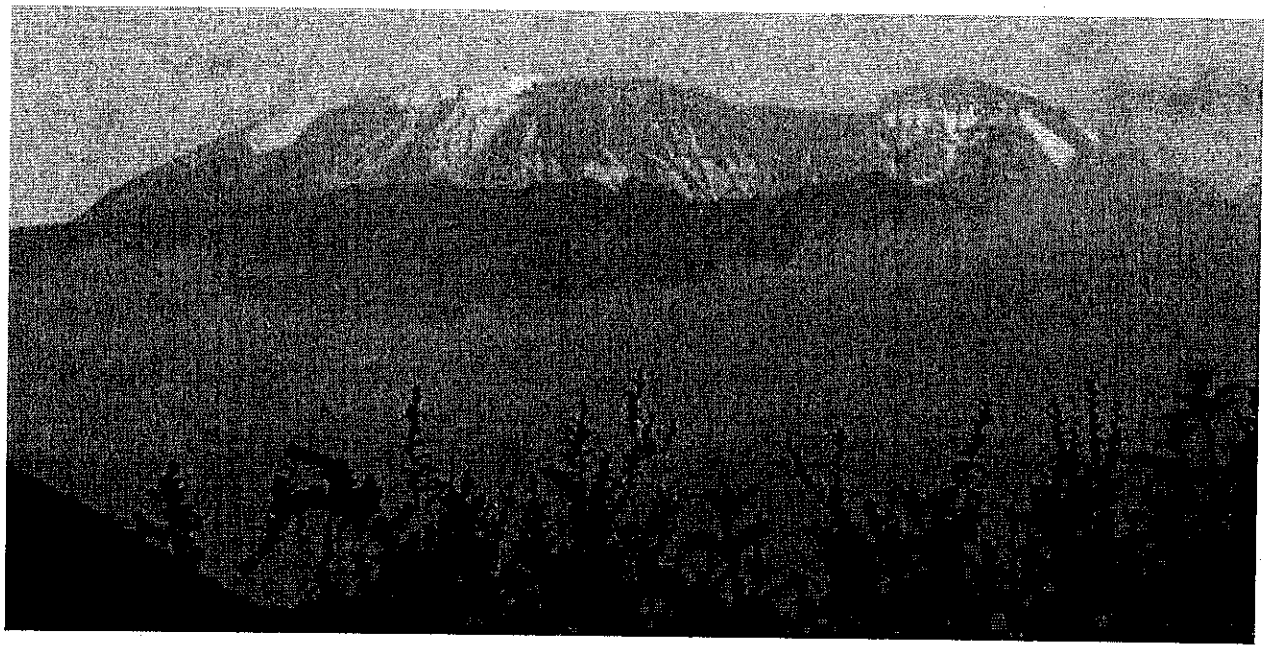
Ti is Tingatinga
En is Engasurai
Ng is Ngarenyiani
Em is Embonget

Il is Ildonyo
Le is Lenamala
Ol is Oltepesi
Ma is Enoinyo Mal

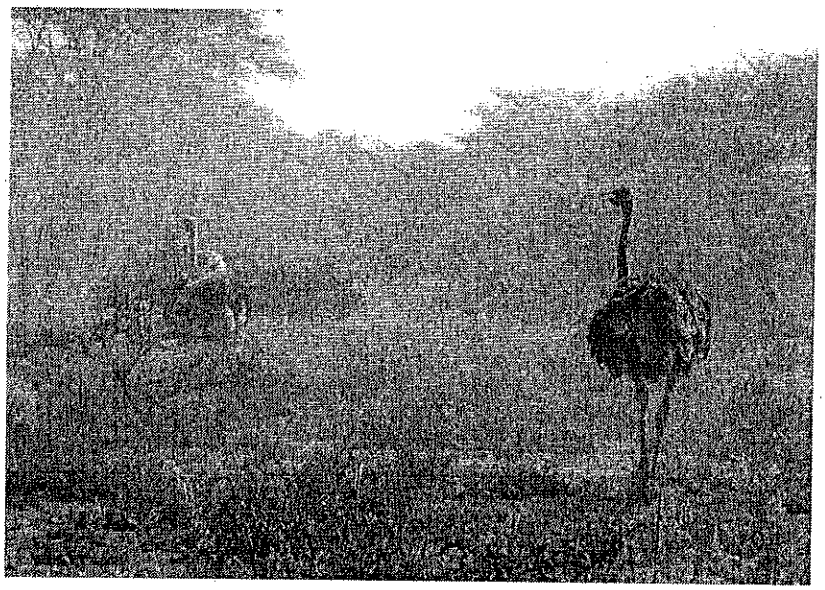
Plan for the Next Six Months

With the national and local elections over and a new WMA board, it should be possible to move ahead quickly on a number of plans

- Sign an MOU with the WMA and produce new work identity cards as proof of status for the fieldmen
- Organise an educational trip for the fieldmen
- Provide the three primary school wildlife clubs with book and stationary boxes once the new meeting times have been arranged
- Help Lendiy supply bicycles to those fieldmen who can ride but are presently sharing a bike
- Consider offering fieldmen to the neediest West Kilimanjaro village outside the present project area
- To encourage all of the sponsors to visit the project and see the excellent conservation they are facilitating with their generous donations.



West Kilimanjaro has even more to offer a tourist than just wildlife and culture

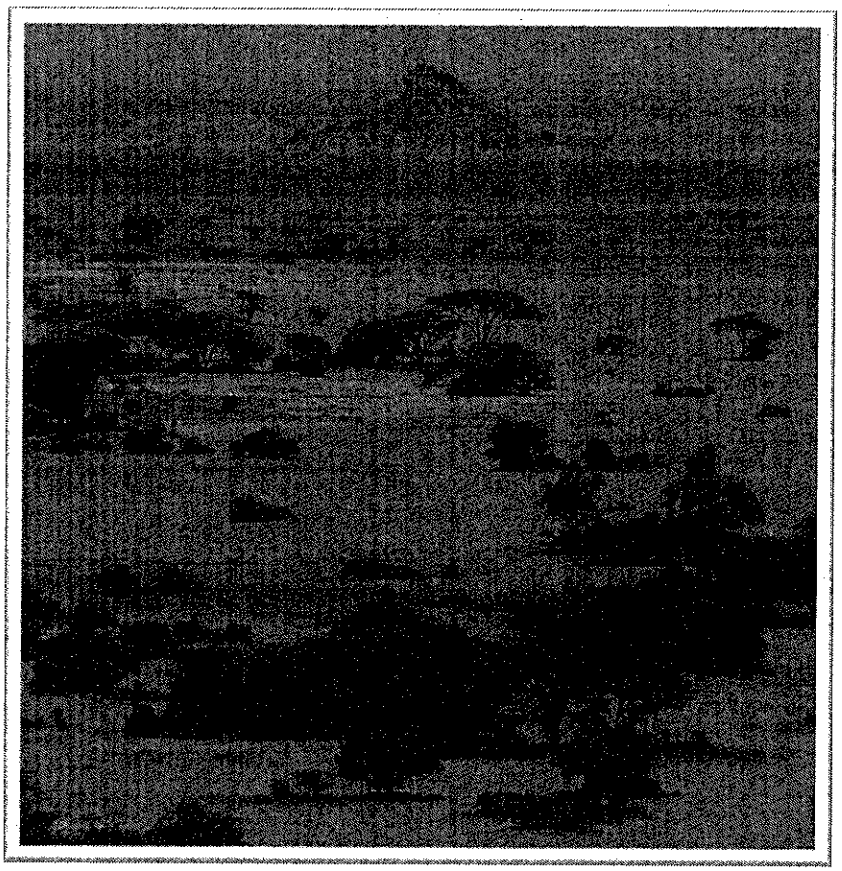


Although not counted by the fieldmen, ostrich are common

THE WEST KILIMANJARO CONSERVATION PROJECT

23rd BI-ANNUAL REPORT

October 2010 to March 2011



The big picture: sharing data and good practice beyond the project boundaries

Supported by:
Born Free Foundation, UK
Humane Society International, Australia
Taiwanese Forestry Bureau, Conservation Division

Compiled by Nicholas Martyn

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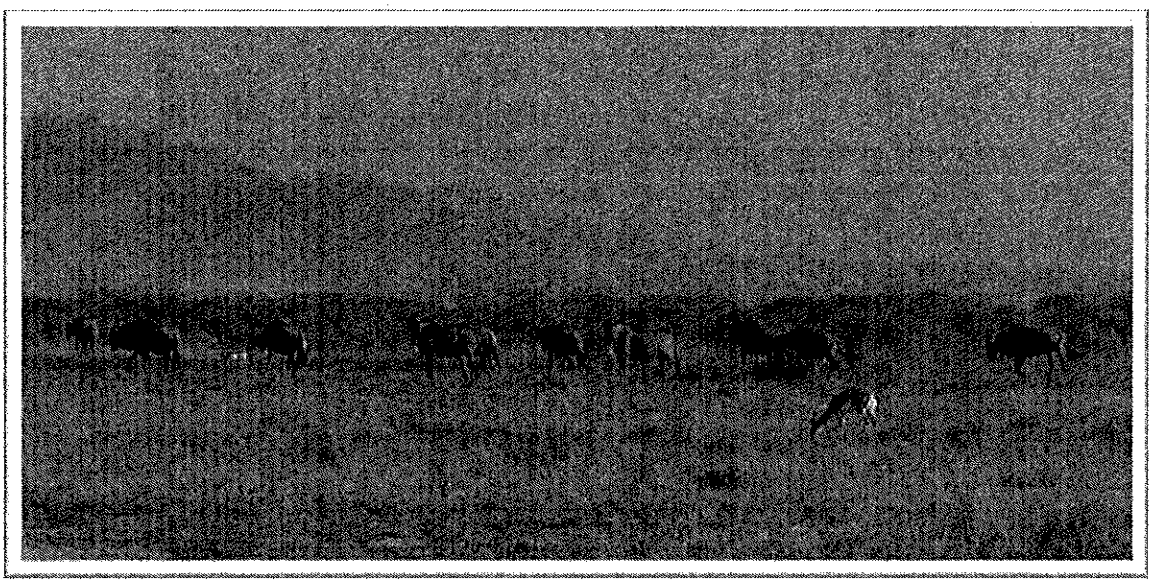


Thriving grazers: Wildebeest and Thompsons Gazelle

Overview and Comment

Weather

This period started hot, dry and dusty as is expected for the time of year. There were a few light showers in November, they became heavier in December but stopped again in January making this year's short rains particularly short. The long rains started in March and although not very heavy they were well distributed.

Food and Water

During this period most agriculture was in the form of small, irrigated vegetable plots which, although few, were very productive and beneficial to many members of the community. By March the farmers had started to prepare their fields and some had already planted. This period, milk production was better than average because, although few in number, the cattle were in very good health and many had calved.

Water supply was generally adequate, when used economically. The March rainfall changed this and made the water resources plenty.

Migrations and Vegetation

In September there was limited water and pasture for the livestock forcing most cattle far from the settlements and making daily watering impractical.

Water and fresh pasture became locally available in December and the mobility of the livestock meant all livestock had sufficient, nutritious grazing. By March environmental conditions were ideal for all herbivores so there was no need for any animal, wild or domestic, to migrate far.



Recording patrol data

Human-Wildlife Conflict

While the livestock were far from settlements in search of pasture there were increased reports of predation but nothing unusual. In January the Ildoinyo team found 2 cheetahs that had killed 2 goats earlier in the day. By contrast there were few elephants in the project area and no reports of crop raiding. Conflict hit a low in March when the ideal conditions dispersed the wildlife and allowed the livestock to graze near to the settlements

Fieldmen

The fieldmen were in good health and worked well through this period with no need for changes or substitutions. Most had about 2 patrols checked per month by the assistant coordinators or project coordinator.

The average age of carcass was a consistent but high 2.5 days but with only 4 carcasses observed the data is not reliable other than to indicate there is good coverage of patrol area by the fieldmen.

Training and Methodology

A project progress report was to be made to the WMA executive in September but it was delayed due to most people's preoccupation with the national elections. A planned visit by Born Free consultant Nick Martyn was postponed to December for the same reason. An educational tour is

planned to another less developed WMA in Tanzania so as to both share experiences and to give advice. A number of the fieldmen feel they would learn more from a trip to a developed project in Kenya so there is no consensus yet as to the destination but it will be resolved by June.

Data shows many patrols being checked this period because Project Coordinator Joseph Lendiy gave his two assistants the instructions to start this important work. Some end-of-month meetings were held separately each side of the project area while others were combined to a single meeting in the project office in Tingatinga.

In December a MOU was signed between the WMA and WKCP to clarify their working relationship. Written job descriptions were distributed to project personnel. 7 more bikes have been purchased so that each fieldman, with the exception of Naigwana, has one. Naigwana does not yet cycle and it has been decided that he should show some competence before a bike is purchased.

Conservation Clubs

The national elections proved to be disruptive to the conservation clubs and schools in general and for this reason no progress was made with the clubs in September or October. After which they closed for the long, Christmas holidays and since that time it has not been possible to reorganize the government directed timetable to allow a slot for the clubs. This is now a matter of urgency.

Visits Made

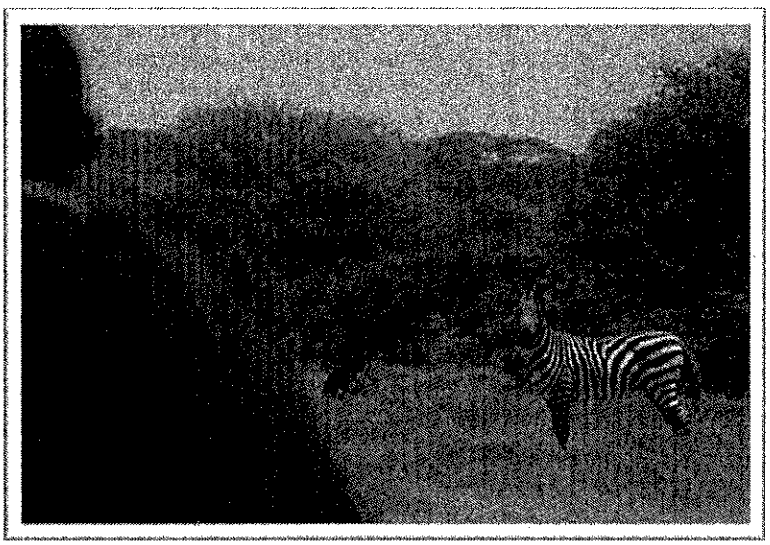
The project coordinator visited Arusha each month to collect honorariums and to submit the monthly report.

In December Lendiy and Martyn met representatives from Nature Conservancy in Arusha and agreed to work towards the pooling of data and good practice among the many conservation organizations in the greater Kilimanjaro area. This could reveal interesting information on wildlife migrations and the relative effectiveness of the diverse conservation strategies in use. During the same visit Lendiy represented the WMA at a meeting with a potential tourism investor for West Kilimanjaro.

Visitors Received

In October a large group of 11 conservationists and guides from the National Outdoor and Leadership School (NOLS) visited to plan cooperation and support with the WKCP. In November the Mweka Wildlife College made a fieldtrip to the project for the first time in over a decade due to the healthy and diverse wildlife populations now found in the area.

In November Born Free consultant Nick Martyn visited the project to assess progress and suggest possible changes and improvements.



Relaxed wildlife

Tourism

Tourist numbers declined this period but are likely to increase if the on-going negotiations with a major tour operator are successful. The cultural centre of Orpopong'I continued to receive low-level tourism but it is on the edge of the project area so the visitors are not usually counted.

Environmental Monitoring Data and Analysis

Key Species

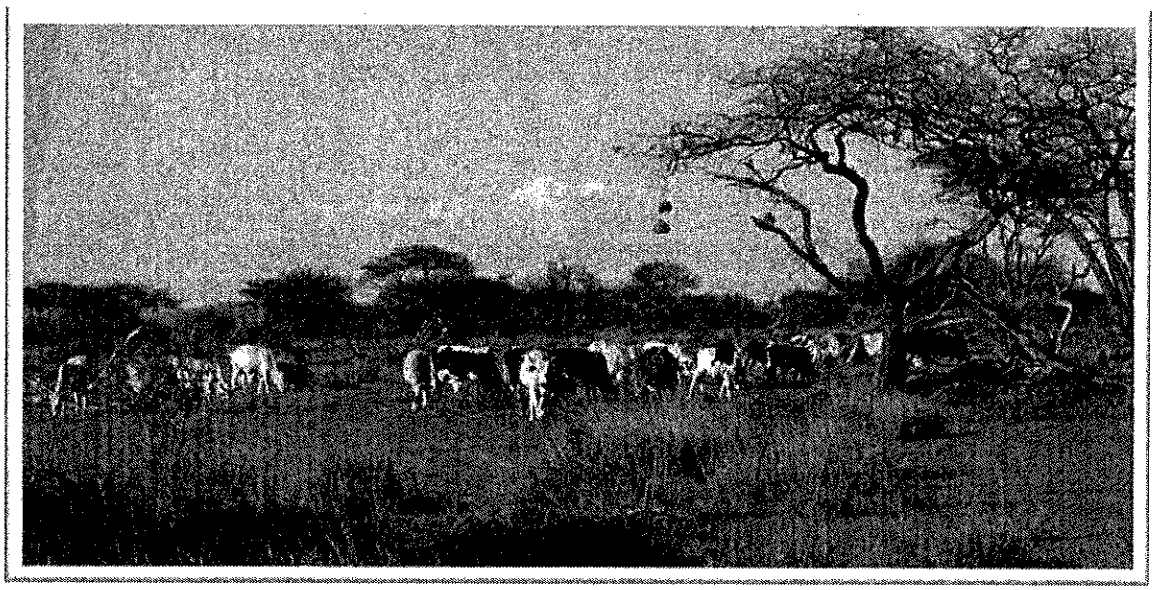
Elephant numbers dropped for the 7th period in succession. There was no evidence of elephants being disturbed or poached so it may be assumed that they have simply found the environmental conditions more conducive elsewhere, specifically in the Amboseli region of Kenya. West Kilimanjaro is still very likely an important elephant habitat and when conditions change they can be expected to return.

Giraffe and eland populations remain close to all time highs and have been remarkably consistent over the last 4 years suggesting they are undisturbed and at a density close to the long term holding capacity.

Cheetah numbers are healthy and stable although not at a peak. They are frequent culprits in the predation of small livestock but there is no evidence of retaliation from the community.

Predators

There were no major changes in predator populations this period as jackal, hyena, leopard and lion numbers were about the same as they have been over the last 18 months. With the exception of hyena predators are at a high. Fortunately there was minimal conflict between pastoralists and predators this period contrary to what might be expected when herbivores are in such good condition.



Cattle are an integral part of the West Kilimanjaro environment

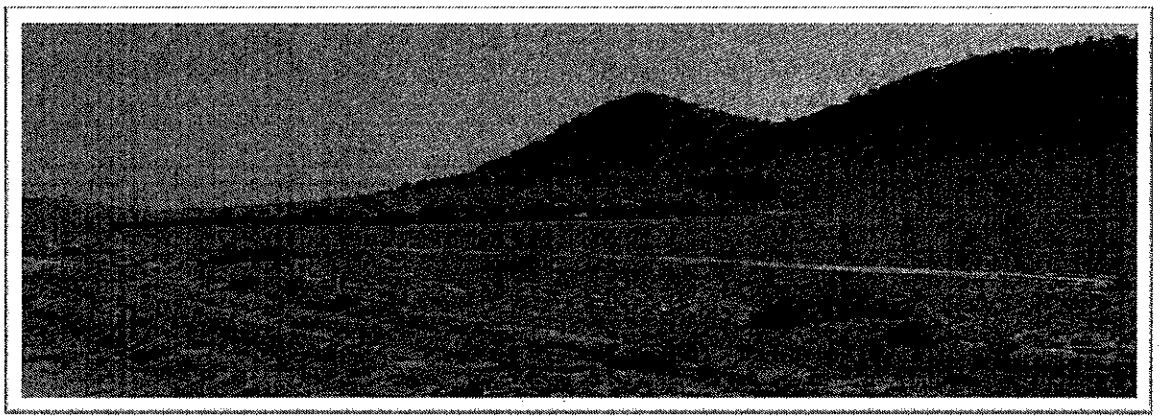
Herbivores

No hippopotamus were observed in the Sinya pools this period probably because there was sufficient grazing near the Amboseli swamps. Also missing were the buffalo that presumably migrated to the nearby highlands. All other herbivores were at or close to their long-term highs with the exception of wildebeest that declined by about 30% from the last period.

Transects

This is the first period for which full transect data has been collected. The data, although less copious and reliable, was consistent with general patrol data but suggest impala, gerenuk and kudu are doing rather better than other species while Oryx, wildebeest and elephant have declined.

It should be noted how well distributed giraffe, Grant's gazelle and zebra are through the whole project area while leopard and cheetah seem to prefer Ildoinyo and Leremeta.



A village in the Ildoinyo area of Sinya

Carcasses and Poaching

The observation of carcasses remains at an all time low due to a lack of poaching and excellent environmental conditions. This is positive news because in the past the Christmas period has experienced an increase in poaching pressure. Poaching is still a serious threat as demonstrated by the killing, eating and removal of trophies from a lion in neighboring Longido and the shooting of elephant poachers just a few kilometers on the Kenyan side of Sinya.

In summary, the carcasses found are listed below:

- A giraffe carcass, dead for about 1 day, was found in Ngereyiani on 2nd October. The cause of death was unclear but predators had eaten it so a leopard could have killed it.
- In December an eland carcass was found a few days after it had died. The cause of death was unknown but there was no sign of poaching.
- In January the Ngereyiani team found a 3-day-old zebra carcass. There was no sign of poaching so natural causes were assumed.
- In February the Endoinyo mali team found a 3-day-old impala carcass where cause of death was unknown but assumed to be natural.

Charcoal

All of the charcoal burning reported was observed in Tingatinga village but was at a low level of about 3 kilns per month and is likely only used locally.

Raw Data Summary - Overview

	Oct 10 to Mar 11						Average Data and Totals from September 1999																		
	Oct	Nov	Dec	Jan	Feb	Mar	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th	21st	22nd	23rd	Total
Patrols, total	64	64	64	64	64	64	36	34	33	32	33	33	32	30	32	32	48	48	48	56	60	64	64	64	64	5764
Patrols, checked	12	11	11	14	15	11	9	8	8	8	9	9	8	9	10	9	15	15	12	11	11	12	14	13	12	1335
Fieldmen																										
Saiken Oyoko	8	8	8	8	8	8								8	8	8	8	8	8	8	8	8	8	8	8	864
Mbeo Lormarai	8	8	8	8	8	8																	8	8	8	128
Koreka Merijoi	8	8	8	8	8	8								8	8	8	8	8	8	8	8	8	8	8	8	543
Kele Parangu	8	8	8	8	8	8								8	8	8	8	8	8	8	8	8	8	8	8	543
Mapli Kisheyan	8	8	8	8	8	8								8	8	8	8	8	8	8	8	8	8	8	8	544
Kela Mukanda	8	8	8	8	8	8								8	8	8	8	8	8	8	8	8	8	8	8	544
Lekiaki	8	8	8	8	8	8															8	8	8	8	8	240
Tikonian Naigwana	8	8	8	8	8	8	8	8	8	8	8	8	8	8		8	8	8	8	8	8	8	8	8	8	1079
Oseikel Nairoua	8	8	8	8	8	8											8	8	8	8	8	8	8	8	8	446
Kayongo	8	8	8	8	8	8															8	8	8	8	8	216
Koreka Merijoi	8	8	8	8	8	8															8	8	8	8	8	216
Ngoye Ngasinkoni	8	8	8	8	8	8											8	8	8	8	8	8	8	8	8	446
Kokai Ngirimbish	8	8	8	8	8	8											8	8	8	8	8	8	8	8	8	446
Ringoine	8	8	8	8	8	8															8	8	8	8	8	216
Kiambwa	8	8	8	8	8	8															8	8	8	8	8	216
Nkodikod Lemusae	8	8	8	8	8	8											8	8	8	8	8	8	8	8	8	446
Key Species																										
Elephant, seen	71	65	21	14	3	14	55	38	40	74	92	112	91	99	117	113	122	162	155	108	94	80	62	41	31	11598
spoor	35	52	28	28	20	33	145	150	170	192	221	237	281	233	254	171	96	94	69	49	46	44	43	36	33	18263
Giraffe, seen	518	477	512	332	243	353	141	124	102	103	103	191	170	158	203	244	387	382	410	455	489	451	487	485	406	35463
Spoor	18	70	42	67	58	36	146	206	183	151	283	287	285	226	275	231	194	92	91	60	59	62	43	15	49	19601
Eland, seen	111	139	120	76	62	66	89	74	82	65	131	97	90	77	104	145	194	91	121	141	134	130	120	109	99	14869
Spoor	24	38	30	52	52	23	69	90	95	89	144	136	123	113	146	163	97	51	62	39	41	35	41	19	37	10540
Cheetah, seen	10	5	3	5	4	8	4	2	1	2	4	3	1	2	14	20	13	9	8	9	9	7	8	8	6	838
Spoor	19	27	24	25	19	27	14	11	12	8	9	11	9	12	30	33	24	17	15	15	17	22	16	22	24	2049
Carcasses																										
Hours old	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	1	1	1	1	0	0	0	0	79
Days old	1	0	0	1	3	0	3	1	1	1	1	2	3	0	1	0	2	1	1	2	3	5	6	1	1	220
Weeks old	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	19
Months old	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7

Raw Data Summary (cont)

	Oct 10 to Mar 11						Average Data and Totals from September 1999																		
	Oct	Nov	Dec	Jan	Feb	Mar	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th	21st	22nd	23rd	Total
Visitors																										
Photographic	0	2	2	0	0	0	3	12	21	9	4	9	0	10	0	8	13	3	6	1	1	1	1	2	1	54
Hunting	0	0	0	0	0	0	7	1	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14
Camping	0	0	0	0	0	0	0	4	0	0	6	6	6	4	14	0	0	1	0	0	0	0	6	0	0	3
Driving	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	2	0	0	0	0	0	4	0	31
Unknown/other	0	0	0	0	0	0	0	2	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	8
Environmental																										
Charcoal	2	5	2	2	4	0	0	0	39	25	7	9	11	10	0	0	3	6	0	9	9	5	5	0	3	146
Other Wildlife																										
Buffalo	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	1	17	0	9	4	0	0	0	2	0	265
Bushbuck	3	1	2	2	2	2	0	1	0	0	0	0	0	0	0	4	2	3	6	3	2	2	3	2	2	253
Gerenuk	158	123	228	133	152	151	115	104	127	117	120	161	139	87	162	169	232	181	158	165	160	147	177	192	158	19866
Grants gazelle	576	579	594	508	506	401	394	351	213	234	258	312	350	326	325	461	695	712	716	701	663	624	626	691	527	62347
Hippo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	2	0	47
Hyena, seen	7	0	3	2	1	1	1	1	1	2	1	0	2	1	8	9	8	2	2	1	1	1	2	3	2	295
Spoor	68	63	68	88	73	50	79	49	47	41	39	25	37	49	63	38	43	42	39	56	62	63	64	78	68	6343
Impala	386	199	177	240	218	220	138	161	218	209	243	249	237	180	210	199	321	249	193	214	223	236	224	221	241	28373
Jackal	59	74	64	73	51	40	18	17	11	9	7	10	11	5	28	41	47	20	25	42	48	48	57	59	59	3714
Kudu, lesser	57	75	82	60	61	82	67	67	58	48	66	61	67	43	64	61	49	39	36	49	50	56	63	64	70	7118
Leopard, seen	14	12	9	1	10	8	2	2	2	1	1	1	0	1	3	3	6	6	5	4	5	4	6	6	9	476
Spoor	14	32	27	32	19	22	5	4	5	3	2	5	4	4	7	13	16	14	16	13	13	14	19	25	24	1361
Lion, seen	4	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	2	1	1	0	0	0	2	2	2	81
Spoor	8	4	20	2	5	7	0	0	1	1	0	0	1	2	2	1	2	5	3	3	3	4	8	17	8	409
Oryx	45	69	71	20	30	23	8	24	17	13	15	14	5	8	45	56	39	53	56	53	46	41	72	63	43	4368
Thompsons g.	647	586	685	513	527	572	493	541	303	261	436	525	531	399	364	433	696	741	678	909	921	869	871	819	622	77793
Warthog	50	62	48	54	50	56	23	9	10	9	12	13	10	25	35	32	31	37	37	43	48	48	45	50	50	3516
Wildebeest	1076	886	887	813	358	574	671	432	202	173	447	329	298	360	663	811	1110	1016	1066	1032	1022	858	946	1066	899	89532
Zebra	1045	1027	1072	919	824	892	1057	899	852	894	1093	1171	1196	920	931	849	1217	1464	1390	1212	1196	1101	1179	1173	963	142771

Raw Data Summary - Transects

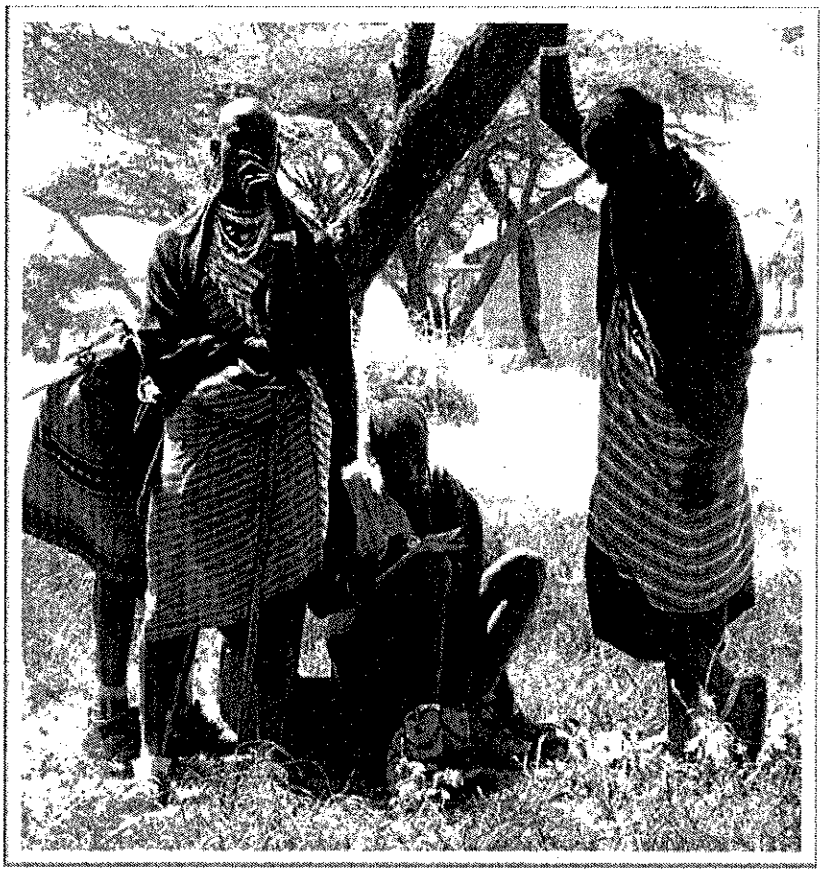
	Total - Oct 10 to Mar11								Av per patrol Oct 10 to Mar 11									Total - to Mar 11								Av per petrol Apr 07 to Mar 11								
	Ti	En	Ng	Em	Il	Le	Ol	Ma	Ti	En	Ng	Em	Il	Le	Ol	Ma	Total	Ti	En	Ng	Em	Il	Le	Ol	Ma	Ti	En	Ng	Em	Il	Le	Ol	Ma	Total
Buffalo									0	0	0	0	0	0	0	0	0.0	24	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.1
Bushbuck			3						0	0	1	0	0	0	0	0	0.1	0	0	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Bush pig									0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Caracal									0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Cheetah, seen					3	3			0	0	0	0	1	1	0	0	0.1	0	3	3	0	7	3	0	0	0	0	0	0	1	0	0	0	0.1
spoor		4	2		3	4			0	1	0	0	1	1	0	0	0.3	5	9	9	0	6	7	1	3	0	0	0	0	1	1	0	0	0.2
Eland, seen	38	19	4	3	26			18	6	3	1	1	4	0	0	3	2.3	376	156	100	25	33	0	7	20	8	3	2	1	3	0	0	2	2.3
spoor	11	10	9	8	7				2	2	2	1	1	0	0	0	0.9	82	65	89	22	7	0	9	1	2	1	2	0	1	0	0	0	0.8
Elephant, seen			13		17			9	0	0	2	0	3	0	0	2	0.8	177	72	139	9	17	0	0	9	4	2	3	0	1	0	0	1	1.3
spoor	4		6	6	3	6	7	2	1	0	1	1	1	1	1	0	0.7	69	49	74	20	6	11	9	4	1	1	2	0	1	1	1	0	0.8
Gerenuk	6	19	37		51	3	42	42	1	3	5	0	9	1	7	7	4.2	63	213	332	29	85	15	64	55	1	4	7	1	7	1	4	5	3.8
Giraffe, seen	73	58	41	65	75	27	37	35	12	10	7	11	13	5	6	6	9.6	469	386	504	195	153	64	66	77	16	8	11	4	13	5	4	7	7.6
spoor	8	7	7	3	4		4	5	1	1	1	1	1	0	1	1	0.8	62	81	106	6	4	3	6	5	1	2	2	0	0	0	0	0	0.8
Grants gazelle		79	47	50	123	49	70	73	0	13	8	8	21	8	12	12	16.2	168	441	885	143	197	147	107	123	4	9	18	3	16	12	6	11	9.9
Hippo									0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Hyena, seen						3			0	0	0	0	0	1	0	0	0.1	0	0	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0.0
Spoor		10	16	2	19	10		3	0	2	3	0	3	2	0	1	1.3	35	51	95	15	30	26	7	9	1	1	2	0	3	2	0	1	1.2
Impala	23	57		5	28	20	11	66	4	10	0	1	5	4	2	11	5.5	273	253	117	13	28	26	23	80	6	5	2	0	2	2	1	7	3.3
Jackal	4	6	9	6	6	3	1	4	1	1	2	1	1	1	0	1	0.8	14	41	66	18	24	6	2	7	0	1	1	0	2	1	0	1	0.8
Kudu, lesser		9	19	11				1	0	2	3	2	0	0	0	0	0.9	8	29	116	22	4	0	1	1	0	1	2	0	0	0	0	0	0.8
Leopard, seen		1							0	0	0	0	0	0	0	0	0.0	0	6	4	1	0	0	0	1	0	0	0	0	0	0	0	0	0.0
spoor		1	1	1	8	1		3	0	0	0	0	1	0	0	1	0.3	8	18	17	6	12	7	0	4	0	0	0	0	1	1	0	0	0.4
Lion, seen									0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
spoor								2	0	0	0	0	0	0	0	0	0.0	4	0	0	0	0	3	0	6	0	0	0	0	0	0	0	1	0.1
Oryx			8						0	0	1	0	0	0	0	0	0.2	0	52	231	8	15	0	0	0	0	1	5	0	1	0	0	0	0.8
Serval									0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Thompsons g.	38	38	36	118	150	27		47	6	6	6	20	25	5	0	8	8.5	427	586	234	373	250	184	20	111	9	14	5	8	21	15	1	10	10.4
Warthog		5	5				5	13	0	1	1	0	0	0	1	2	0.9	60	73	69	12	0	0	5	17	1	2	1	0	0	0	0	2	0.8
Wildebeest	44		72	80	72	45		88	7	0	12	13	12	8	0	15	8.4	330	533	1005	399	136	139	79	106	7	11	21	8	11	12	4	10	10.5
Zebra	150	89	116	94	138	68	103	87	25	15	19	11	23	11	17	15	17.0	1144	1069	1606	439	303	189	159	166	24	22	33	9	25	16	9	15	19.2

Ti is Tingatinga
En is Engasursi
Ng is Ngereyiani
Em is Embonget

Il is Ildoinyo
Le is Leremeta
Ol is Olbepessi
Ma is Endoinyo Mali

Plan for the Next Six Months

- All agree that the main objective of the educational trip should be to improve community conservation initiatives in Tanzania be it WKCP or in the region we visit. Select a venue based on our objectives and then organize it before the end of August 2011.
- Visit the project area during the school term to hold discussions with the teachers with the objective of identifying a time the primary school conservation clubs. If this is not possible during the school timetable, we will investigate the possibility of clubs that function independently of the schools.
- Present the WMA with an offer of fieldmen to another West Kilimanjaro village so as to hear the opinions of the local organization charged with managing the environment before we make a decision.
- Request feedback from the WMA on the implementation of the MOU.
- Implement the request of the WMA for fieldmen to jointly patrol with the Village Game Scouts each month so as to assist with improving the quality and quantity of their work.
- Encourage all the sponsors, especially TFB, to visit the project and see the excellent conservation they are facilitating with their generous donations. Such trips are also usually excellent to educate and motivate the fieldmen in their important work.



Fieldmen meet to exchange notes and experiences at the end of each month

肯亞野生動物署計畫報告摘要

肯亞野生動物署(Kenya Wildlife Service, KWS)為肯亞野生動物主管機關，於 1989 年設立，職掌範圍包括動植物之保育、經營管理和利用政策、各類保護區之設立及經營管理、保育教育宣導、推動野生動物研究計畫、野生動物相關國際公約、野生動物危害等。肯亞政府僅提供 KWS 20%預算，KWS 以國家公園等收入補足其他預算需求。

肯亞野生動物署所提計畫，依據 2008 年至 2011 年計畫及報告資料，摘要如下：

2008 年所提「奈洛比國家公園黑犀牛監測儀器和圍籬計畫」，計畫目標是監測奈洛比國家公園(Nairobi National Park)黑犀牛族群。

為確保肯亞黑犀牛族群之穩定成長，保育策略有必要因環境的變化及不時出現的新挑戰予以調整。1990 年代，因盜獵問題嚴重，犀牛族群由 20,000 頭減少到只剩 400 頭。肯亞野生動物署黑犀牛保育和經營管理策略之目標為每年增加族群數量 6%，也就是由現在的 500 頭，成長到 2011 年時 700 頭。

奈洛比國家公園位於肯亞首都奈洛比南方 8 公里處，佔地 117 平方公里。奈洛比國家公園黑犀牛族群，自 1990 年起，每年成長率略高於 5%，已移出 100 餘頭至其他保護區。奈洛比國家公園的 68 頭黑犀牛，約佔全肯亞族群之 11%。監測和看守犀牛須要儀器(GPS、相機和望眼鏡)，建立圍籬可防止人類之入侵。

2008 年經費主要採購計畫執行所需器材及架設圍籬。項目如下(2009 年 2 月止)：

編號	項目	價格(US$)
1	露營相關器材	121.50
2	汽車輪胎	763.78
3	露營相關器材	311.44
4	電池	92.80
5	補給食物	61.25
6	廁坑	100.00
7	備用零件	254.50
8	水泥	129.55
9	廁坑	125.00
10	帳棚	6,828.05
11	手電筒 5 支	250.94
12	補給食物/文具	130.00
13	補給食物	46.71
14	臨時工資	37.50
15	臨時工資	15.63
16	建材	25.63
總計		9,294.28
尚餘經費		9,705.72

其餘預計購買物品如下：

編號	項目	價格(US$)
1	太陽能充電板 3 組(提供電腦電力用)	1,500
2	太陽能電池 4 組(提供電腦電力用)	1,256
3	反用換流器(100 瓦)	2,188
4	電腦 2 部	1,875
5	雜支	2,888
	總計	9,707

監測計畫所蒐集資料，將是犀牛行為和遷移路線研究之重要資料，監測項目包括：

- 數位相機用來建立每隻黑犀牛的身份檔案。
- 望遠鏡可供巡護人員瞭解和監測黑犀牛身體狀況。
- 全球衛星定位系統(Global Positioning System, GPS)可提供黑犀牛所在位置和巡邏路線等資料，有助於規劃有效巡邏路線和瞭解黑犀牛活動範圍。
- 電圍欄(energizers)、太陽能電池、充電控制器、圍籬可提昇經營管理黑犀牛族群的成效。
- 有夜視功能之望遠鏡可協助夜間巡護人員找到犀牛，也可補充白天巡護人員所蒐集的資料。
- 監測蒐集到的資料，有助於評估黑犀牛族群現狀，並可建立犀牛族群現狀月報或年報，包括年齡/性別組成、族群大小和密度、死亡率和原因、犀牛身體狀況、分娩週期、carry capacity 和限制因子。

依據 2009 年和 2010 年 KWS 提供之計畫報告，成功執行下列工作：

- 將巡護人員基地由 Mbagathi 移到新地點 Capture Base。
  現在巡護人員駐紮在離 Mbagathi 營地 20-30 公里處，犀牛監測工作之協調聯絡因而大幅改善。
- 增進黑犀牛之安全及改善圍籬監測工作
  新設 2 處圍籬巡邏基地和 3 處衛星基地，修復巡邏車輛等工作，使棲地和圍籬被破壞情形有所改善，巡邏隊機動性增強。
- 改善犀牛族群資料之蒐集
  2008 年估計奈洛比國家公園有 70 頭犀牛，2010 年增至黑犀牛 77 頭和白犀牛 11 頭，再度被觀察到之比例分別為 87%和 100%。因新購之電腦及太陽能發電設施啟用後建立資料庫，監測資料之分析和取得更容易。

工作項目細節說明如下：

一、集中犀牛工作小組基地

- 10 名巡護人員已移到新基地 Capture Base。
- 已購買及架設 10 組營帳設施。
- 已採購各種野外營地需要之裝備。

二、犀牛和圍籬監測工作

- 已於 Kappa 和 Marimbet 設立 2 處圍籬基地。
- 於野生動物廊道(corridor)和熱點(hot spots)設立 3 處衛星基地。
- 採購零件、器材、備用輪胎、5 個手電筒，並修復巡邏車。
- 沒有發現犀牛被盜獵。

三、黑犀牛族群資料

- 2008 年 10 月奈洛比國家公園黑犀牛估計數量為 70 頭，2009 年將其中 5 頭移到犀牛較少的 Ol jogi ranch 地區。
- 2008 年 9 月至 2011 年 5 月間，發現 7 頭幼年黑犀牛，2008 年 9 月至 2009 年 3 月間觀測到 83%黑犀牛。2010 年再度觀察到 87%黑犀牛。
- 2009 年 10 頭白犀牛被送至奈洛比國家公園，2010 年生下 1 頭小犀牛。
- 已採購電腦 2 台、印表機 2 台，UPS 不斷電系統 2 組、變頻器 1 組、深度循環電瓶 1 組、太陽能板和相關設施 2 組。

贊助肯亞犀牛保育計畫的其他機關包括：

- 非洲野生動物基金會(African Wildlife Foundation)
- 英國北部動物協會(Chester Zoo, North of England Zoological Society)
- 英國政府之達爾文計畫UK Government (Darwin Initiative)
- 歐洲動物園和水族館協會(European Association of Zoo and Aquarium)
- 伊甸野生動物信託(Eden Wildlife Trust)
- 法蘭克福動物協會(Frankfurt Zoological Society)
- Frefrei Geboren
- 國際自然保育聯盟(International Union for Conservation of Nature, IUCN)物種存續委員會(Species Survival Commission)非洲犀牛專家小組(African Rhino Specialist Group)
- 犀牛方舟協會(Rhino Ark)
- 犀牛救援協會(Rhino Rescue)
- 國際拯救犀牛協會(Save the Rhino International)
- 美國國際開發署(United States Agency for International Development)
- 美國魚類暨野生動物署(US Fish and Wildlife Service)
- 世界自然基金會(WWF)
- Zoo D'Amnevile
- 倫敦動物協會(Zoological Society of London)

2009年所提「蠕蟲對人類環境和梅魯國家公園黑犀牛影響之保育研究計畫」，計畫內容及報告摘要如下：

肯亞野生動物署於2001年起，開始執行犀牛復育計畫，將犀牛重新引入(restock)梅魯國家公園(Meru National Park)，2003年運進8頭犀牛，2006年4月前，梅魯國家公園犀牛族群有55頭(21頭黑犀牛，34頭白犀牛)。2009年有51頭(19頭黑犀牛，32頭白犀牛)。梅魯國家公園特別在園區內設立48平方公里之保護區，作為犀牛棲息地。2006年4月和2007年9月間，有6頭犀牛死亡。犀牛死亡原因目前仍調查中，可能的原因包括經由采采蠅傳播的昏睡病，壁蝨引起的邊蟲症，蠕蟲(helminths)和被附近農地污染的水。

梅魯國家公園由14條河流供應水源，這些河流附近居民有些家庭並無廁坑，有些廁坑建在河邊，而國家公園上游的梅魯村並無下水道系統，洪水氾濫時，所有污水包括排泄物都會沖倒國家公園的河流中，水和土壤有可能被蠕蟲污染。

本計畫希望瞭解人體內的蠕蟲、環境和犀牛有否關連，計畫目標包括：

一、調查梅魯國家公園犀牛族群腸內寄生蟲的來源是否來自人類。
二、調查梅魯國家公園附近居民蠕蟲感染途徑。
三、調查梅魯國家公園園區內外之動物飲水地區糞便感染程度。
四、調查國家公園附近人民飼養之有蹄類哺乳動物之蠕蟲感染途徑。

調查地點為梅魯國家公園附近的Meru North District, Igembe Division，調查地點年雨量變化大，範圍由724mm至1,200mm。本計畫調查對象包括研究地區所有學校、選定學校中所有9-11歲學童和研究地區所有填表表明願意被調查的人士。

本計畫工作項目包括人體糞便檢查、大規模化學治療、監測和評估接受治療的人、蒐集和檢測動物排遺、水質檢測瞭解糞便污染情形和資料分析和管理。希望藉由計畫之執行，改善犀牛之健康狀況，以期犀牛族群能以每年增加5%的程度成長，建立梅魯國家公園穩定犀牛族群。

本計畫合作單位包括肯亞野生動物署、肯亞醫學研究所(Kenya Medical Research Institute)和微生物學研究中心(Centre for Microbiology Research)。

本計畫預期效益包括：
一、 社區驅蟲計畫將達成降低蠕蟲數量之目的，改進社區和居民健康。
二、 瞭解人體內的蠕蟲、環境和犀牛間之關連，可作為研擬當地環境衛生教育計畫之基礎。

本計畫預期成果包括：
一、建立各野生動物棲地蠕蟲密度和數量資料。
二、管理保護區犀牛蠕蟲情形，改善犀牛健康。

計畫執行進度說明如下：
- 已於6個地區主管單位說明計畫執行事宜，召集行政、衛生和教育單位人員共同參與。
- 已至15個學校說明計畫執行細節。
- 已召開2次社區會議，宣導計畫執行項目。
- 已辦理器材和儀器採購。
- 已擬定2010年工作時間表如下：

工作目標	工作項目	開始執行日期
檢測學童糞便蠕蟲密度	蒐集700份學童糞便	3月15日
檢測環境中蠕蟲密度	蒐集及分析200份土壤樣本 撰寫1份報告	3月22日
檢測犀牛蠕蟲密度	蒐集及分析200份犀牛糞便樣本 撰寫1份報告	3月25日
監測治療後學童糞便蠕蟲密度	蒐集700份學童糞便	4月5日
分送計畫報告	辦理研討會一次 召開會議4次	6月
監測及評估計畫進度	撰寫1份報告	7月

2009年至2011年5月期間計蒐集669份學童糞便，分屬5個學校，包括Kanjoo、Thambiro、Kathithini、Kalimiku、Vision academy。蒐集Kanjoo、Thambiro、Kathithini地區土壤樣本30份，蒐集Kanjoo、Kathithini和Mutundu等河流之水體樣本15份，蒐集12份犀牛糞便樣本。檢驗結果所有犀牛糞便和水體樣本都有鉤蟲，大部分土壤和糞便樣本有鉤蟲。人類造成被鉤蟲卵污染之土壤，雨季時土壤被沖至附近河流，犀牛飲用到受污染的水而被感染。教育宣導和設立生態廁所(eco-toilets)將有助於改善此情形。上開期間計畫報告也列有各校驗出不同種類蠕蟲之結果表格。

本計畫之執行有下列非預期的效應：

- 提升社區對改善環境衛生需求之瞭解。
- 政府單位同意在受感染社區建築生態廁所。
- 計畫執行期間發現有必要繼續進行第二階段計畫。此階段重點是人體、環境和犀牛體內寄生蟲之基因研究。

肯亞野生動物署 2010 年所提「梅魯保育區大象行動模式研究計畫」，計畫內容及報告摘要如下：

梅魯保育區(Meru Conservation Area, MCA)所涵蓋之保護區域及範圍如下：

保護區域	面積(km^2)
Meru National Park (MNP)	870
Bisanadi National Reserve (BNR)	606
Kora National Park (KNP)	1,789
Mwingi National Reserve (MNR)	745
總計	4,010

之前於MCA、Eastern Conservation Area (ECA)和北部放牧區(Northern Grazing Area, NGA)約計11,000 km^2地區進行航空調查(aerial survey)，有大象紀錄的地區包括KNP, BNR和NGA。唯空中調查僅提供大象位置和數量資料，需進一步瞭解大象每日行動，乾季和濕季使用棲地情形，才能劃定真正需要保護的地區。例如2006年12月的調查發現504頭(90%)大象出現在ECA保護區域外面。另因人口增加，保護區鄰近地區被變更為農地或人類聚落(human settlement)的案例增多，野生動物保育及經營管理，也有必要兼顧動物及人類，與當地居民合作，以達永續經營之目標。

KWS迫切需要蒐集大象行動資料之原因如下：

- 確認大象乾季和濕季實際使用之棲地。
- 提供大象分佈最新資料，安全監測將更有成效。
- 資料可供ECA設計更好的大象保育或經營管理措施。
- 保護區外之某些特定地區對大象很重要，所蒐集資料可作為遊說的後盾。
- 調查Meru大象是否於濕季時遷徙至Shaba National Reserve。
- 調查大象遷徙廊道之寬度和長度，確保這些地區不被分割或規劃為人類居住地或農耕地。

本計畫總體目標如下：

- 畫出ECA和環繞地區之大象遷徙路線圖。

- 找出大象乾季和濕季偏好使用之棲地。
- 測出大象遷徙路線和農田或聚落的距離。
- 分析MCA和環繞地區之土地利用變更對大象行動模式之影響。

計畫執行方法：

一、繫項圈之前(Pre-collaring activities)

- 蒐集整理現有ECA和環繞地區土地利用資料。
- 設計軟體以供下載大象衛星資料。不同象群位置資料，可供選擇合適繫項圈之象群。
- 採購及運送所有器材至繫項圈地點。

三、繫項圈(Actural collaring operation)

- 備妥麻醉槍。
- 由husky aircraft選定目標象群，之後通知直昇機搭載獸醫、科學家及一名攜帶項圈的助理至現場。
- 選定目標，予以麻醉後繫上項圈。同時蒐集資料或採樣，例如血液、前後肢長度和寬度、耳朵直徑等。
- 注射恢復劑，大象站立開始移動時，工作人員搭直昇機離開。
- 重複上述步驟，預計為4頭大象繫上項圈。

四、繫項圈之後(Post collaring)

- 蒐集分析資料。
- 監測上開4頭大象，準備月報表。資料每2天下載一次。

本計畫需動員之人力包括計畫主持人1人、飛行員2人、挑選大象人員2人、安全巡護人員2人、支援人員5人、軟體設計1人，共計15人。所需設備及器材包括麻醉槍、手提電腦、藥品(Immobilizer & revival drugs)、抗生素、GPS、照相機、飛機(Husky & Helicopter)、車輛、項圈、繩子、水、取樣袋/瓶等。

本計畫蒐集到大象遷徙路線資料以及乾季和濕季偏好使用之棲地。發現以前使用之遷徙廊道目前為人類居住區。因而瞭解梅魯國家公園和Shaba National Reserve之間地區，人象衝突增加之原因。

計畫執行往後延3個月，因需要蒐集更多基本資料，而經費限制需調整計畫執行項目優先順序。另採購項圈需經過特殊程序，法國發展署(French Development Agency)應允贊助之經費有所耽擱，於2011年6月才能納入計畫預算。

已進行之工作項目包括蒐集MCA土地利用資料、於MCA使用新項圈進行初步調查，以及進行各項器材採購程序。KWS所提供報告包括2張非洲象追蹤圖。

重新調整之計畫執行時間表如下：

工作項目	工作目標	預計或執行完成時間
文獻回顧	蒐集整理現有MCA和環繞地區基本資料，例如土地利用、人口/村落、野生動物族群大小和分佈、野生動物遷徙路線	2010年12月

取得衛星影像資料	已取得MCA衛星影像資料	2011年1月
訓練野外觀察人員	以GPS找出大象位置	2011年6月
大象監測	每日大象活動資料和空中監測	2011年7-9月(濕季) 2012年1-3月(乾季)
採購項圈	採購2個項圈	因超出預算暫緩，先進行GIS程序
研發軟體由衛星下載資料	完成軟體研發	暫緩
飛機燃料和藥品	每月飛行15小時，持續6個月追蹤GIS資料	每月兩次
繫項圈	完成繫6個項圈工作	暫緩
彙整資料於網站	6個項圈所蒐集資料匯集至電腦，並正確顯示於衛星影像上	暫緩
月報	每月撰寫一篇報告	乾濕季各3篇
報告大象行動模式	辦理一次研討會	2012年4月
將研討會建議納入報告	撰寫一篇報告	2012年5月
結案報告初稿	撰寫一篇報告	2012年6月

本計畫總預算US$85,400，預算摘要如下。我國贊助US$15,000，已支用US$3,000，其餘US$12,000將運用於衛星影像和軟體研發，俟工作完成後動支經費。

項目	金額(US$)
項圈(4 個)	24,000
軟體設計	6,000
衛星資料費用(12 月)	8,400
整理伺服器資料	4,900
伺服器資料費用	4,500
繫項圈(包括飛機燃料、飛行員時薪、工作人員食宿等)	11,400
藥品(Drugs & anti-biotics)	5,000
文具	200
項圈校正及回收	5,000
顧問費(20 天)	10,000
研討會報告(1 天)	6,000
總計	85,400

REF: KWS/CONF/1212

26th May 2011

Mr. Yen, Jen-Teh
Director General
Forestry Bureau, COA
No. 2, Section 1, Hangchow South Road
Taipei 100, Taiwan

Dear Yen,

REF: REPORTS FOR KENYA WILDLIFE SERVICE PROJECTS FUNDED BY FORESTRY BUREAU, COA – TAIWAN.

Please find enclosed the final Technical Progress Reports for the 2008 and 2009 projects and a Technical Progress Report for the 2010 project implemented by Kenya Wildlife Service with conservation grant support from the Forestry Bureau, COA, Taiwan as listed below.

Project Title	**Conservation Grant Year**	**Grant Amount (US$)**
Monitoring Equipment for Endangered Black Rhino and Fence Equipment in Nairobi National Park, Kenya	2008	19,000
Helminthes Interface in Humans, the Environment and Black Rhino in Meru National Park and its environs	2009	15,000
The Movement Patterns of Elephants in Meru Conservation Area	2010	15,000

As we continue in our efforts to conserve wildlife, KWS hopes for a favourable response to the 2011 grant consideration for our proposal entitled **Conservation Education and Payment for Environmental Service**.

On behalf of Kenya Wildlife Service, I wish to thank Forestry Bureau, COA Taiwan, for your continued support towards wildlife conservation in Kenya.

Should you require any further information please do not hesitate contact us.

Yours sincerely,

JULIUS KIPNG'ETICH, CBS
DIRECTOR

CC: Mr. Kuan, Li-Hao
Director
Conservation Division
Forestry Bureau, COA
No. 2, Section 1, Hangchow South Road
Taipei, 100, Taiwan

Encls.

TECHNICAL PROJECT PROGRESS REPORT

PROJECT TITLE: MONITORING EQUIPMENT FOR ENDANGERED BLACK RHINO AND FENCE EQUIPMENT IN NAIROBI NATIONAL PARK, KENYA



SUBMITTED TO: FORESTRY BUREAU, COA TAIWAN

BY: KENYA WILDLIFE SERVICE

REPORTING PERIOD: SEPTEMBER 2008 TO MAY 2011

KENYA WILDLIFE SERVICE

MAY 2011

FINAL TECHNICAL PROGRESS REPORT

FORESTRY BUREAU, COA - TAIWAN/KENYA WILDLIFE SERVICE PROJECT

PART 1: GENERAL NARRATIVE REPORT

Project/ Programme Title:	*Monitoring Equipment for Endangered Black Rhino and Fence Equipment in Nairobi National Park, Kenya*
Grant amount	*USD $ 19,000*
Reporting Period:	*Sept 2008-May 2011*
Name (writer(s) of this report):	*Polycarp Okuku*
Position/ Title:	*Rhino Officer*
Organization:	*Kenya Wildlife Service*
Date:	*19th May 2011*

1) SUMMARY

The scope of this project was to assist the management of KWS in Nairobi National Park improve efficiency in rhino monitoring and security. This could only be possible through procurement and supply of rhino monitoring equipment to re-equip the newly established rhino sub headquarters for the monitoring team. These equipment have also enhanced the newly introduced monitoring system where rhinos are monitored at the designated blocks within the National Park.
As a result of this the rhino monitoring team were re-located to Capture Base for centralised and easy coordination purposes in 2008. Similarly, 2 fence posts were established in Kappa and Marimbet areas to reduce vandalism on the fence that is quite crucial in confining rhinos in the National Park. Secondly the creation of these posts went hand in hand with the necessary repairs and installation of energisers and replacement of worn out electrical parts and posts. Thirdly,3 satellite security posts were made at Forest ,Maasai gate and opposite Nazarene University to control cattle influx and illegal activities inside the park. Finally, all purchased equipment like tents, solar powered system and computers were bought and handed over to Rhino monitoring team in Nairobi National Park.

2) ACKNOWLEDGEMENTS

KWS sincerely thanks the Forestry Bureau of Taiwan for their financial support without which this project could not have been a reality. Further appreciation is to Mr. Julius Kipng'etich, Director Kenya Wildlife Service, for facilitating fund raising for this project from the Forestry Bureau, Taiwan. We thank all the personnel from Nairobi National Park Rhino Unit, the Senior Warden's office, the Wildlife Protection Unit, Biodiversity Research and Monitoring Unit, Procurement and Accounts, Civil Works, Fence Technicians and KWS Headquarters (Project Accounts and Rhino Programme) for their participation and technical support in this project. Special thanks go Edwin Wanyonyi and Idza Dzilla of resource mobilization for their step by step technical support during the development of proposal, implementation of project and reporting of project.

3) INTRODUCTION

I. Background

The conservation of the ecological environment for posterity and economic development is an objective of the forestry Bureau COA, Taiwan. This objective has been implemented through specific roles and targets as outlined in the Bureau's strategic plan. Funding for this project was achieved based on the Bureau's role/target on Biodiversity Monitoring and Research. The Bureau's objectives are in line with Kenya Wildlife Service's conservation and management strategy for black rhinos in Kenya for the period 2007-2011, with Nairobi National Park being a key rhino sanctuary (KWS, 2007).

Nairobi National Park which benefited immensely from this funding lies about 8km south of the Kenyan Capital City. It was declared as a national Park in 1946 and for a long time has been blessed to be a successful black rhino sanctuary. The park contributed over 100 black to other sanctuaries and the latest donation was of 5 black rhinos to Oljogi ranch in 2009.Black rhinos here grow at a slightly an average annual growth rate of over 5% per annum. In 2009, some 10 white rhinos were introduced here from Lake Nakuru National Park. The species population stood at 77 black rhinos and 11 white rhinos with 4 calves and 1 calf of births recorded in 2010 for the sanctuary respectively. Hence equipping the monitoring team in this sanctuary in the city is crucial to further her success in diverse dimensions as outlined in the project objective.

4) PROJECT SUCCESSES

I. **Successful re-location of Rangers camp from Mbagathi to Capture Base**:
The unit rangers currently reside about 20 -25 km away from the Mbagathi camp where they used to live before the project started. This re-location has practically easened coordination aspect of these rangers considerably especially on endangered black rhino monitoring activities.

II. **Improved endangered black Rhinos security and fence monitoring**:
Black rhinos are listed in appendix I of the IUCN red list for species that are critically endangered globally.After receipt of project funds, we have established 2 fence outposts, 3 satellite bases at the fence line and park's southern dispersal area respectively as well as managed to repair our rhino monitoring vehicle and portions of damaged electric fence line. These activities have tremendously contributed to reduced habitat destruction; fence vandalism around Kappa to Marimbet fence zones as well as enhanced mobility of rangers within the various patrol blocks.

III. **Improved information on rhino population performance**:
The estimated rhino population in the park around 2008 was estimated as 70 in number. 5 of these were trans- located to a less populated area namely: Ol jogi ranch and about 2 new calves for the species have been positively seen and identified. During the 2010 period the population reached 77 Black and 11 white rhinos and their re-sighting efficiency stood at 87% and 100% respectively. The analysis and retrieval of such rhino monitoring information has been made easier given that we acquired two (2)new computers/accessories and installed a solar system for rhino data base.

5) FINANCIAL REPORT

5a) **Activities**

Output/activity	Progress
1. Centralized Rhino unit's operation base at Capture Base.	▪ 10 staff moved to new camp, Capture Base ▪ 10 Assorted tent age and equipment bought ▪ Assorted Camping gear bought for field usage
2.Rhino security and fence monitoring	▪ 2 fence posts established at Kappa and Marimbet ▪ 3 satellite bases mounted at the wildlife corridor/hot spots ▪ Spares parts, vehicle tyres bought to maintain monitoring vehicle ▪ 5 torches bought ▪ No rhino mortality reported arising from poaching
3.Information on rhino population performance	▪ 87 % black rhinos population positively seen in 2010 ▪ 5 black rhinos trans located to Ol jogi ranch, Kenya in 2009 ▪ 7 new black rhino calves sighted within reporting period ▪ 10white rhinos trans located into Nairobi N Park in 2009and 1 calf born in 2010 ▪ Procured 2 Computers and related networks like 2 printers,2 UPSs,1 inverter, 1 Deep cycle battery, 2 solar panels and accessories

5b)

No	Item/Activity	Budget			Expenditure		Deviation in % and justification
		No of units	Cost/unit (US$)	Total (US$)	No of units	Total Cost (US$)	
1	Establish new rangers camp	1					Projected actual cost went up by 377% to cater for comprehensive kit for rhino monitoring and surveillance
	Re-location		335	2,010	1	329.00	
	Camping gear				Assorted	509.30	
2	Tents and accessories	6			10	8033.00	
3	Establish fence outposts along northern part	2			2	806.50	Projected actual cost went up due to priorities arising from establishing outposts and facilitating activities to counter fence vandalism and improve security systems in the park within project period
	Establish security satellite posts	3			3	62.70	
	Maintain rhino monitoring vehicle	1			1	2404.90	
	Power torches	4	20	80	5	295.20	
4	Solar system to power rhino data base: Solar batteries	3	100	300	1	716.80	The actual cost went up by 137%, again more items like an inverter and charge controller were included to make solar system workable.
5	Solar panels	3	600	1800	2	1,529.40	
	Solar inverter	1			1	852.90	
	Charge controller	1			1	292.60	
6	Computer	1	1,100	1,100	2	1970.60	Extra equipment procured
7	Ups	2			2	255.90	
8	Printer	1	400	400	2	941.20	
9	Pair of binoculars	10	160	1,600	Nil	Nil	Equipment bought by another partner before project commencement
10	Night vision goggles	3	2,500	7,500	Nil	Nil	
11	Digital cameras and lenses	3	1,600	4,800	Nil	Nil	
		Total				19,000.00	

Summary :
Money Received : USD 19,000.00
Money spent to date : USD 19,000.00
Account Balances : NIL)

6) **UNEXPECTED EFFECTS**

- Patrol movements within the park made easier since rhino camp was relocated to a centralised area
- There is need for a crossing bridge on the Mbagathi river to facilitate movements in and out of the new camp
- Increased presence of rhino team in the southern dispersal area significantly assisted in control of competition for browse by rhinos and livestock in the park

7) **LEARNING AND SHARING**

- Use of tents in establishing the new camp serves as a temporal accommodation measure. Future funding should consider up grading them to permanent housing structures since such camps remain in use for over 20 years once made.
- The park 's electric fence is over 20 years old and needs a complete and comprehensive repair to deter wildlife from straying into the capital city or its environs
- Initially the only Rhino monitoring vehicle stayed on duty 24/7 except when it broke down. Given the inherent poaching threats arising from the global village, an additional vehicle was given to the unit and this has considerably improved monitoring efficiency. Both vehicles work day and night to accomplish this noble task.

8) COMMUNICATIONS/ STORIES

Significant improvement in rhino monitoring and surveillance including security of the habitat has been achieved as a result of the project

9) FUTURE ISSUES/ CHALLENGES

Drought and Hunger in Kenya: In 2009 the Government declared the hunger in Kenya as a National disaster. Those who neighboured wildlife areas especially in the dispersal corridor likely poached wildlife for food or money. Due to elongated dry season in most areas in Kenya then including Nairobi National Park, pastoralists introduced their livestock in protected areas in search of pastures for their livestock. This hampered progress in actualising the intensity of block patrol system. Fortunately there was some rainfall in 2010 and this year. This will enhance the improved crop production and livestock husbandry in Kenya.

Effects of Post Election Violence and world economic recession: The situation in 2009 may have provoked people to poach for money and thus constrain the meagre wildlife conservation resources. These two factors negatively affected the KWS conservation budgets. Thus, these had a direct impact on human and capital resources for rhino monitoring and surveillance.
KWS engaged the local community in more conservation and education awareness. KWS also gave priority financial support towards protection and monitoring of wildlife since then. Over time the Kenyan economy grew by 5.4% in 2010 and this caused a simultaneous improvement in the tourism sector as well. Unfortunately Kenyan people are moving closer to 2012 when general elections will be held. This could pose some un-certainties on the way our economy will behave.

10) CONCLUSION

- Most activities were on track as planned. There were variations made on the unit quantity of items procured and changes in unit costs.
- This funding indeed enabled the rhino monitoring unit to move away from park headquarters by centralising their operations. Hence less interference of the patrol teams by head office, more time to collect data, patrol and dominate the rhino range. This led to improved surveillance networks and security to the threatened rhino species.

11) RECOMMENDATIONS

I recommend additional funding to cater for crossing bridge over Athi River in order to access Capture Base, a more durable rangers' accommodation in their new sub- head quarters and for repair of the park's electric fence.

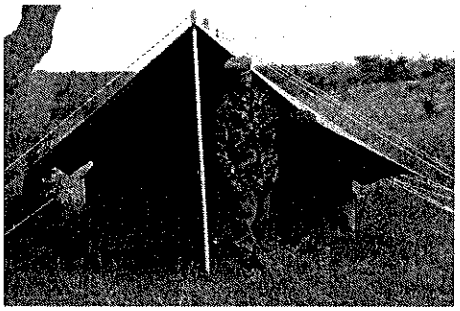
Appendix



Electric Fence line



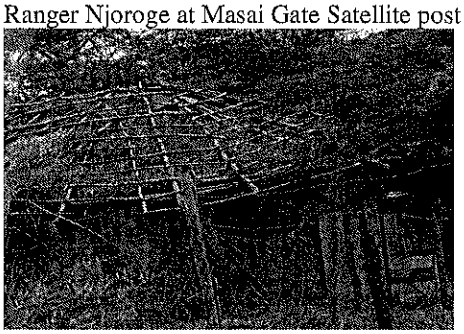
A male black rhino in the park



Ranger Njoroge at Masai Gate Satellite post



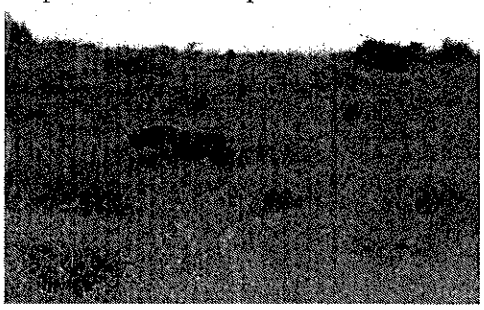
Rhino Monitoring vehicle



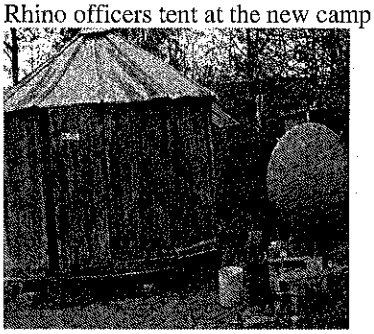
Uniport at the new camp



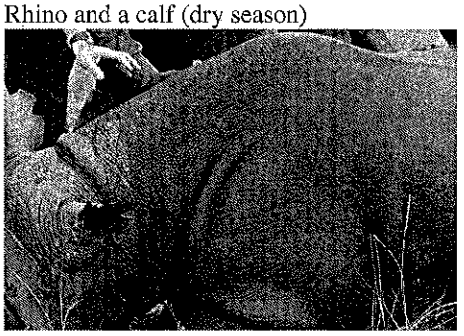
Rhino officers tent at the new camp



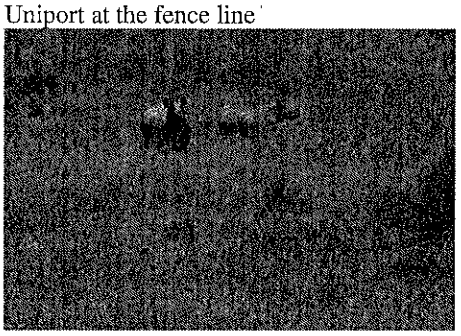
Rhino and a calf (dry season)



Uniport at the fence line



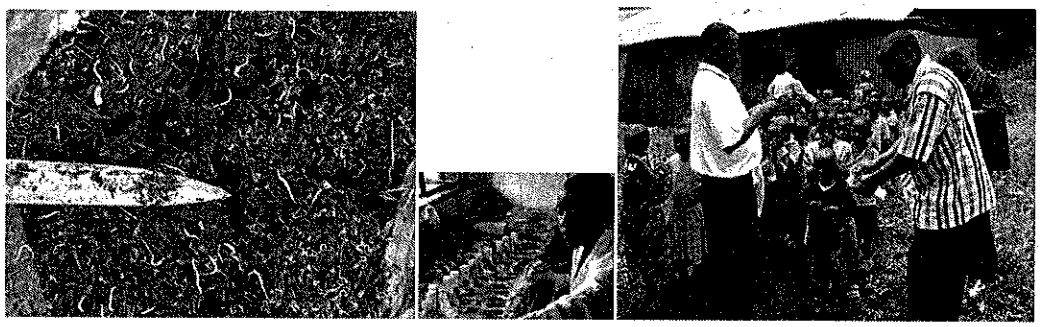
A rhino being immobilised during translocation



Grace and 3 month old calf

TECHNICAL PROJECT PROGRESS REPORT

PROJECT TITLE: **HELMINTHES INTERFACE IN HUMANS, THE ENVIRONMENT AND BLACK RHINO IN MERU NATIONAL PARK AND ITS ENVIRONS**



SUBMITTED TO: **FORESTRY BUREAU, COA TAIWAN**

BY: **KENYA WILDLIFE SERVICE**

REPORTING PERIOD: **SEPTEMBER 2009 TO MAY 2011**

KENYA WILDLIFE SERVICE

MAY 2011

FINAL TECHNICAL PROGRESS REPORT

FORESTRY BUREAU, COA - TAIWAN/KENYA WILDLIFE SERVICE PROJECT

PART 1: GENERAL NARRATIVE REPORT

PROJECT TITLE/OUTLINE

Project/ Programme Title:	*Helminthes Interface in Humans, the Environment and Black Rhino in Meru National Park and its environs*
Grant Amount	*US $ 15,000*
Reporting Period	*September 2009 – May 2011*
Name (writer(s) of this report):	*Shadrack Ngene*
Position/ Title:	*Senior Research Scientist*
Organization:	*Kenya Wildlife Service*
Date:	*18 May 2011*

1) SUMMARY

This study investigated the interface of helminthes in humans, the environment (soil and water) and black rhinos in Meru National Park and its adjacent areas. Data was collected from 669 stool samples from pupils at five primary schools (Kanjoo, Thambiro, Kathithini, Kalimiku, and Vision academy), 30 samples of soils from Thambiro, Kanjoo, and Kathithini areas, 15 samples of water from Kanjoo, Kathithini, and Mutundu rivers, and 12 samples of rhino dung. Hookworms were present in all the rhino and water samples as well as most of the soil and stool samples. Humans contaminate soil with hookworm eggs, which then are swept into adjacent rivers during the rainy seasons. From the rivers, the hookworm eggs are taken in by rhinos as they drink the contaminated water.

Genetic analysis of the hook worms from humans, soils, water and black rhinos is recommended for future research to establish a genetic link of the worms from humans to soil, water and the black rhinos. Construction of eco-toilets in the community area will minimize spread of the hookworms from humans to soil, water and black rhinos.

2) ACKNOWLEDGEMENTS

We would like to thank the Forestry Bureau of Taiwan for the financial support to undertake this project, without their financial support this project could not have been a reality. Further appreciate Mr. Julius Kipng'etich, the Director Kenya Wildlife Service, for facilitating fund raising for this project from the Forestry Bureau, Taiwan. We thank all the personnel from Meru National Park Rhino Unit, the Wildlife Protection Unit, Biodiversity Research and Monitoring Unit, Procurement and Accounts, and KWS Headquarters (Project Accounts, Veterinary Services and Rhino Programme) for their participation and technical support in this project. Special thanks go Edwin Wanyonyi and Idza Dzilla of Resource Mobilization Department for their technical support during proposal development, project implementation and report writing. Technical input and support from Dr. Samuel Kasiki and Patrick Omondi on during proposal development and project implementation are greatly appreciated.

3) INTRODUCTION

I. Background

The conservation of the ecological environment for posterity and economic development is an objective of the forestry Bureau COA, Taiwan. This objective has been implemented through specific roles and targets as outlined in the Bureau's strategic plan. Funding for this project was achieved based on the Bureau's role/target on Biodiversity Monitoring and Research. The Bureau's objectives are in line with Kenya Wildlife Service's conservation and management strategy for black rhinos in Kenya for the period 2007-2017, with Meru National Park being a key rhino sanctuary (KWS, 2007).

Efforts to restock Meru National Park (MNP) with both black and white rhinos started in 2001. The first translocation of 8 rhinos took place in 2003. Before April 2006, the park had a population of 55 rhinos (21 black and 34 white). Today the park has 51 rhinos (32 white and 19 black). Between April 2006 and January 2007, five rhinos have died after their healthy conditions deteriorated. The rhinos are kept in a sanctuary of about 48km^2, which is located within the park.

MNP including the sanctuary is supplied with water by 14 rivers. These rivers originate on the upper parts of Nyambene ranges. This area is heavily settled, with many of the human settlements occurring along the rivers. This is makes access to water for domestic use easy. Sanitation in the area is poor, with families having no pit latrines. Others have constructed pit latrines close to the river systems. In addition, Maua town, located on the upper parts of the MNP catchments area, does not have a sewage system. It experiences flooding during the wet season. This makes all effluents from the town including human wastes, to be discharged to the river system. The above is suspected to result to heavy load of helminthes in water and soils in the affected area, which is consumed by the rhinos.

Recently, the Kenya Wildlife Services reported death of several rhinos where intestinal parasites were suspected to be the main problem. At the moment, there isn't enough information about epidemiology helminthic diseases in the communities living around Meru National Park, the home to the affected wild animals. This report establishes infection patterns of helminthes in the communities around the park, examines the levels of contamination of the environment (water) and finally establishes the infection rates in the rhino population in Meru National Park. The source of infection of rhinoceros (*Diceros bicornis bicornis)* population with intestinal parasites will be established and appropriate control measures will be recommended to the park management.

II. The helminthes

Intestinal parasitic diseases are among the most common infections of humans worldwide. Their association areas with poor standards of hygiene and sanitation are well known (Buck *et al.*, 1978). Infection by water and soil transmitted helminthes has been increasingly recognized as an important public health problem, particularly in developing countries. Progress has been made in the understanding of ecology, epidemiology and related morbidity and in developing new tools for control. In the 1993 *World Development Report,* intestinal helminthes ranked first as a cause of disease burden in children aged 5-14 years and was grouped among the diseases that can be efficiently controlled by cost-effective intervention. Although effective drugs have been available for over a quarter a century, geo-helminthes remain entrenched in most of the tropical countries particularly the sub-Saharan Africa causing untold suffering to millions of people. World Health Organization has focused intervention activities on these parasites, which are widespread and highly prevalent, but also relatively easy to control through health education and mass chemotherapy (WHO 1997; Savioli *et al.*, 1992).

Apart from climatic conditions, helminthes are associated with several other factors, including socioeconomic status of the population in consideration, availability of safe water and sanitation. Low levels of education compounded with lack of knowledge and misconceptions regarding helminthic infection contribute significantly toward their distribution and intensity in the population. High transmission rates of helminthes are therefore found in the rural areas with poor sanitation, very low personal hygiene and where education regarding transmission is inadequate. Other factors influencing the distribution of geo-helminthes relate to family size and population density (Akogun, 1989; Haswell *et al.*, 1989). These characteristics fit well with the conditions on the western side of Meru rhino sanctuary.

4) PROJECT SUCCESSES

I. Successful stakeholders' sensitization meetings on the project objectives and implementation schedule

The communities living on the western boundary of Meru National Park have maintained poor hygiene, since they use bushes and rivers as sites for depositing digestive wastes. The fecal materials are ingested by black rhinos, especially when they drink the contaminated water. Firstly, meetings were held with District Officers (DO), Public Health Officers (PHO), and Area Education Officers (AEO) in Ndoleli, and Kiengu Divisions. The objective of the meetings was to inform the respective officers of Kenya Wildlife Service (KWS) intention to carry out the project. The objectives of the project were discussed during the meetings. Secondly, target schools were visited and the respective school administration informed about the project objectives and its implementation plan. The schools were geo-referenced using a hand held GPS unit. Thirdly, community meetings were held to enlighten the community about the project. During the meetings, the importance of proper environmental hygiene was discussed. This created awareness to communities on the need to use pit latrines,

with the goal of reducing helminthes load in soil and water. As such, the health status and associated fecundity of the black rhinos in Meru National Park will be enhanced.

II. Expected improved of the health status and fecundity of black Rhinos in Meru National Park:

Black rhinos are listed as endangered species in the IUCN red list for critically globally endangered species of wild animal. In order to ensure that the population grows by 5% each year, a healthy rhino population is essential. By making the communities aware of the need of a hygienic environment, the loads of helminthes in the environment, and thereafter in rhinos will be lowered. This will improve the health status of the rhinos, therefore enhancing their fecundity.

5) PROJECT RESULTS

A total of 669 stool samples were collected from different pupils in five primary schools within the study area. The schools included Thambiro (30.1%; n = 201), Kalimiku (21.1%; n = 168), Kanjoo (32.1%; n = 215), Kathithini (10.3%; n = 69), and Vision academy (2.4%; n = 16). About 11.2% (n = 75) of the pupils sampled were infected with different species of helminthes. From the seventy five pupils infected, 53% (n = 40) were infected with hookworms. A summary of infections in different schools is provided in tables 1-5 below.

Stool samples were collected from 201 pupils in Thambiro primary school. About 31.3% (n = 63), 41.3% (n= 83), and 27.4% (n = 55) of the stool samples were collected in class 2, class 3 and class 4 respectively. A total of twenty one pupils were infected with different species of helminthes representing about 10.5% infection of the population. About 2.5% (n = 5), 3.0% (n = 6), and 5.0% (n = 10) of the infected pupils were in class 2, class 3 and class 4 respectively. Table 1 below provides a summary of the infections of pupils in different classes by different species of helminthes.

Table 1: Number of different species of helmithes found in pupils in classes 2-4 in Thambiro primary school, Igembe district. **F** = Female; **M** = Male; – = Sex not established; **L** = Lubricoides; **T** = Trichura; **H** = Haemenolepis; **E** = Enterobias; **Verm** = Vermicularis.

Class	Sex	Age	Hookworm	Ascaris L.	Trichuris T.	H. Nana	E. Verm
2	F	7	0	0	1	0	0
	M	11	0	0	7	0	0
	M	12	446	3	22	0	0
	F	7	0	0	2	0	0
	F	8	0	0	13	0	0
3	F	10	0	0	2	0	0
	F	10	2	0	0	0	0
	M	10	3	0	0	0	0
	F	10	0	0	0	0	3
	F	7	0	0	6	0	0
	F	12	0	0	6	0	0
4	M	12	0	146	0	0	0
	M	13	0	0	1	0	0
	M	12	34	0	1	0	0
	F	10	1	0	0	0	0
	F	11	0	0	0	2	0
	F	10	0	0	3	0	0
	M	12	0	0	0	2	0
	M	12	0	0	2	0	0
	M	12	1	0	0	0	0
	F	12	1	0	1	0	0

In Kalimiki primary school, stool samples were collected from 168 pupils in classes 1-5 respectively. About 16% (n = 26), 20% (n = 34), 28% (n = 47), 23% (n = 39), and 13% (n = 22) of the stool samples were collected in classes 1, class 2, class 3, class 4 and class 5 respectively. About 2.4% (n = 4), 2.4% (n =4), 3.0% (n = 5), 3.5% (n =6), and 2.45 (n = 4) of the pupils in class 1, class 2, class 3, class 4 and class 5 were infected by different species of helminthes (Table 2). Table 2 below provides details of the infections of pupils by different species of helminthes.

Table 2: Number of different species of helminthes recorded in pupils in classes 2-4 at Kalimiku primary school, Igembe district. **F** = Female; **M** = Male; **-** = Sex not established: **L** = Lubricoides; **T** = Trichura; **H** = Haemenolepis; **E** = Enterobias; **Verm** = Vermicularis

Class	Sex	Hookworm	Ascaris L.	Trichuris T.	H. Nana	Taenia	E. Verm
	F	11	0	0	0	0	0
	F	0	0	5	0	0	0
Class 1	F	0	0	1	0	0	0
	M	13	0	0	0	0	0
	F	14	0	0	0	0	0
	M	2	0	0	0	0	0
	F	3	0	0	0	0	0
Class 2	M	125	0	2	4	0	0
	-	4	0	0	0	0	0
	F	5	0	9	0	0	0
	F	8	0	3	0	0	0
	F	0	0	3	0	0	0
Class 3	M	7	0	0	0	0	0
	-	0	0	2	0	0	0
	-	0	0	3	0	0	0
	-	4	0	0	0	0	0
	-	0	0	6	0	0	0
Class 4	-	0	903	0	0	0	0
	-	7	0	0	0	0	0
	F	0	0	3	0	0	0
	F	0	87	4	0	0	0
Class 5	F	0	0	0	1	0	0
	M	2	0	0	0	0	0

Stool samples were collected from 215 pupils at Kanjoo primary school. About 63% (n = 136) and 37% (n = 79) of the samples were collected in classes 3 and 4 respectively. Out of these, 13% (n= 28) of the pupils were infected by different helminthes species. Of the infected pupils, 9% (n = 20) and 4% (n = 8) were from class 3 and class 4 respectively. Table 3 below presents a summary of the pupils infected by the different species of helminthes.

Table 3: Number of different species helminthes recorded in pupils in classes 3-4 in Kanjoo primary school, Igembe district. **F** = Female; **M** = Male; **–** = Sex not established: **L** = Lubricoides; **T** = Trichura; **H** = Haemenolepis; **E** = Enterobias; **Verm** = Vermicularis.

Class	Sex	Age	Hookworm spp	Ascaris L.	Trichuris T.	H. Nana	Taenia spp	E. Verm.
	M	12	7	0	1	0	0	0
	F	13	2	0	0	0	0	0
	F	10	0	0	3	0	0	0
	M	10	1	0	0	0	0	0
	M	16	3	0	0	0	0	0
	M	14	0	0	0	0	0	6
	F	11	5	0	0	0	0	0
	M	15	2	0	0	0	0	0
	F	10	0	0	0	2	0	0
	M	13	4	0	0	0	0	0
	F	13	4	0	0	0	0	0
	M	11	2	0	0	0	0	0
	M	10	14	0	4	0	0	0
	M	14	6	0	0	0	0	0
	F	10	0	0	3	0	0	0
	M	7	0	0	2	0	0	0
	M	11	8	0	0	0	0	0
	F	9	26	0	0	0	0	0
	F	12	8	0	0	0	0	0
Class 3	F	7	0	0	6	0	0	0
	M	13	8	0	0	0	0	0
	M	14	9	0	0	0	0	0
	F	12	6	0	0	0	0	0
	M	14	0	0	1	0	0	0
	M	11	3	0	0	0	0	0
	F	13	3	0	6	0	0	0
	M	13	6	0	0	0	0	0
Class 4	F	10	0	0	2	0	0	0

Sixty nine stool samples were collected from pupils in Kathithini primary school. Only about 4% (n = 3) of the sampled pupils were infected with different species of helminthes. Table 4 below presents a summary of number of pupils infected by different species of helminthes.

In addition, sixteen pupils from Vision academy near Kanjoo primary school were also sampled. None of the pupils (7 males and 9 females) was infected by helminthes.

Table 4: Number of different species of helminthes recorded in pupils in class 2 in Kathithini primary school, Igembe district. **F** = Female; **M** = Male; **–** = Sex not established: **L** = Lubricoides; **T** = Trichura; **H** = Haemenolepis; **E** = Enterobias; **Verm** = Vermicularis

Sex	Age	Hookworm spp	Ascaris L.	Trichuris T.	H. Nana	Taenia spp	E. Verm
F	11	0	0	1	0	0	0
F	11	0	0	1	0	0	0
F	8	0	0	0	0	40	0

Eggs of hookworms were found in most of the soil samples collected at Thambiro, Kanjoo, and Kathithini areas (Table 6). A summary of the presence and absence of eggs of different helminthes species is provided in table 6 below.

Table 6: Presence (1) and absence (0) of different species of helminthes in soil samples collected at Thambiro, Kanjoo, Kathithini, and Murera areas, west of Meru rhino sanctuary. **L** = Lubricoides; **T** = Trichura; **H** = Haemenolepis; **E** = Enterobias; **Verm** = Vermicularis.

Sample sites	Hookworm spp	Ascaris L.	Trichuris T.	H. Nana	Taenia spp	E. Verm.
	1	1	1	0	0	1
	1	1	0	1	1	0
	0	1	1	1	1	0
	1	1	0	0	1	0
	1	1	1	0	0	1
	1	0	0	1	0	0
	1	1	0	0	1	1
	1	1	0	0	1	1
	1	1	1	1	1	0
Thambiro area	0	0	1	1	1	0
	1	1	0	1	1	0
	1	1	1	1	1	0
	1	1	0	0	1	0
	1	1	1	0	1	0
	1	0	0	1	1	1
	0	0	1	0	0	0
	0	1	0	1	1	0
	1	1	0	1	0	0
	1	0	0	1	1	0
Kanjoo area	1	0	1	0	1	1
	1	1	0	0	0	0
	1	0	1	0	1	0
	1	1	0	1	0	1
	1	0	1	0	1	0
	1	1	0	1	1	0
	1	0	1	1	1	1
	0	0	1	1	0	0
	1	1	1	1	1	0
	1	1	1	0	1	1
Kathithini area	1	1	0	0	1	0

Eggs of hookworm species were recorded in each of the five water samples collected along rivers Kanjoo, Kathithini and Mutundu (Table 6). Table 6 below presents a summary of other species of helminthes recorded in water samples collected in the three rivers.

Table 6: Presence (1) and absence (0) of different species of helmiths in water samples collected along Rivers Kanjoo, Kathithini,and Mutundu in Meru rhino sanctuary. **L** = Lubricoides; **T** = Trichura; **H** = Haemenolepis; **E** = Enterobias; **Verm** = Vermicularis.

Sample sites	Hookworm spp	Ascaris L.	Trichuris T.	H. Nana	Taenia spp	E. Verm.
	1	1	1	0	0	1
	1	1	0	1	1	0
	1	1	1	1	1	0
	1	1	0	0	1	0
Kanjoo River	1	1	1	0	1	0
	1	1	0	1	0	1
	1	0	1	0	0	0
	1	0	0	1	0	0
	1	1	1	1	1	0
Kathithini River	1	0	0	1	1	1
	1	1	0	0	0	0
	1	0	1	0	1	0
	1	1	0	1	0	1
	1	0	1	0	1	0
Mutundu River	1	1	0	1	1	0

Twelve dung samples from different black rhinos in Meru rhino sanctuary were collected. All the samples had hood worms. Only one sample from the rhino named Stella had Taenia species. Table 7 below provides a summary of the names of rhinos and their infection status.

Table 7: The names of rhinos whose dung samples were collected and analysed for presence or absence of different species of helminths. Spp = species; 1 = presence of helminths species; 0 = absence of helminths species.

Name	Hookworm spp	Taenia spp
Mtoto wa Njambi	1	0
Mtoto	1	0
Adam	1	0
White	1	0
Njambi	1	0
Silvan	1	0
Gathuo	1	0
Makhamisa	1	0
Nderitu	1	0
Wetite	1	0
White 2	1	0
Stella	1	1

6) FINANCIAL REPORT

Items	Quantity	Budget in USD	Expenditure in USD	Deviation in %, justification & other comments
Glass slides	2000pcs	11.54		Provided by KEMRI Reallocated for project operations and management after approval from the Assistant Director Eastern Conservation Area
Cover slips	20 packets	38.46		Provided by KEMRI
Stool specimen containers (with spatula)	2000pcs	512.82		Provided by KEMRI Reallocated as above
Kato Kartz kit	For2500 samples	320.51		Provided by KEMRI Reallocated as above
Centrifuge tubes (for stool concentration)	400pcs	356.41		Provided by KEMRI Reallocated as above
Funnels (plastic)	20pcs	25.64		Provided by KEMRI Reallocated as above
Gloves (rubber size)	100boxes	384.62		Provided by KEMRI Reallocated for vehicle maintenance with approval from the Assistant Director Eastern Conservation Area
Gauze	20rolls	205.13		Provided by KEMRI Reallocated for vehicle maintenance with approval from the Assistant Director Eastern Conservation Area
Stationary /office supplies		256.41		Provided by KEMRI Reallocated for project operations and management after approval from the Assistant Director Eastern Conservation Area
Acetone	10litres	76.92		Provided by KEMRI Reallocated as above
Diethyl ether	10liters	205.13		Provided by KEMRI Reallocated as above
Iodine	2litres	38.46		Provided by KEMRI Reallocated as above
Ethanol	15litres	134.63		Provided by KEMRI Reallocated as above
Lysol AR	40litres	128.21		Provided by KEMRI Reallocated as above
Formaline	10litres	128.22		Provided by KEMRI Reallocated as above
Albendazole	10,000tabs	2,564.10	2,564.10	Procured by Taiwan Funds
Fuel	70 L/day for 30 days = 2,100	1,884.61	1,884.61	Provided by Taiwan Funds

Items	Quantity	Budget in USD	Expenditure in USD	Deviation in % and justification
Operation and management	-	Nil	2233.36	Provided by Taiwan Funds
Vehicle maintenance	30 days	1,346.15	2,034.6	Provided by Taiwan Funds
Allowances	30 days	4,423.07	4,423.07	Provided by Taiwan Funds
PC (Desktop)	1pc	Nil	1,206.41	Procured by Taiwan Funds. These items were procured using the contingency budget of USD 1910.26. These items were purchased to be used to maintain the project data base and other research database in the park after approval by KWS director
UPS	1pc	Nil	179.49	
Printer (HP laser jet)	1pc	Nil	474.36	
Contingency		1,910.26		, Used to procure PC, UPS and printer
Summary : **Money Received : USD 15,000.00** **Money spent to date : USD 15,000** **Account Balances : USD Nil**				

7) UNEXPECTED EFFECTS

- Improved community awareness of the need to maintain a hygienic environment
- Government willingness to construct eco-toilets to affected communities
- The need to continue with the phase two of the project. This phase to focus on genetic study of the worms in humans, the environment and rhinos as well as construction of eco-toilets for the communities

8) LEARNING AND SHARING

- Hook worms were found in human, the environment (water), and the black rhinos. This is an indication that humans contaminate the water with the hookworms in areas where sanitation is poor. These are then taken in by rhinos as they drink the contaminated water.
- This problem can be resolved by constructing eco-toilets for communities living in the Meru rhino sanctuary catchment area as well as enhancing environmental health education and awareness campaigns in the area.

9) COMMUNICATIONS/ STORIES

- By discussing and involving government officials at divisional to locational level, it will be possible to construct eco-toilets for the communities as a follow up project.

- As part of Kenya Wildlife Service information dissemination strategy, information regarding the de-worming programme was placed in the organization's website.

10) FUTURE ISSUES/ CHALLENGES

- **April-May Rains:** The area receives rains during this period. This makes some areas impassable. This will be addressed by using 4X4 wheel drive vehicles and targeting easily accessible schools.

- **Community unwillingness to adopt new innovations**: The community within the project area is less educated and may not easily adopt new ideas from outsiders. This may limit return of stool sample. Also, the community may be unwilling to accept construction of eco-toilets. These will be addressed by engaging the local community local key opinion leaders and the local government.

11) OVERALL ASSESSMENT OF THE PROJECT

- The project results link helminthes in humans, the environment (water) and black rhinos in Meru rhino sanctuary.

12) CONCLUSIONS

In this report we describe the interface of helminthes in humans, the environment (soils and water) and black rhinoceros in Meru National Park. Hookworms were present in humans, the environment (soils and water), and black rhinos. Poor sanitation and hygiene in the community area west of the park contributes to the presence of hookworm eggs in the soil. The eggs are swept into rivers draining water into the park during the rainy season. The black rhinos drink the contaminated water, thereby getting infected with the hookworms. Education and awareness campaigns including construction of eco-toilets in the area will help remedy the situation.

13) RECOMMENDATIONS

In-order to minimise infection of the black rhinos with hookworms and other helminthes, we recommend the following:

- The communities living on the western boundary of Meru National Park needs to be educated on the importance of proper sanitation as well as the importance of using toilets. This will reduce use of bushes as human faecal deposition sites.
- There is need to carry out a genetic study to verify the link of hookworms from humans, soil, water, and black rhinos in Meru National Park.
- Construction of eco-toilets in homesteads without toilets will reduce deposition of human faecal matter within bushes.

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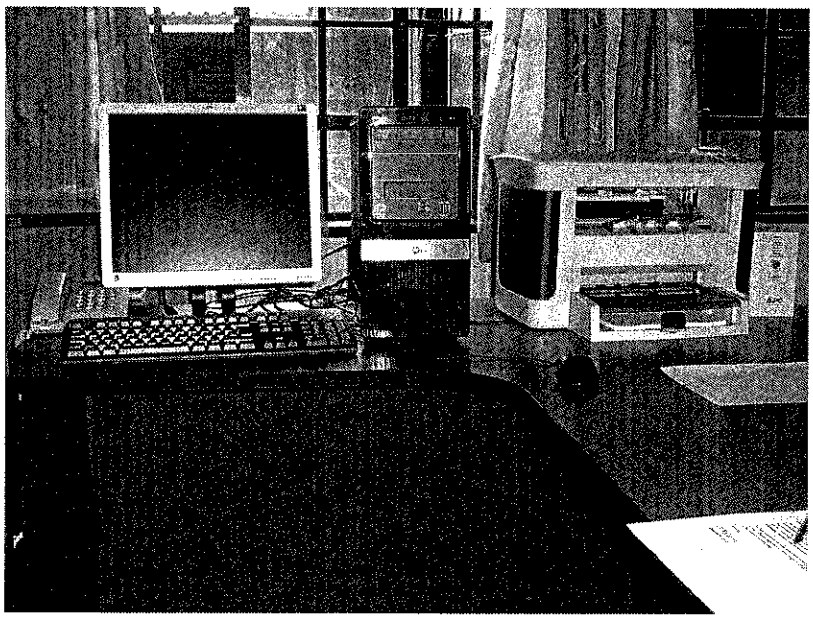
ANNEXES

Annex 1: Intestinal worms in a black rhino named Muema that died in Meru rhino sanctuary. This photograph motivated the development of the proposal, which resulted to this report



Annex 2: A computer, three-in-one LaserJet printing machine (printer, photocopier and scanner), and a UPS equipment procured using the funds provided by the Forest Bureau, Taiwan. These equipments is being used by the Senior Scientist Eastern Conservation Area



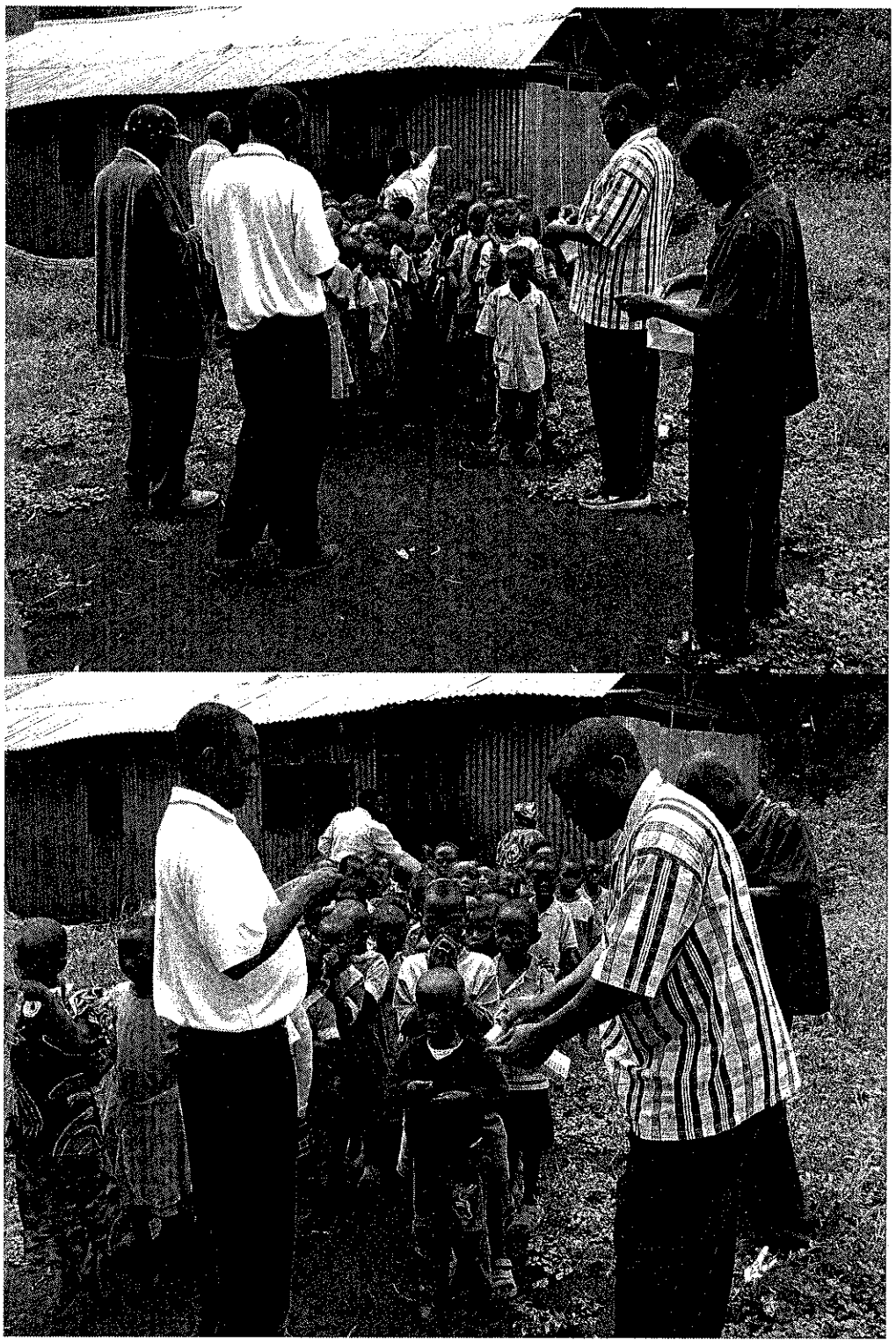
Annex 3: Justus Makau of Kenya Medical Research Institute explains a point to the headmaster of Kanjoo primary school, west of Meru National park. The school is about 5 kilometers from the western boundary of the Meru Park. Looking on from the left is the area education office (AEO), Kenya WildlifeService veterinary officer (Dr. Rono), and Geoffery Bundotich, a researcher in Meru National Park



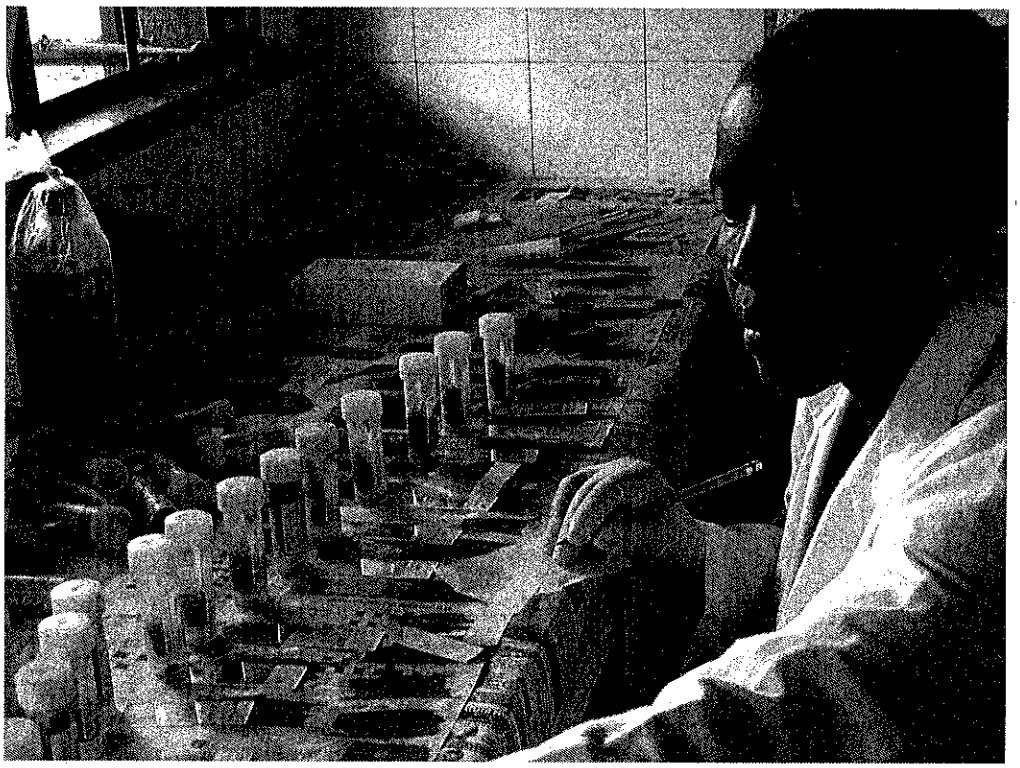
Annex 4: Justus Makau of Kenya Medical Research Institute explains to pupils in Kanjooprimary school how to collect stool samples in a container.



Annex 5: The team giving pupils in albedazole de-worming tablets after completing obtaining samples from the school.



Annex 6: A laboratory technician preparing stool samples from pupils in a laboratory in Murera, Meru National park. Some of the samples collected from the field.

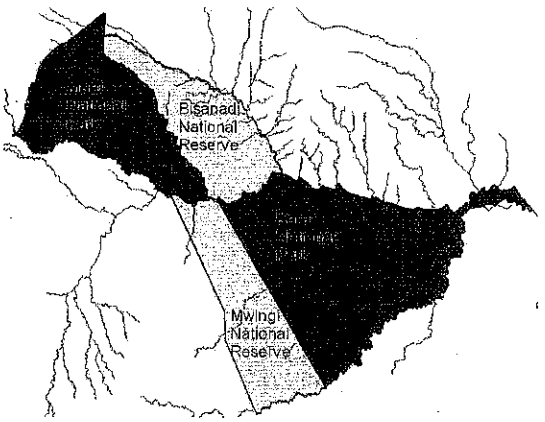


Annex 7: A laboratory technician identifying helminthes using a microscope in Murera, Meru National Park



TECHNICAL PROJECT PROGRESS REPORT

PROJECT TITLE: **THE MOVEMENT PATTERNS OF ELEPHANTS IN MERU CONSERVATION AREA**



SUBMITTED TO: **FORESTRY BUREAU, COA TAIWAN**

BY: **KENYA WILDLIFE SERVICE**

REPORTING PERIOD: **1ST SEPTEMBER 2010 TO 28TH FEBRUARY 2011**

KENYA WILDLIFE SERVICE

MAY 2011

TECHNICAL PROGRESS REPORT

FORESTRY BUREAU, COA - TAIWAN/KENYA WILDLIFE SERVICE PROJECT

TITLE: **THE MOVEMENT PATTERNS OF ELEPHANTS IN MERU CONSERVATION AREA**

1. Project Outline

Project Name / Title	*The Movement Patterns of Elephants in Meru Conservation Area*
Project Amount	*US $ 15,000*
Reporting Period	*1st September 2010 to 28th February 2011*
Name of writer of Report	*Winston Ouna*
Position / Title	*KWS Senior Scientist*
Organization	*Kenya Wildlife Service*
Date	*19th May 2011*

2. Project Achievements

The Meru Conservation Area (MCA) consists of Meru National Park (MNP; 870 km^2), Bisanadi National Reserve (BNR; 606 km^2) Kora National Reserve (KNP; 1789 km^2) and the Mwingi National Reserve (MNR; 745 km^2).

The project has been able to put together data on previous aerial surveys that covered an area of approximately 11,000km^2, which include the MCA and parts of the Northern Grazing Area (NGA). During the surveys, elephants were recorded in KNP, BNR, MNP and the NGA. Aerial surveys only provide data on the location and number of animals counted during the exercise. However this information does provide details on their movement patterns and migratory routes.

The project has been able to develop baseline information on elephant migratory routes. This is also combined with the preferred habitats during the wet and dry season. From the baseline, its also emerging that some of the areas that were previously used as migratory corridors have now been inhabited by human beings. In essence it begins to indicate the reasons for increased elephant-human wildlife conflict in the areas between Meru National Park and Shaba National Reserve.

From the data and baseline information on emergent issue is the need to develop a participatory GIS mapping that is likely to be faster in giving feedback and at minimal costs. This is also based on feedback on the pilot study of software being undertaken by a partner organisation in Isiolo and Lewa.

Therefore as part of the strategy for implementing this program the focus shall shift alittle from collaring two elephants to a stakeholder engagement strategy and community information on the movement patterns of the elephants.

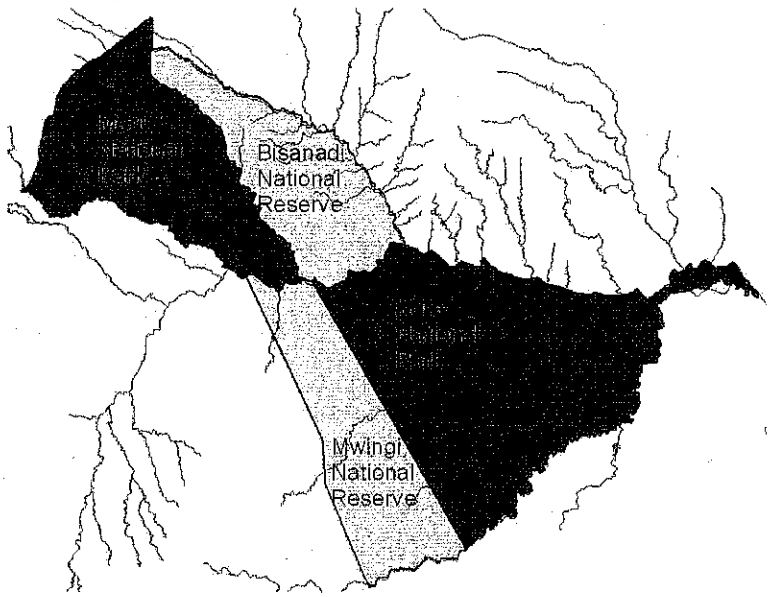
1.0 INTRODUCTION

1.1 Background

The Meru Conservation Area (MCA) consists of Meru National Park (MNP; 870

km2), Bisanadi National Reserve (BNR; 606 km2) Kora National Reserve (KNP; 1789 km2) and the Mwingi National Reserve (MNR; 745 km2). Previous aerial surveys have covered an area of approximately 11,000km2, which include the MCA and parts of the Northern Grazing Area (NGA). During the surveys, elephants were recorded in KNP, BNR, MNP and the NGA.

Aerial surveys only provide data on the location and number of animals counted during the exercise. However, information on the way the wildlife move each day is important as it provides information on the areas, which are critical for the survival of the species being studies. In this study, we propose to establish the movement patterns of elephants during the wet and dry season with the goal of identifying areas they often use during the wet and dry seasons. We will use the Participatory Mapping method. In this method the local people (indigenous knowledge) are used to monitor the elephants and record their location. An aircraft is also used to corroborate and ground truth.



1.2 The Participatory GIS Mapping

This is a stakeholders Engagement strategy

Collating information for decision-making has always been the basis for planning. Correlating this information to its distribution over the territory and performing spatial analysis by establishing relationships between different layers of information has been an acquirement of the latest decade thanks to Geographic Information Systems. Participatory Mapping practices, methods, methodologies and tools have been playing an increasing role in the context of community-driven advocacy, spatial planning and collaborative natural resource management. The project will thus be dependent on local pastoral communities who are found within the study area.

This study will form part of the elephant movement study already going on in Marsabit National park/Reserve (MNP/R) and their environs. The MNP/R study has shown that during the dry season, the elephants use the lowlands (shrub-land) during the night and the forest during the day. During the wet season, the move to the

lowlands and remain there until the beginning of the dry season, when water became scarce within the lowlands.

1.3 Justification

The human population pressures and changes in land-use practices in areas next to parks and reserves demand that conservation strategy be developed to fulfil a set of realistic objectives and multiple functions if they are to survive. An ideal management strategy should aim at protecting wildlife without ignoring interests' of the local people and should be sustainable within the desired framework of human economic development. Protected areas should therefore be planned and managed through local, national and regional cooperation and their management plans should be developed alongside development plans for the surrounding areas. It is worthy to note that keystone species such as elephants and other wildlife species have coexisted with humans for centuries and with better conservation and management programs they can still coexist.

Improvement of security within the environs of Meru Conservation Area (MCA) has resulted to increased sedentary settlements within the environs of the MCA with more land being cleared to give room to crop farming. These areas are used by elephants during the wet season. For example, during the December 2006 aerial survey, a total of 504 elephants were counted, with over 90% of this number being found outside the protected areas within the MCA. The MCA elephant population is known to move to Mount Kenya, Laikipia and lower parts of Isiolo during the wet season, and they move back during the peak of the dry season. With increasing human population, land under crop farming and settlements, it is expected that the present migratory routes for the elephants and other species will be reduced considerably, thus calling for urgent measures to protect the corridors. However, the migratory routes and dispersal areas are not well known and understood. This makes it difficult to design remedial measures such as proper zoning, delineation and planning.

The length and width of the elephant migratory corridors within the MCA environs is not known. In addition, all the areas that are used by the elephants during the wet and dry season are not known. Also, it is not known how far the elephants move from the protected areas within the MCA. We aim to provide information on elephant movement patterns, which is necessary for designing effective elephant management strategies within the MCA ecosystem.

KWS urgently needs information on the movement patterns of the MCA elephants for the following reasons:

- To establish the actual areas utilised by elephants during the wet and dry seasons
- To provide up to date information on elephant distribution for effective security monitoring
- To provide data and information to assist in designing management interventions in the MCA especially with regard to elephant conservation and management issues.
- To provide information for use to lobby on the importance of specific areas outside the protected areas
- To establish whether or not (and when) the Meru elephants migrate to Shaba National Reserve
- To establish the length and width of the elephant migratory corridors with the view

of saving them from further being sub-divided and allocated for settlements and crop farming.

1.4 Overall Goal & Objective

The goal of the elephant movement patterns study will be to provide information on the specific migratory routes used by elephants during the wet and dry season within the environs of MCA. It will also give recommendation for future planning and areas of focus in order to prioritise current and future interventions.

The specific objectives of the study are:

- To map elephant migratory routes spatially and temporal within the MCA and its environs
- To identify the habitats preferred by elephants during the wet and dry season
- To establish the distance of migrating elephants from farms and human settlements
- Establish the impact of land use changes on the movement pattern of the elephants within the MCA and its environs

2.0 METHODOLOGY

Using GIS it is possible to convert a resource use and control exercise from a perception based process to one that is based on factual spatial data. To do so, the SRS is required to have completed the resource mapping and prepared the required map.

This provides the respondents two kinds of information:

• Prioritizing of the resource is possible on the basis of its extent and potential.

• Stakes are more clearly articulated and any negotiations are based on factual data and not wrong perceptions.

Typically, a resource use/control exercise is preceded by the group having a discussion on a map or, in the absence of one, the creation of a resource map. The group is then able to take up specific resources for the use/control exercise and subsequent discussions are more focused.

2.1 Pre-Participatory GIS mapping Activities

1. Preparation of Field maps
2. Preparation of data sheets
3. Identification and Training of field Trackers

2.2 Participatory GIS Mapping Activities

1. Identifying and mapping elephant migratory tracks
2. Geo-referencing the data onto maps
3. Developing final maps

2.3 The Participatory GIS Mapping Team

Table 1 below gives a summary of equipment, aircraft, and vehicles to be used during the mapping operation.

Categories	Number required	Source
Team leader	1	KWS=1
Pilots	1	KWS=2

Trainers	3	KWS=3
GIS Team	2	KWS=2
Elephant locators	14	Community= 14
Security rangers	4	KWS=2
Drivers	2	KWS=2
Total	**7**	**KWS= 10**

2.4 Participatory GIS Mapping Requirements

Table 3: **Category, number and source of equipment, aircraft and vehicles to be used during the collaring operation**

Categories	Quantity	Source
Laptop	1	KWS=1
Cell-Phones	6	KWS
Anti-biotic	100mg	Donor
GPS	6	KWS
Cameras	2	KWS
Aircraft	1	KWS=1
Vehicles	2	KWS

3.0 Revised Timeline for Implementation

Activity	Target output	Comments	Time Frame
Literature Review	Background information of MCA and its Environs; data on past land use practices; human population/settlement; wildlife population sizes and distribution; wildlife migratory routes	Completed	End of December 2010
Acquisition of satellite image of area -Land sat TM	Image covering MCA acquired	Completed	January 2011
Training of field Observers/Trackers	Locating by GPs the Elephant location		June 2011
Monitoring of elephants	Daily elephant movement data 2. Aerial surveillance		1.July – September (wet)-2011 2.January-March-(dry)-2012
Purchase of collars	2 collars purchased		Suspended due to cost implication beyond the budget and need to undertake first a participatory GIS process
Organisation of data on the web and server	All 6 collared elephants data logged to server and displayed correctly on satellite image		Suspended
Collaring operation	6 collars deployed		Suspended
Development of software for downloading data from satellite	Program to download data from server in place		Suspended
Aircraft fuel & drugs	Flying 15hrs every month for 6 months to track GIS information		Bi-monthly
Monitoring of elephants	Daily elephant movement data	Awaiting commitment of funds	Continous
Monthly reports	1 report each month	Awaiting commitment of funds	3reports – wet season 3reports dry season
Presentation of elephant movement patterns report	1 workshop held	Awaiting commitment of funds	April 2012
Incorporate workshop comments into draft report	Final report	Awaiting commitment of funds	May 2012
Final report (draft)	1 report	Awaiting commitment of funds	June 2012

- KWS to train the elephant trackers in use of GPS and data entry
- In places where there is no cell-phone network KWS to assist and train community Trackers with Radio (Hand set)

4.0ANTICIPATED PROJECT BENEFITS & OUTPUTS

4.1 Anticipated Benefits

The study will provide more data and information on:

- The seasonal distribution of elephants in MNP, KNP, BNR, and adjacent environs
- The impacts of encroachment of human activities to elephant migratory corridors and dispersal areas
- The remaining length and width of the elephant migratory corridors
- Areas used and not used by elephants during the wet and dry seasons

4.2 Expected Outputs

The following are the expected outputs":

- Monthly report in which the movement patterns of elephants in the month will be discussed.
- A final report will be provided after the study. The report will make recommendations to assist in designing an elephant management strategy for the Meru Conservation Area Ecosystem.
- A Paper titled, "The movement patterns of elephants in MCA and adjacent environs", will be prepared and presented in the African Journal of ecology for publishing.
- A paper titled, "A comparative analysis of the movement patterns of elephants in MCA and Marsabit and their environs", will be prepared and presented to the International Journal of GIS and Remote Sensing for publishing. This paper will form part of the SRS PhD thesis, which is in preparation.

5.0 BUDGET

No.	Items	Quantity	In Kshs.	US $
1.	Community Trackers (monthly installments)	Ksh 1500x 6persons x 6months	54,000	771
2.	Tracking Training	2days	50,000	714
3.	Report writing		50,000	714
4	Digital Camcorder/ Digital Camera/GPS	6	100,000	1,429
5	Avi-Gas	8 drums (50000 per drum)	400,000	5,714
6	Flying Hours	15hrs every month (ksh 1000 per hr) for 6 months	90,000	1,286
7	Travel and Accommodation for project implementation team		150,000	2,143
8	Fuel and maintenance of vehicle		100,000	1,429
9	Field/out of pocket allowance		50,000	714
10	Stationary		25,000	357
	Total		**1,069,000**	**15,271**

PROGRESS REPORT ON
THE MOVEMENT PATTERNS OF ELEPHANTS IN MERU CONSERVATION AREA
MARCH 2011

1. **Project Outline**

Project Name / Title	The Movement Patterns Of Elephants In Meru Conservation Area
Reporting Period	1st September 2011 to 28th February 2011
Organization	Kenya Wildlife Service
Date	14th March 2011

2. **Project Achievements**

The project has been able to develop baseline information on elephant migratory routes. This is also combined with the preferred habitats during the wet and dry season. From the baseline, its also emerging that some of the areas that were previously used as migratory corridors have now been inhabited by human beings. In essence it begins to indicate the reasons for increased elephant-human wildlife conflict in the areas between Meru National Park and Shaba National Reserve.

Though the project has recorded some achievements, the full implementation delayed for three months due to desire for baseline information and the required specifications to procure digital collars. Further there was need to reprioritize the activities to be undertaken as the budget available was limited and the provision of funding by the French Development Agency to procure the collars was delayed. It's expected that this shall be factored in June 2011 budget.

3. **Activities undertaken**

The pre-collaring activities for the Meru Conservation Area have already been completed. This include:-

- Information on existing land use with the Meru Conservation Area has already been prepared and informs the study
- Scientists in Meru Conservation Area are undertaking a pilot study of the software used by Ian Douglas in the Lewa. Most of the old collars used by KWS were analogue based and there is a need to go to digital system.
- The procurement for materials to undertake the assignment is already in progress

4. Revised Timeline for implementation

Activity	Target output	Responsibility	Comments	Time Frame
Literature Review	Background information of MCA and its Environs; data on past land use practices; human population/settlement; wildlife population sizes and distribution; wildlife migratory routes	Senior Research Scientist (SRS) Eastern Conservation Area	Completed	End of December 2010
Acquisition of satellite image of area -Land sat TM	Image covering MCA acquired	Project coordinator	Completed	January 2011
Purchase of collars	2 collars purchased		In progress	End of July 2011
Development of software for downloading data from satellite	Program to download data from server in place	Consultant	In progress	August 2011
Procurement of collars, aircraft fuel & drugs	All collaring operation materials procured	Project coordinator		End of September 2011
Collaring operation	6 collars deployed	SRS/Veterinary team		October 2011
Organisation of data on the web and server	All 6 collared elephants data logged to server and displayed correctly on satellite image	Consultant	Awaiting commitment of funds	
Monitoring of elephants	Daily elephant movement data	SRS NCA	Awaiting commitment of funds	
Monthly reports	1 report each month	SRS NCA	Awaiting commitment of funds	
Final report (draft)	1 report	SRS NCA	Awaiting commitment of funds	
Presentation of elephant movement patterns report	1 workshop held	SRS NCA	Awaiting commitment of funds	
Incorporate workshop comments into draft report	Final report	SRS NCA	Awaiting commitment of funds	1 days

5. Expenditure Report

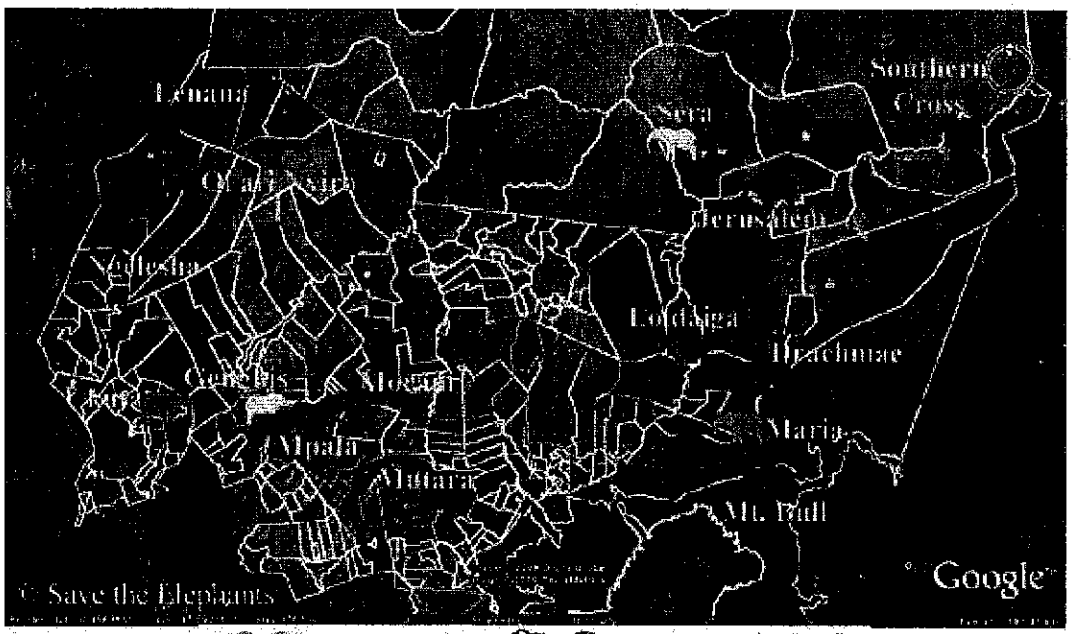
S/No.	Items		Quantity	Rate (US $)	Total (Euro)
1	Collars		4	6,000	24,000
2.	Software development		1	6,000	6,000
3.	Satellite hosting data - fees		12 months	700 per month	8,400
4.	Organizing data in server		7 days	700 per day	4,900
5.	Server hosting data - fees		10 months	450 per month	4,500
6.	Collar fixing	Jet A1 fuel	8 drums	450	3,600
		AV gas	6 drums	450	2,700
		Flying Hrs	6 hrs/day for 10 days = 60 hrs	20/hr	1,200
		Accommodation & meals for vet. officer, Pilot & RS-Elephant	3 officer for 10 days	100/day = 100 x 3 x 10	3,000
		Meals others	9 paxs for 10 days	10	900
7.	Drugs & anti-bio-tics		-	-	5,000
8.	Stationary		-	-	200
9.	Collar correction & recovery		-	-	5,000
	Consultancy fees		20 days	500	10,000
	Report presentation workshop				6,000
Total					**85,400**

Out of the grant provided US $ 3,000 has already been spent with a commitment of US $ 12,000 for images and software. The committed funds are still held in the KWS bank account awaiting delivery of images and software for payment.

Annex 1
Tracking Animals for Conservation

Elephant Tracking Report No. 20: 1st to 30th April 2010
The report has been a pilot project on the movement of 17 elephants tracked in Laikipia, Samburu, Meru and Marsabit in April 2010 to inform the digital mapping system supported by Dr. Ian Douglas.

Southern Cross, whose collar has been recording intermittently for the last few months is back on the tracking system. She has been spending time in Meru North, Ngare Mara and Shaba National Reserve. *Ol ari Nyiro* has continued visiting settlement areas, this time having been out of Laikipia Nature Conservancy to as far as Mutukanio and back twice. Marsabit elephants are on the periphery of Mt. Marsabit. Sera has maintained her presence in West Gate while Jerusalem as been roaming from Isiolo West up to Kalama though the reserves. *Mt. Bull* is still in Imenti Forest. The recently collared bull, *Mutara*, is back in Ol Pejeta Conservancy.



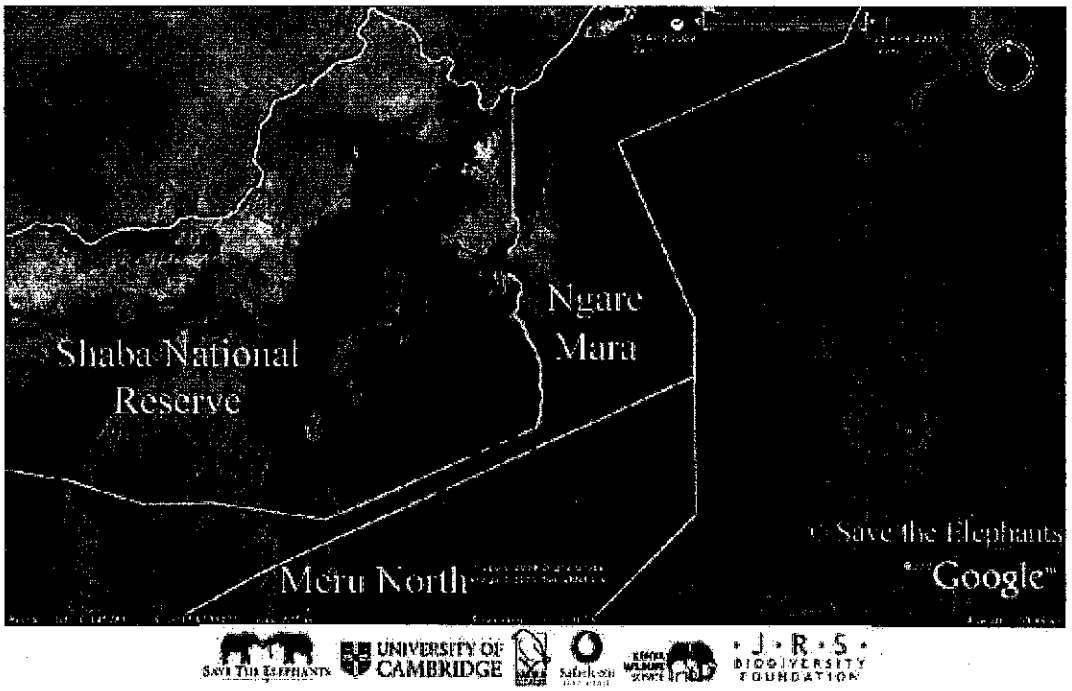


Figure 10. After missing from the tracking system in the February, *Southern Cross* is back.
We note that she spent considerable time in Meru North as opposed to her usual range in western part of Ngare Mara and Shaba.

南非荒野基金會教育宣導計畫成果摘要

南非荒野基金會(Wilderness Foundation South Africa)所提教育宣導計畫(Imbewu Programme) 成果摘要如下：

南非荒野基金會為非營利民間組織，其緣起說明如後。Dr. Ian Player 於 1963 年設立荒野領袖學校(Wilderness Leadership School, WLS)，著重以教育機構進行自然步道相關活動，並希望藉由野外經驗，提升南非人的環境意識。Dr. Player 深信荒野地為社會存續的基礎，為因應自然保留區及荒野地區受威脅情況日益嚴重，1972 年 Dr. Player 設立荒野基金會(Wilderness Foundation, WF)，希望藉由宣導活動、遊說、出版和環境教育等相關活動，增進民眾對荒野地區的瞭解。

本計畫提案人 Mr. Andrew Muir 於 1986 年加入 WLS，在擔任 National Director 八年期間，創設四個計畫(Usiko, Khula Nam, Imbewu and Pride of Table Mountain)。2001 年末，該機構組織重整，WLS 只負責荒野步道相關活動，而其他由 Dr. Player 設立的機構或相關計畫整合為南非荒野基金會，並由 Mr. Muir 擔任 Executive Director。目前美國和英國也都設立 Wilderness Foundation。美國的為 Wild USA，英國的是 Wilderness Trust UK。

Mr. Andrew Muir 於 2008 年獲頒 2008 Rolex Award for Enterprise 及 The Herald GM Citizen of the Year (GM 先鋒年度人物獎) environment category (環境類別)。前者係因推動 Umzi Wethu Academy for Displaced Youth Programme 得獎，此項計畫訓練及協助愛滋孤兒從事生態旅遊相關工作。Rolex Award for Enterprise 2008 年約有 1,500 人申請(來自 127 國)。2008 年獲獎者有 5 人，獎金十萬美元。後者係獎勵對環境保育之貢獻。

南非荒野基金會的目標為：

一、加強南非荒野地之保育，並依法保護。
二、經由民眾支持，積極保護荒野地。
三、協助其他保護南非荒野地相關機構。
四、經由教育宣導等計畫，提倡荒野為南非資源的觀念。
五、監測荒野地經營管理計畫，設法增加公有或私有荒野地的面積。
六、尊重野生動物及荒野地在南非存在的權利。

Imbewu 在 Zulu 土著語言中是種子(seed)的意思。Imbewu 計畫是南非荒野基金會和南非國家公園管理局(South African National Parks, SANP)人與保育處(People & Conservation Departmnet)共同合作設立，希望南非青年對自然及文化歷史有新的認知。南非由不同政黨執政後，仍然僅有 4%的南非黑人去過國家公園或 game reserve。1996 年，第一個 Imbewu Camp 在克魯格國家公園(Kruger National Park, KNP)設立。2002 年，SANP 和南非荒野基金會合作將 Imbewu 計畫納入 SANP 的全國教育策略(National Educational Strategy)。南非荒野基金會並與 SANP 簽訂備忘錄，SANP 可於任何一個國家公園設立 Imbewu 計畫。

Imbewu Camps 通常緊鄰荒野地區，營區為半原始狀態，以對環境衝擊最小的方

式建造。Imbewu 計畫甄選學生和老師，提供為期 4 天的國家公園經驗。許多青年住在國家公園附近，但卻從來沒進去過，有的青年住在貧民區，只看過被破壞過的環境。Imbewu 計畫由智慧長者(wise elders)領隊，他們是經驗及傳統知識豐富的退休巡護人員(game rangers)。每人都有 30 年以上的野外經驗，平均年齡 66 歲。有些長者雖然不識字，但經由部落傳統之口耳相傳，對生態系和傳統知識瞭解甚多。Imbewu 計畫協助訓練這些長者，擔任解說員，將傳統生態智慧傳承給年輕學生。

Imbewu 計畫的課程包括：

一、由 Imbewu 計畫教師帶領解說的步道之旅。
二、非洲文化價值，傳統植物使用。
三、每個 Imbewu 課程參加人數最多 16 人，並分兩個小組，每組由一位 wise elders 帶領，解說或活動內容包括：不留痕跡原則(leave no trace principles)、水及其重要性、生火及蒐集薪材規範、團隊合作、尊重生命、尊重 wise elders、尊重彼此等。
四、以傳統土著語言在營火旁說故事的方式，分享大自然的知識。

被遴選參加 Imbewu 計畫者都是具有領袖特質及對大自然有興趣的人，年紀介於 15～24 歲間，男女各半。Imbewu 計畫希望參加的人能將學到的經驗傳達出去，鼓勵參加者籌設保育社團，或於學校或社區推動環境計畫。鄰近國家公園鄉鎮高中每校遴選 8 人，遴選標準如下：

一、對環境議題有興趣者。
二、有領導能力者，例如學校或社區模範。
三、一般而言，沒機會參加類似自然體驗課程的學生。
四、願意學習並多瞭解環境保護領域者。
五、願意克服對黑夜、動物、蛇和昆蟲等之恐懼，而體驗大自然者。

Imbewu 計畫主要成果包括：

一、1996 年起，陸續於南非 6 個國家公園設立 Imbewu camps (包括 Imfolozi, Kruger, Addo, Tsitsikamma, Namaqua, Kgalagadi)。Imbewu 計畫是目前南非全國性類似計畫中，規模最大的。2010/11 年有 200 餘人參加，設立迄今已有 12,000 多人參加過 Imbewu 計畫的課程。
二、已訓練了多位智慧長者擔任環境教育教師。為因應長者因年紀漸長身體虛弱之情況，由 SANP 安排巡護人員協助，並同時向長者學習，以達成傳承之目的。每年參與之巡護人員均需事先參加訓練班。
三、製作 Imbewu 計畫簡報資料，至學校說明計畫重點。例如 2007 年到 19 個學校宣導。
四、2007 年 SANP 協助安排 Imbewu camp 學員參加 game drive 實地觀賞野生動物，因此項活動非常成功，2008 年起持續辦理。
五、2005 年 Imbewu 環境教育計畫擴充至衣索匹亞和肯亞。衣索匹亞計畫由生態學習和社區行動協會(Movement for Ecological Learning and Community Action, MELCA)推動，進展順利且執行成效良好。MELCA 於 2004 年在衣

索匹亞註冊，Imbewu 計畫在衣索匹亞取名 SEGNI 計畫。衣國土著語言 SEGNI 是種子(seed)的意思。

設於下列國家公園的 6 個 Imbewu camps 說明如下：

一、Kruger National Park

- Imbewu Kruger 1996 年設立，已有 3 位 wise elders (解說員)，2004 年有 389 人參訓。
- 2005 年止，共辦 32 梯次，有 512 人參加。
- 2006 年進行擴充 Imbewu camp 工作，將在 Letaba 的營地移到 Satara。新營地未完成前，於舊營地附近步道辦理自然體驗課程。

二、Addo Elephant National Park

- Imbewu Addo 2000 年 7 月設立，已有 3 位 wise elders。
- 2004 年有 160 人參訓。
- 2005 年辦 23 梯次，有 182 人參加。
- 2006 年辦 27 梯次，有 232 人參加。
- 2007 年辦 22 梯次，有 174 人參加。
- 2008 年辦 20 梯次，有 160 人參加。
- 2009 年於 Kabouga 和 Woody Cape 共辦理 22 梯次，分別來自 17 個學校。
- 2010 年於 Kabouga 和 Woody Cape 共辦理 23 梯次，分別來自 21 個學校，有 184 人參加。

三、Tsitsikamma National Park

- Imbewu Tsitsikamma 於 2000 年設立，已有 4 位 wise elders 和 6 位青年解說員。
- 2004 年有 168 人參訓，分別來自 24 個高中。
- 2005 年辦 19 梯次，有 152 人參加。
- 2006 年辦 9 梯次，有 48 人參加。
- 2007 年辦 23 梯次，有 176 人參加。
- 2008 年間，通往營地的路被洪水沖毀，且營地附近盜獵活動增加，為確保學員之安全，決定另覓地點，2009 年將新址環境影響評估送交相關單位審查。

四、Namaqua National Park

- Imbewu Namaqua 2002 年設立，已有 4 位 wise elders，2004 年有 137 人參訓，分別來自 5 個高中。

五、Imfolozi National Park

- Imbewu Imfolozi 2001 年設立，已有 23 位 wise elders，2004 年有 350 人參訓。Imfolozi 國家公園的 Imbewu 計畫一直面臨募款困難問題，仍尋求合作單位中。

六、Kgalagadi Trans-frontier Park

- Imbewu Kgalagadi 2009 年 10 月設立，目前有 4 位 wise elders。教育宣導重點議題為土地和愛護地球、青年教育、傳統知識和技巧、說故事。
- Kgalagadi Trans-frontier Park 前身為 Kalahari National Park，當初國家公園設立時，土著 Bushmen 被迫遷移，後來國家公園將土地還給當地之 Khomani Sa community，Bushmen 逐漸遷回。1999 年 3 月歸還 27,769ha，後來又歸還 43,000ha。Bushmen 為依賴荒野和地球維生之代表，本

Imbewu 計畫的重點即為傳承此種傳統文化和生活方式。

- 2009 年 9 月開始訓練土著耆老，並推動土地和照顧地球教育(Land and Earth Care Education)計畫、青年教育(Youth Education)計畫以及傳統知識和技巧回收(Recycling of Traditional Knowledge and Skill)計畫。
- 2009 年 7 月為 8 位 elders 辦理 Imbewu 先驅計畫，由南非荒野基金會和國家公園主管單位 SANP 共同參與，評量教育計畫應該包含之內容。共有 5 位 elders、2 位青年、2 位 Bushmen Trackers (擅長追蹤野生動物)參與。試驗計畫進入尾聲時，elders 建議日後教育計畫納入 4 大重點，包括自然學習(Nature Learning)、族群和諧(Harmony between all people)、加強溝通(Promote Communication)和生命目標(Creating Purpose in Life)。
- 2009 年 11 月、2010 年 4-5 月及 2010 年 6 月辦理 3 梯次 Imbewu 野外環境教育活動。

南非荒野基金會其他工作或活動成果，包括：

- 2009 年止，有 100,000 多人參加過 Wilderness Foundation 舉辦的活動。
- 推動 The Baviaanskloof Mega-reserve Project，協助促成面積 500,000ha 保護區之設立和初期經營管理，2008 年起逐步將管理權移交 Eastern Cape Parks Board (ECPB)。
- 推動設立面積 9000ha 之 Plains of Camdeboo 私立保護區，並進行植生和土壤復育計畫。除現有野生動物外，也將再引入大羚羊(Eland)、南非長角羚(Gemsbok)、紅狷羚羊(Red Hartebeest)。
- 與 Msinsi Holdings 和 Ethembeni Community 合辦 Pride of Durban 活動，針對學校辦理保育宣導。宣導重點為自然環境作為維生系統的重要性、永續利用自然資源、人類對環境的威脅、如何降低人類對環境的衝擊等。2006 年辦 24 梯次，有 43 位老師及 695 位學生參加。
- 2003 年開始於 Port Elizabeth 辦理 Pride of Groendal 活動，針對學校辦理認識動植物、自然觀察及其他活動，2006 年辦 10 梯次，277 位學生參加。
- 1996 年起辦理 Pride of Table Mountain 活動，本自然步道解說活動籌辦人於 1998 年、2002 年和 2003 年獲頒環境獎(Cape Times Environmental Award 等)。1996-2008 年共辦 220 多梯次，13,000 位學生參加。1996-2010 年共有 14,000 人參加。
- 2008 年創辦 Pride of Bosberg Mountain 活動，2009 年有 392 人參加。
- 2010/11 年 Groendal、Table Mountain 和 Bosberg Mountain 三項活動共有 1,300 人參加，自 1996 起，共有 18,200 人參加。
- 於 MTO Forestry Plantation area 辦理戶外教學，2010/11 年共有 960 人參加，1996 迄今有 10,000 人參加。

WILDERNESS
FOUNDATION

IMBEWU

Quality entry level outdoor experience for previously disadvantaged youth, to stimulate and inspire interest in the natural environment and conservation



PROGRESS REPORT: 2010

TO

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1. THE WILDERNESS FOUNDATION:

THE WILDERNESS FOUNDATION is a project-driven organisation that strives to create opportunities for economic and social equality and achieves its mission by initiating and implementing projects concentrated in four main programme areas: Conservation; **Social Intervention**; Advocacy and Awareness; and **Experiential Education**. The Wilderness Foundation has been a pioneer in using wilderness as a positive force for social and environmental sustainability in South Africa.

The Wilderness Foundation is one of few South African conservation organizations currently involved with an active, sustainable social intervention and experiential education programmes . Through our Social Intervention (Umzi Wethu Training Academies) and Experiential Learning Programmes (Pride & Imbewu Trails) we are able to introduce a fundamental respect and innate love for nature amongst the youth in compromised communities. Thereby inculcating the essential concepts and ethos of conservation and developing an understanding of its importance.

2. THE WILDERNESS FOUNDATION: ADDRESSING A NEED THROUGH EXPERIENTIAL EDUCATION:

Conservation: In the 21st century, we are faced with rapid disappearance of much that is wild and natural. Africa is custodian to a large percentage of our planets' wilderness areas which is supported by indigenous cultures that have a deep concern for nature. Unlike other countries in Africa, South Africa has only pockets of wild lands left. South Africa has however had great success in establishing protected areas on both public and private land, and a booming ecotourism industry has accompanied this growth. The Wilderness Foundation recognizes that the sustainability of South Africa's wild lands and wilderness is intrinsically dependant on its social and economic sustainability. Currently, the level of wildlife poaching, particularly of rhinos, is on the rise in South Africa. Parks are under-resourced and understaffed and increasingly unable to cope with the pressure of illegal and often foreign-inspired wildlife poaching gangs that recruit from amongst our youth made vulnerable by HIV/AIDS and poverty. Moreover, sorely lacking is the conservation awareness and environmental ethic that might prevent communities from harboring poachers or that could encourage community members to inform the authorities of poaching incidents.

Social: The WF believes that a quality experience of wild lands and wilderness is the spark that motivates an individual to a higher ideal of conservation. Ironically, far more western tourists have been exposed to and stirred by these wilderness areas and related wildlands than have local South Africans. South Africa's history has confined most South Africans to townships or degraded rural areas and fractured traditional cultures. Even today, after 16 years of democracy in South Africa, experiences in nature reserves are beyond the economic reach of most South Africans. A recent study indicates that only 4% of the country's black population has directly experienced local wildlife reserves. This affects the understanding, appreciation and support for Conservation from the majority of the South African public and its democratically elected decision-makers.

The Response: The WF has responded by developing models for environmental learning and protection through its **Experiential Education Programme**. This Programme educates through experience by providing varying levels of outdoor experiences in wilderness and natural environment areas. It currently targets a wide spectrum of people, namely: ***1. Previously Disadvantaged Learners*** - who have never experienced their natural heritage; ***2. Political leaders & Decision Makers***- needing direct contact and exposure to the environment to fully appreciate its requirements and to recognise and address our various advocacy & conservation initiatives.- ***3. General Scholars and Corporate staff***- providing a primary quality experience of Africa's natural environment and game reserves. The programme is incorporated into all of WF's other programme focus areas namely: Conservation, Social Intervention and Advocacy & Awareness.

3. EXPERIENTIAL EDUCATION PROGRAMME – learning through participating and experiencing- **in support of Leadership Development**

VISION: for as many South African citizens to share in their natural birth right (Africa's wild /natural areas and national parks), creating inspiration and interest in the natural environment and conservation- providing opportunities for their personal growth in support of leadership & conservation development.

AIMS:

- To deliver quality primary outdoor experiences to stimulate, spark and inspire interest in the natural environment and conservation.
- To provide our community the opportunity to rediscover the relationship between their cultures and nature through the power of education and the experience of their natural heritage: wilderness areas, national parks and their immediate natural environments.

PROGRAMME PROJECTS:

The Programme currently constitutes the following projects: **Imbewu, Pride, Khula Nam, Wilderness Leadership School, Opinion Leaders Nature Trails.**

OBJECTIVES: Through the provision of the above projects, the programme's objectives as per selected target groups are to:

A) Future and Corporate leaders *(Wilderness Leadership School; Wild Leaders Workshops & Trails ; Nelson Mandela Metropolitan University Business School joint initiative: Executive Workshops on Ecological Leadership)*

- Guide people on wilderness trails to ensure an experience of wilderness to deepen their understanding of their own spiritual being, their relationship to others and their broader community and their place within our planet's greater community of life.
- Awaken a deep respect for the living world for every person completing the trail and to inspire them to express this by reducing the relative environmental impact of their society.
- Continue to be a leader in providing wilderness trails and workshops of the highest ethical & ecological integrity.

B) Previously Disadvantaged Learners (Imbewu; Pride; Khula Nam Nature Trails)

- Provide previously disadvantaged school children the opportunity to experience wild places for the first time, educating on the importance of caring for and preserving our natural areas & environment.
- Utilize the power of experiential learning to provide learners with knowledge & understanding of their immediate natural habitat & the importance of ecological preservation.
- Provide youth with an opportunity to rediscover the relationship between their cultures and nature through the teachings of elders in a wilderness setting.

- Developing the skills capacity of young community volunteers through relevant training, experience and leadership enhancement and to recruit these potential leaders from trail participants.

C) Political leaders & Decision Makers (Opinion Leader Trails)

- Educate and influence key government officials on the most pertinent environmental issues within a wilderness context informing them of the importance of caring for and preserving our natural areas & environment.

4. IMBEWU: GENERAL PROJECT DESCRIPTION:

The Imbewu Project is one of the five main projects that fall under the auspices of the Experiential Education Programme. This report focuses on the activities of the Imbewu project operating in the Addo Elephant National Park and the Kgalagadi Trans Frontier Park for 2010 as per the financial support designated by the Forestry Bureau,COA, of Taiwan.

A) PROJECT BACKGROUND AND DESCRIPTION: The African name "Imbewu" literally means seed. It reclaims a birthright – a quality experience of people's natural and cultural heritage.

The project provides a quality entry level four- day outdoor experience amongst previously disadvantaged youth in wilderness areas in the heart of National Parks. It targets approximately 200 disadvantaged senior scholars annually and has reached approximately 10 000 children since inception.

This project was launched in the Kruger National Park in 1996 as a joint partnership between the People & Conservation Department of the South African National Parks and the Wilderness Foundation. The project has been operational in Kruger, Tsitsikamma, Addo and Namaqua National Parks and is currently active in the Addo Elephant National Park in the Eastern Cape and the Kgalagadi Trans Frontier Park. Imbewu trails are designed to introduce previously disadvantaged youth to the National Parks and protected areas, around which they live, which they may not otherwise have had the opportunity to explore. Imbewu seeks to instill in present and future generations, a deep abiding emotional link to the earth and Africa's cultural legacy. This is achieved through the involvement of 'wise elders' – retired field rangers who accompany students on trails and impart local indigenous knowledge. The project aims to reclaim a birthright providing disadvantaged youth a quality experience of their natural and cultural heritage and activates black conservation mentors who offer an educative mix of afro centric and western concepts of conservation. It recognizes that with a feeling for the bush-originally at the heart of African culture and of conservation ethics- a proactive role in environmental initiatives can be realized. Imbewu is a catalyst (seed) project designed to develop young black leaders, in an environment, which stirs healing and the planting of new skills by:

- Introducing youth from disadvantaged backgrounds to experience the wilderness environment in our National Parks.
- Providing youth with an opportunity to rediscover the relationship between their cultures and nature through the teachings of elders in a wilderness setting.
- Delivering a youth empowerment initiative that offers a quality experience which restores self-identity and natural heritage links, developing an environmental consciousness.

The young leaders from disadvantaged backgrounds are transported to the heart of nature reserves, where they hike and learn for four days and three nights. On each trail the learners are lead by one elder (retired Parks Field Ranger)

and one SANPARKS Field Ranger (currently employed by the Parks). The experience is unique in that specially selected "wise people" –elders, share their accumulated wisdom from lifelong work in the parks and from traditions learnt from their forefathers. During the four-day period, pupils are taken on interpretive walks in the National Park, led by the Imbewu guides. Cultural values and traditional plant uses are interwoven into each walk. Pupils are accommodated under flysheets in primitive campsites and enjoy the age-old art of story telling around a campfire at night. Pupils are selected for their understanding and interest in their environment, their willingness to learn and their ability to interact with people as well as their leadership abilities. The participants are not required to have had any hiking experience, physical fitness and strength are not the focus of the trail, although walking fitness is advised. We operate by the minimum impact rule - trails are therefore limited to eight trailists at a time accompanied by two well-qualified guides who have been trained in all outdoor skills and safety procedures.

B) PROJECT IMPLEMENTATION:

General: The partnership with SANPARKS and WF includes the following:

- SANPARKS provides: Entry into the Parks, Field Rangers to help guide the trails and assistance with the co-ordination of schools.
- WF provides: Co-ordination of schools and selection of learners, the transport of learners to and from trail sites, recruitment and training of Elders and Rangers, food & equipment on Trail.

1. **Pre-Trail Selection Process:** The Imbewu project is actively promoted to a list of schools in disadvantaged, economically vulnerable communities in the vicinity of the National Park. This is done in collaboration with SANPARKS through introductory talks and presentations to the schools about the project as well as an introductory letter. Once the school has indicated an interest for participation, this is followed with direct correspondence and visit with principals and teachers to organize the selection of pupils. **Selection of Participants:** participants are sourced from the high schools based in disadvantaged communities in the vicinity of the National Parks. Generally only 8 learners from each school are selected per trail. This small group allows for individual attention, safety of the group in the wilderness and minimum impact on the environment which is dictated by the 'leave- no-traces'principles that govern this learning. The following criteria are used for the selection of 8 participants from each school: pupils must:
    - Show an interest in the environment – member of a club/society.
    - Have leadership qualities – a role model in school and/or community.
    - Be an individual who would not ordinarily have been able to access such an opportunity.
    - Wants to be aware and gain a better understanding of the environment and conservation issues.
    - Be prepared to overcome fears of the outdoors and the natural environment (the dark, animals, snakes, insects etc.) to appreciate the experience of nature.

The learners are then selected based on the input from their teachers in respect of the above criteria. The selected pupils are sent an introductory letter and indemnity form for their parents to read and complete before they can be taken on Trail.

2. Trail Procedure and Activity:

Imbewu Trails generally take place every second week from Friday to the following Monday. The WF staff collect pupils from their schools on Friday morning and after the trails, take them back to school on the following Monday. All learners must submit their indemnity forms before entering the WF vehicle. The 'wise elder' trail guides and SANPARKS Field Rangers are collected en route to the National Park. On arrival at the National Park, the WF staff explain the rules and regulations of the Park and what is expected from the learners on trail. Each learner is issued with a backpack, sleeping bag, cooking /eating utensils, roll mat and ground sheet and is shown how to pack. They are required to carry all their food and equipment. Once the packing and explanations are concluded the Elder and a Field Ranger commence with their 4 day trail. Activities on trail include:



- **Hiking**: through the wilderness and led by the Elder and Field Ranger. Along the way the Elder imparts his knowledge of the fauna and flora and combines a cultural connectivity with the environment as a whole.
- **Campfire Stories**: Elders invoke the African art of story telling, sharing with the youth, in their indigenous languages, traditional knowledge that connects wilderness with its people. Stories combine historical fact and mythical lore related to local culture and the environment, reviving cultural beliefs and traditions in accordance with environmental and social ethics.
- **Solitaire**: or solitary time (at night and during the day) provides the learners with the opportunity to focus on their senses and surroundings, to reflect on their experiences and their future. Learners are encouraged to bring personal journals to record their reflective thoughts.
- **Living as a unit/team**: where every member of the group learns to work collectively with each other engaging in activities such as cooking, collecting water, making the fire, cleaning dishes and ensuring the safety and wellbeing of the group.

3. Imbewu Leaders: ('Wise Elders'-Retired Park Rangers and SANPARKS Field Rangers)

The caliber of the Imbewu Leaders is what makes the Imbewu Project unique. The 'Wise Elders' are recruited from a small circle of retired black Field Rangers or Foresters. They are between the ages of 61-72 years of age and some cannot read or write, but are an invaluable resource of timeless traditional knowledge and wilderness experience. Through Imbewu, the WF values and shares the insight and knowledge of these black conservationists, who have lived and worked a lifetime in the African wilderness. Through the input of the 'Wise Elders' learners experience



and appreciate wilderness as irreplaceable and inspirational to the human spirit, whilst instilling personal confidence and identity and rooting nature conservation in an African context. With time, the Elders become frail and unable to lead, necessitating the recruitment of new elders. However, this is not an easy task. For this reason an additional arrangement was made with SANPARKS to utilize their nature conservation Field Rangers to assist the 'Wise Elders'on the Imbewu trails. These rangers therefore also serve as role models to the youth, initiate discussions regarding current conservation issues and themselves learn from the 'Wise Elder' on the trails. With supportive training in refresher nature guiding, current conservation techniques and environmental issues and first aid, Imbewu offers the Elders and Rangers a unique opportunity for further capacity development in conservation within an African and global context. All Elders and Rangers are required to complete First Aid training (with special attention to snake bite treatment, treatment of dehydration, sprains and broken limbs) and a basic Imbewu Orientation (to be trained on interpretation of middens, common plants, medicinal / useful plants, common animals & birds and tracking etc.) before becoming involved on Trails. The Imbewu co-coordinator has developed orientation training to revise current leaders on and introduce new leaders to the fundamental objectives, governing principals and ethics of the Imbewu project. This is generally presented at the beginning or end of the year (before the schools are ready to book their respective Imbewu Trails), every 2 years.

4. Monitoring & Evaluation:

Short Term: At the end of each Imbewu Trail, the learners are requested to complete an evaluation questionnaire as well as write an essay narrating what they have experienced and learnt and what they propose to do with the knowledge gained. On return to their school, the principal/teacher is requested to complete and send the WF a questionnaire based on the feedback from their pupils. This feedback, in additional to the verbal comments from the Elder and Ranger Guides is used to evaluate whether the 'Leave no Trace' principles that govern the Imbewu Trails have been practiced and adhered to, as well as to ensure that the nature-based experiential education and capacity building objectives have been met. In addition, the Grade 11 & 12 pupils are required to provide a report-back presentation to their fellow classmates on their experiences and lessons learnt on the Imbewu Trail. **Long Term:** WF intends to develop a formal follow-up programme for Imbewu once we have successfully selected and developed the appropriate partners and strategies. One of the fundamental aims of the Imbewu project is to create 'young environmental/conservation ambassadors' in disadvantaged communities. WF does not currently have the resource capacity to overcome the challenge of tracing the progress of the learners once they have left school. Initially we would need to confine our follow-up to environmental activities undertaken by the pupils whilst they are still in the schooling system. We are exploring opportunities with SANPARKS and other service providers like WESSA who could incorporate this evaluation as part of their existing EE Schools and Eco-Schools outreach programmes.

5. Imbewu and the Wilderness Foundation's Social Intervention Project: Umzi Wethu Training Academies for Vulnerable Displaced Youth:

In 2006 the Wilderness Foundation embarked on its Social Intervention Programme through the initiation of the Umzi Wethu Training Academies for Vulnerable Youth. This is in response to the contrasting trends in South Africa of: the large number of deaths from HIV/AIDS, the associated growth in the number of orphans, and the expansion of parks and game reserves and associated revenue. By utilising the economic promise of the ecotourism and hospitality industry we tackle the cycle of poverty and HIV/AIDS with a skills development and job placement programme for some of the most vulnerable members of society–youth particularly orphans, on the verge of adulthood. The programme targets young people that show resilience and ambition -- but despair of opportunities to support their households. It transforms them into skilled and highly employable young adults with secure, well-paying ecotourism jobs with benefits extending to their families and communities. To date a total of 107 students have graduated- 64 being Hospitality students and 43 Game Ranging students.The job retention rate of Umzi graduates is about 85% and placement rate is 94%.Within the Umzi Wethu program, Imbewu trails are used for selection as well as experiential education and personal growth. Before candidates are accepted into the program, they embark on a selection trail – usually their first experience of hiking and camping in a wild place. Feedback from this trail is used to inform the decision of whether or not to include the student in the program. Once students have entered the program they enjoy a further three Imbewu trails during their year at the Academy.



5. Imbewu Pan African Expansion

In 2005 the Imbewu model expanded to Pan Africa with programmes initiated in Kenya and Ethiopia through joint venture partnerships. The Imbewu in Ethiopia has been particularly successful in the wake of extensive workshops between WF and MELCA (Movement for Ecological Learning and Community Action). MELCA (www.melca-ethiopia.org) was registered in 2004 with the Ethiopian Federal Ministry of Justice as a membership based association that emphasizes that culture is the source of identity and wisdom, and that the destruction or degradation of culture will result in the loss of a vast amount of knowledge and identity. Its vision is to work for a healthy ecosystem and vibrant culture and to improve the lives of the Ethiopian community through developing and spreading innovative methods. MELCA calls its Imbewu programme SEGNI (meaning 'Seed' in the indigenous Ethiopian language) and defines its project as: Social Empowerment through Group and Nature Interaction. The project operates in Ethiopia at the Bale Mountains National Park and at Menagesha Suba- a natural and man made State Forest. Through the SEGNI program, MELCA seeks to create a sense of responsibility in youth towards the environment and to their cultural legacy through approaches developed and tested over the past seven years both in South Africa and Ethiopia. The Ethiopian replica runs along the same principles, guidelines and methodology as the Imbewu project in South Africa, and has only been adapted to accommodate cultural, social and environmental differences. Like Imbewu, the SEGNI programme takes youth into the wilderness on overnight trails to experience nature, learn about traditional knowledge of biodiversity and conservation and to promote leadership. The trails are in national parks and forests under the tutelage of elders. The



Ethiopian approach is called "discovering your cultural biodiversity." The process creates an environment where the youth learn from their communities about their traditional ecological knowledge. Many students and teachers from elementary schools, colleges and universities and local decision makers have participated on trails. Those who have participated are given an identity card as "eco-advocates". Participants have showed marked improvement in their behavior towards the environment and have embarked on many self initiated activities such as planting of thousands of tree seedlings.

5. IMBEWU: ADDO & KGALAGADI REPORT 2010:

This report focuses on the activities of the Imbewu project operating in the Addo Elephant National Park and the Kgalagadi Trans Frontier Park for 2010 as per the financial support designated by the Forestry Bureau, C.O.A, of Taiwan.

IMBEWU ADDO 2010: Is operational in the Addo Elephant National Park in the Eastern Cape and started in 2000. Addo National Park is now the third largest national park in South Africa. It has expanded to conserve a wide diversity of biodiversity, landscapes, fauna and flora. Stretching from the semi-arid karoo area in the north around Darlington Dam, over the rugged Zuurberg Mountains, through the Sundays River valley and south to the coast between Sundays River mouth and Bushman's river mouth, Addo covers about 180 000 hectares (444 700 acres) and includes the Bird and St Croix Island groups. The Imbewu project continues to be active at two sites in this National Park: Kabouga (near Kirkwood) and Woody Cape (near Alexandria). **A total of 23 Trails were delivered reaching a total of 184 learners through 21 schools in 2010.**

Selection of Learners: The Senior High School learners all came from schools located in compromised, rural, urban and township communities in the vicinity of Port Elizabeth in the Eastern Cape. **Communities are**: Alexandria, Motherwell township, Kenton on Sea, Uitenhage, Zwide & KwaNobuhle Townships, Kirkwood, Addo and Paterson. **The Senior Schools are**: Bertrams , Soqhayisa, Ikamvalesizwe, Ukhanyo, Alexandria, Douglas Mbopha, Mfesane,Masiphathisane,Mlungisi,Thembalabantu, St Colmcille, Kirkwood, James Jolobe, Samkelwe Sandisulwazi, Ethembeni, Moses Mabida, Uitenhage, Vulumzi

Place of Imbewu Trail	Date of trail	School Name	Number of pupils	Communities they come from	SANPARKS Ranger on trail	Wise Elder on Trail
Woody Cape	22nd -25th Jan 10	Betrams High	8	Port Elizabeth	1	1
Woody Cape	29th -1st Jan 10	Soqhayisa High	8	Motherwell	1	1

Woody Cape	5th – 8th Feb 10	Ikamvalesizwe High	8	Kenton –on-Sea	1	1
Woody Cape	12th -15th Feb 10	Ukhanyo High	8	Alexandria	1	1
Woody Cape	5th -8th Mar 10	Alexandria High	8	Alexandria	1	1
Woody Cape	12th-15th Mar 10	Douglas Mbopha High	8	Motherwell	1	1
Kabouga	23rd-26th Apr 10	Mfesane High	8	Motherwell	1	1
Kabouga	30th Apr-3rd May10	Masiphathane High	8	Motherwell	1	1
Woody Cape	7th-10th May10	Mlungisi High	8	Uitenhage: kwaNobuhle	1	1
Woody Cape	14th -17th May10	Thembalabantu High	8	Zwide	1	1
Kabouga	4th -7th Jun 10	St Colmcille High	8	Kirkwood	1	1
Kabouga	16th -19th Jul10	Kirkwood High	8	Kirkwood	1	1
Kabouga Kabouga	23rd-26th Jul10 30th Jul-2nd Aug10	James Jolobe High Samkelwe High	8 8	Motherwell Addo	1	1
Kabouga	13th -16th Aug10	Sandisulwazi High	8	Paterson	1	1
Kabouga	3rd-6th Sept10	St Colmcille High	8	Kirkwood	1	1

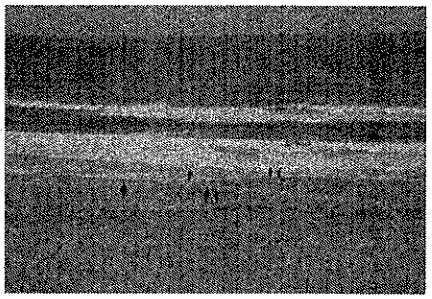
Kabouga	10th-13th Sept10	Ethembeni High	8	Port Elizabeth	1	1
Kabouga	17th-20th Sept10	Moses Mabida High	8	Kirkwood	1	1
Kabouga	1st-4th Oct10	Uitenhage High	8	Uitenhage	1	1
Woody Cape	15th-18th Oct10	Vulumzi High	8	Motherwell	1	1
Woody Cape	22nd-25th Oct10	Ethembeni High	8	Port Elizabeth		
Woody Cape	29th-31st Oct10	Ukhanyo High	8	Alexandria		
Kabouga	5th-8th Nov10	St.Colmcille H.S	8	Kirkwood		
Kabouga	12th-15th Nov 10	James Jolobe	8	Motherwell		
TOTAL	23 TRAILS		184			

Camps:



Kabouga: Is about 1 hour outside of Port Elizabeth. Here there are two camp sites and the wise elder decides where they sleep each night. Each day on trail the learners will do a lot of walking, sometimes with their packs other times not. The elder and the ranger will point out various plants, animal spoor, dung and other interesting fauna and flora. In Kabouga they see a lot of animals, Warthog, Red Hartebeest, Baboons Kudu, Ostrich, Bushbucks and other small animals.

Woody Cape: Is about 2-3 hours drive outside of Port Elizabeth. At Woody Cape there are also two camp sites but they tend to use only the one as water is scarce at the other. We are working towards establishing at least three campsites in both venues and hope that this will be in operation near the end of 2011. In Woody Cape it is very rare to see a lot of game as the vegetation is dense forest thicket. They sometimes see Bushbuck and smaller wildlife. As this site is along the coast, the learners spend time on the beach learning about marine ecology. It is a long walk to the beach but well worth it.



Comments from the Imbewu Co-ordinator:

General:

"The learners are always excited to come on trail, some of them will have heard about the Imbewu Trails from their friends who have been on trail previously."

On challenges that were overcome e.g. cultural believes/personal fears/attitudes etc:

"The biggest fear most of them have in the first day/ night is sleeping outside in the bush and encountering snakes or other dangerous animals. As the time goes they get used to sleeping outside and overcome their fears."

On adequate clothing of the Learners on Trail: *"Mostly they come with adequate clothing and shoes but occasionally there will be those who don't have the correct shoes."*

Comments from the Learners: *"To me it was such a great experience as I have never done anything like this before." Nobathembu Nqebe – Grd 10 – Vulumzi S.S.S "I loved Imbewu especially the stories the elders told us as they made us laugh" – Siphokazi Links – Grd 9 – Moses Mabida High School. "I will never forget iMbewu, especially the second day walk through the mountain. I learnt so much about the plants and animals." – phumeza Melane – Grd 10 – Samkelwe High School.*



Left: Oom Moses : Woody Cape Elder



Left: Oom William: Kabouga Elder

Imbewu Leaders: ('Wise Elders'-Retired Park Rangers and SANPARKS Field Rangers)Addo Imbewu currently has 3 'Wise Elders' (Black men ages: 61-72 who are all retired SANPARKS Rangers) and 8 SANPARKS Field Rangers (Black men ages: 30-50) who assist the Elders on Trail. One Elder and one Field Ranger lead the Trails. The Kabouga section has one Elder: Mr khuwleli William Dodo: who is Xhosa and has been an Imbewu elder for many years. He is currently 71 years old and lives in the town of Addo. The Woody Cape section has two Elders: 1. Mr Thameni Moses Ntseta: who is Xhosa and has been an Imbewu guide for 4 years. He lives in the town of Alexandria and is 66 years old. 2. Mr Tekisi John Manyathela is a Xhosa man who is 70 years old and also lives in the town of Alexandria. Elders are recruited according to their age and knowledge of the field. We look for retired rangers who have an extensive knowledge of plants and animals as well as a deep cultural background. They must be walking fit and be able to pass on their knowledge and experiences to the young generations. We are hoping to recruit new Elders soon. The 8 SANPARKS Field Rangers rotate their Imbewu duties amongst each other. The Refresher training was conducted at the end of 2010 and will be repeated between 1-2 years depending on need.

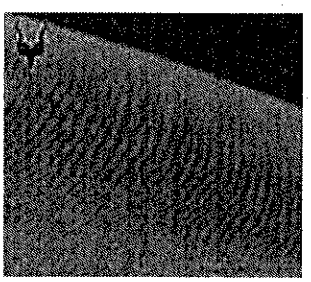
Quote from the Imbewu Co-ordinator: *"The elders are doing fine and enjoying their work and they don't seem to tire of being out too long with the group of learners. They enjoy showing off their knowledge of plants and animals as well as their walking fitness. If a child feels ill on the camp the elder boils a cure in the form of a plant / root or*

some leaves and is held high esteem. We would like them to continue having passion for Nature, and never stop planting the seed of Nature to the young generation."

Challenges/Future plans:

- **Recruitment of new Elders:** Our three Elders have been doing Imbewu Trails for a number of years and are showing signs of ageing, especially our Kabouga guide, Mr William Dodo who is the oldest of our 3 Elders (71 years old). It is not easy to find new retired Rangers, elderly people who need to: be physically fit and healthy; have a wealth of knowledge about ecology, conservation issues, and socio-cultural history of the area; are willing to spend 3 nights in the bush and want to pass their knowledge on to the youth.
- **Monitoring & Evaluation systems:** We would like to improve on our evaluation techniques for short & long term evaluations and monitoring. Currently we only have the evaluation questionnaires and essays that the learners complete to verify project experience and content. We would like to monitor and track learners' implementation of what they have learnt with fellow pupils and in their communities i.e. have they joined or initiated environmental interest groups, recycling endeavours etc. Long Term, we would like to know if the trails have impacted or influenced the learner's career, job, extramural choices and activities. We are exploring opportunities with SANPARKS and other service providers like WESSA who could incorporate this evaluation as part of their existing EE Schools and Eco-Schools outreach programmes.
- **Adequate Clothing & Foot ware for Learners:** As most learners come from economically vulnerable and disadvantaged backgrounds, we do find that they are not always adequately clothed for the Trail experience. For example warm and weatherproof items and proper walking shoes are especially lacking. We would like to purchase some of these items that would be worn by learners whilst on trail and then returned to the WF. However will need to source additional funding from our donor partners to cover this expense.
- **Other items to benefit Trails:** WF would like to provide appropriate clothing for our Trail Leaders and provide uniforms that identify with the Imbewu project and the Wilderness Foundation. This too would need to be sourced through additional funding requests.

IMBEWU KGALAGAD: 2009 & 2010:



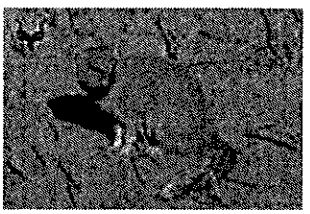
Introduction & Background: Imbewu Kgalagadi was launched in October 2009. It operates in the the Kgalagadi Transfontier National Park which is situated approximately 250 km from Upington in the far northern Cape and 904 km from Johannesburg in South Africa. It is an amalgamation of the Kalahari Gemsbok National Park in South Africa (proclaimed in 1931) and the Gemsbok National Park in Botswana. The Kgalagadi Transfrontier Park comprises an area of over 3,6 million hectares – one of very few conservation areas of this magnitude left in the world. The Khomani San community lives in the region of the Kgalagadi Trans-frontier Park and numbers between 900 and 1500 people. On proclamation of the Kalahari National Park, now Kgalagadi, the indigenous Bushmen were

removed from the land. For many years they have lived outside of the park, (living in small, scattered groups in the urban and rural areas of Angola, Botswana, Namibia, South Africa, Zambia and Zimbabwe) integrating into the larger community and diluting their own culture. **The Securing of Land for the Khomani San**: In March 1999, the Khomani San had a portion of their territory restored by the government of South Africa. This land included 27 769ha in the Kgalagadi Transfrontier Park forming the Ae!Hai Kalahari Heritage Park. A further 43000 hectares of land bordering on and in proximity to the park are also owned by this community. The original group was as few as 50 people but due to the land claim the community has steadily grown as people with Bushman lineage have returned. It is hoped that the Imbewu project will help to protect the wilderness area within the park for use as a pristine educational and spiritual resource, whilst giving guidance and assistance with utilizing the land outside of the park to provide homes and sustainable indigenous agriculture for the community.

The traditional leader Dawid Kruiper and a small group of four elders attended a special Imbewu trail in July 2009 to learn the objectives and methodology of the programme and to understand the role they would fulfil in the process. Their unique culture is endangered and they were quick to see the value that Imbewu could play in assisting the expansion of a cultural reservoir of knowledge and skill. Their vision for the Khomani youth is:

- Respect for the natural world, respect for each other as people.
- Trust.
- That people take pride in being a Bushman and that the world will learn to respect them due to their ethics, integrity and demonstrative passion for nature.

They have been persecuted for hundreds of years and they still perceive themselves as inferior to other population groups. With this in mind, that they seek help to break this mind set and instil a new way of thinking for their youth. Imbewu is seen as part of their new journey and the elders are committed to playing a role by sharing the stories and folklore that contain meaning to link and reinforce the trail experience. In our efforts to uplift the community, the three areas in which we work are: **Land and Earth care education:** Providing information and skill so that the broader community can live on and utilize their land in a profitable and sustainable way; **Youth Education:** offering the youth a link with their past and opportunities to learn the ways of their own, unique culture; **Recycling of Traditional Knowledge and Skill:** Encouraging and facilitating the sharing of the "old ways" between the elders and the broader community through the art of story telling where traditional learning is achieved through education and entertainment. At present, very few of the community members have the skills required to live off the land and the knowledge of the traditional Bushman culture. Many of the traditional stories have been lost over time and the practice of



story telling is fading. We, with the help of our five Khomani San Elders, are gathering these stories for Imbewu trails.

Trail Information: July 2009-2010

1. **Pilot Trail for Khomani San Elders**: The Khomani San elders requested a pilot programme for 8 elders to evaluate what would be taught to the youth attending an Imbewu trail. Many years of exploitation and perceived abuse had hardened attitudes and it was important to dispel any doubts to the sincerity of SANParks and WF for this initiative. A total of 5 elders, 2 youth and 2 Bushmen trackers attended the first 4 day trail accompanied by Maria Moate and Christine duPlessis of SAN Parks and facilitated by Lee Dormer and Richard Gordon of the Wilderness Foundation. The distance walked was minimised due to the ages of the group. Oom Dawid Kruiper the traditional leader of the Khomani personally attended and after a reluctant two days began to share traditional stories. At the conclusion of this first trail the elders asked that 4 key points be addressed as part of the outcomes driven by Imbewu:
   1. Nature Learning.
   2. Harmony between all people.
   3. Promote Communication.
   4. Creating purpose in life (Goal Setting).

   In an emotional speech to conclude, Oom Dawid claimed that he believed the WF, SANParks and the Khomani are one family and that this programme will assist in building better relations between us and that the children will be afforded a unique opportunity to learn those things that will make the Bushman great again.

2. **Youth Imbewu Trails**:

Date of Trail	**Elders**	**Bushmen Trackers**	**Youth**	**SANParks Facilitator**	**WF Imbewu facilitator**	**Comments**
4th-7th November 2009	4	2	2	Richard Gordon	Lee Dormer	Unfortunately 3 youth candidates had to withdraw on our arrival due to a variety of personal issues. The remaining two however engaged in a very meaningful way and compiled a code of conduct for themselves as a set of guidelines on how they believed that they should act to become meaningful and contributing members of their society. Due to the extreme heat it was decided to schedule the next trail for the beginning of winter.
30 April – 3 May 2010	5 **Elders** Oupa Dawid Kruiper Ouma !una (Katriena) Rooi Ouma Anna Januarie Ouma Marie Jacobs Ouma Griet Seekoei	2	5 **Youth and Children** Annalien Malgas Michelle Malgas Makhai Kruiper Andries Kruiper Sanna Kruiper	Richard Gordon Kirsten McLeish	Lee Dormer	A variety of natural world examples were used to facilitate conversations that dealt with "communities", "decision making" and "ethics". Welcome rain shortened the story telling at the fire but this was made up for when spontaneously the elders shared traditional stories whilst walking in the desert. During the course of the 4 days alcohol and substance abuse was focused on and the elders believed that they should be role models in the wilderness as well as at home in the community. All remarked

						that they felt the healing power of these days together and that they had reconnected with each other and the earth.
24 June – 28 June 2010	2 **Elders** Ouma !Una Rooi Oupa Dawid	2	5 **Youth and Children** Isak Kruiper Dawid Kruiper (jnr) Jacobus Rooi Reagan Rooi Andries Kruiper	Richard Gordon Kirsten McLeish	Lee Dormer	Continuing on from the theme above (as will all our Imbewu Camps) discussing issues within the community and utilising the environment as a stimulus to convey messages and draw parallels. Ouma !Una one of the 2 elders alive that can still speak the original Khomani language gave us all the privilege to listen to her stories in the old language, she then wonderfully translated into Afrikaans for all to understand.

Main Challenge:
One of the challenges that we are facing is the lack of commitment of the community youth to attend the camps. There is agreement up front to attend, however they often withdraw before the camp commences. The elders have undertaken to look into this and reduce the amount of absentees for further camps.

TAIPEI LIAISON/FORESTRY BUREAU COA: IMBEWU REPORT: 2010/2011

Income :	$ 10,784.00	R 72,711.12	R 72,711.12
Expenditure for 2010/2011			R 146,452.09
Equipment (gas cannisters, torches, etc.)	$ 198.93	R 1,446.25	
Trail costs (food, fuel, etc.)	$ 4,323.98	R 31,435.35	
Maintenance: camp equip.	$ 723.38	R 5,258.95	
Motor vehicle expenses	$ 936.10	R 6,805.47	
Admin overheads (telephone, stationery)	$ 189.36	R 1,376.65	
Salary: rangers/staff	$ 6,562.75	R 47,711.21	
Management fees	$ 4,814.31	R 35,000.00	
Training: trail guides	$ 284.94	R 2,071.50	
Audit fee	$ 687.76	R 5,000.00	
Insurances (for vehicle, equip)	$ 1,423.21	R 10,346.71	
	$ 20,144.72		

Rate of exchange implemented: R7.27 (rate of receipt of funds)

印度保育團體 Aaranyak 計畫報告摘要

Aaranyak 設立於 1989 年，為印度東北部主要的生物多樣性保育協會。Aaranyak 主要目標包括：

- 推動保育宣導活動。
- 於鄰近保護區之社區，規劃以社區為基礎之保育行動，降低民眾對生物資源之依賴，提倡永續發展。
- 執行研究計畫和辦理保育活動，提升民眾對生物多樣性保育之瞭解。
- 以教育宣導和司法途徑，勸阻野生動物貿易行為。
- 探詢以法令和司法方式保護生物多樣性之方法。

Aaranyak 所執行計畫包括：

一、教育宣導和人才培訓計畫
二、印度東北地區受威脅物種保育計畫(包括犀牛、象、虎、豹、鳥類、爬蟲類、靈長類動物、等之研究和保育計畫)
三、保育和生計計畫
四、法律和提倡計畫
五、水、氣候和災害計畫
六、野生動物遺傳學計畫

自 1997 至 2009 年，Aaranyak 受委託的計畫，包括已完成的和持續進行中的有 19 項。包括「經由社區參與保育金毛葉猴計畫」、「大禿鸛救援和復育計畫」、「大象保育宣導計畫」、「爬蟲類資源調查計畫」、「印度生物多樣性策略及行動計畫」等。贊助單位包括 David Shepherd Wildlife Foundation, IUCN, US Fish and Wildlife Service, Conservation International, Rufford Foundation, Smithsonian Institution, BirdLife International 及印度政府單位等。

2008 年所提「東喜馬拉雅野生動物犯罪監測計畫」，因 Aaranyak 於 11 月才收到經費，執行期間改為 2008 年 12 月至 2009 年 11 月。計畫內容及執行情形如下：

非法野生動物交易已成為世界第二大犯罪行為(第一大為麻醉藥品非法交易)，野生動物非法交易案件的增加，於地區、國家和國際層級，都已成為極度受關注的議題。國際刑警組織(Interpol)表示跨國非法野生動物交易有逐漸增加的趨勢，並通常伴隨其他跨國非法犯罪行為，如麻醉品交易及武器走私。目前有八百種以上的植物和動物是禁止國際間交易的。在印度，象牙、虎皮及骨、豹皮、雲豹皮、犀牛角、麝香、熊膽及製品、藏羚毛等的非法交易，已震驚保育團體及其政府。印度政府當局已制訂許多政策及法律，以保護野生動物並制止這方面的犯罪行為。近來數個民間組織亦開始協助政府執法單位，調查野生動物的非法走私案件。

本犯罪監測計畫主要範圍包括印度東北地區、不丹和尼泊爾。計畫目標包括：

一、透過多位可信賴線民所提供之資訊，調查野生物盜獵或走私涉案人。

二、建立並維繫計畫人員與各政府機構執法人員聯絡網，以有效對抗盜獵及走私者之不法行為。

三、與印度以外東喜馬拉雅地區或國家之執法機構建立聯絡網，以資訊共享的互惠方式分享情報，遏止野生動物的非法交易。

四、針對野生物盜獵或走私涉案人採取法律行動，並聘法律顧問以確保將野生動物犯罪者處以印度法律中之最高刑罰。

五、撰寫一份「印度東北地區非法野生動物貿易現況報告」，於 15 屆 CITES 大會前送阿薩姆省政府、印度政府和 CITES 秘書處參考。

六、針對印度東北地區 125 位反盜獵執法人員，辦理 5 梯次法規訓練班，每梯次 25 人、為期兩天。

野生動物犯罪監測計畫於 1998 年由 David Shepherd Wildlife Foundation (DSWF) 和 Global Survival Network 贊助成立，原來名稱為 Cross Town，迄今建立的資料庫有 100 個野生物盜獵或走私涉案人資料。

監測及探查盜獵或走私者行動，以及蒐集犯罪活動新資料為本計畫優先執行項目。獲知盜獵及走私者的未來動向至為關鍵，此類資訊可協助逮捕參與活動之罪犯。偶爾可從印度或其他東南亞國家當地居民口中獲悉此類訊息，但此類犯罪行為主要都選在人煙稀少的偏遠地區以避人耳目，並且大多數背後均有地下幫派組織操控，故知情者多因害怕遭到報復而選擇沉默，致使執法單位難以知悉，也難預防犯罪行為的發生。因此有關情治單位系統之建立及維持良好運作至為重要。

本計畫以極度審慎方式執行，負責蒐集盜獵或走私活動資料人員之身分予以保密。如需因應非法野生動物貿易研究，人員姓名將使用代號。使用錄音機和相機協助蒐集資料。一旦情報完整，移請相關執法單位緝捕，但情況緊急時，與警察和林務部門人員諮商後採取行動。

暫訂之一年工作計畫，主要工作包括：

- 蒐集情資工作人員訓練。
- 蒐集與分析盜獵或走私野生動物資料。
- 採取行動遏止盜獵後走私活動。
- 辦理 5 次法規訓練班。
- 辦理 2 次「打擊犯罪年會」邀集警、政、軍等單位，分析一年來所蒐集情報，商討來年行動計畫。

將以下列方式衡量計畫成效：

- 被逮捕或擊斃之盜獵者走私犯人數。
- 被沒收的武器、彈藥、野生動物相關違禁品數量。

- 盜獵行為被終止的次數。
- 運用執法機構聯絡網，打擊犯罪之成果。

本計畫執行情形如下：

- 2008 年 12 月起，集結線民情資以獲取野生動物相關犯罪資訊，尤以盜獵及走私為主。截至 2009 年 7 月為止，阿薩姆省已有 20 多名盜獵者遭到逮捕。
- 與官方林務人員定期交流、分享資訊，並協助執法人員在處理及逮捕野生動物犯罪者方面達成更多績效。
- 對一扣押野生動物製品案件，提供 Manas 國家公園管理單位法律相關意見及協助，此案有 11 名走私者涉案而遭到逮捕，目前仍在 Barpeta 法庭審理中。
- 已完成三場法規訓練，分別在 Orang 國家公園、Nameri 國家公園暨老虎保護區、及 Manas 國家公園暨老虎保護區暨世界襲產。
- 已撰寫本計畫之進度報告，俟計畫結束即發布，可提供更多東北印度之野生動物犯罪之詳細資訊。

2009 年，印度保育團體 Aaranyak 所提「印度瑪那茲(Manas)國家公園亞洲象族群動態調查計畫」內容，2010 年 3 月及 12 月計畫報告綜合摘要如附：

亞洲地區亞洲象棲地約有 59 處，雖然族群量數量評估各家說法不一，但大家都同意，亞洲象面臨生存危機。約有 873,000 平方公里(即半數以上)之亞洲象棲息地面臨棲地破碎化和人類活動之威脅。印度大象棲地面積雖僅佔所有亞洲象棲地之 17%，但族群量卻佔 60%。1999 年全印度大象族群估計約有 21,000-25,000 頭，東北地區約有 11,000 頭。印度境內，2/3 的大象分佈範圍受到人類活動之嚴重威脅。2002 年印度政府調查資料顯示印度東北地區有 9,243 頭大象，Manas 老虎保護區內有 658 頭大象。印度東北地區雌象偏多之現象由來已久，因此有必要監測雄象數量之變化。

本計畫之重要性如下：
一、本計畫將是此地區第 1 個全面性的大象族群結構調查計畫。
二、本研究將提供各項族群量之基本資料，以及其他公象族群結構資料。

本計畫之預計成效包括：
一、研究成果將有助於大象族群之經營管理。
二、Manas 雄象族群資料將運用於大象族群之經營管理。
三、對大象之生態有更多之瞭解。
四、成年公象的數量和性別比例調查，將協助瞭解盜獵活動對族群之影響。
五、所建立之大象相片檔案，可提供分辨問題象之用，以協助經營管理工作。
六、本計畫成果可供保育主管機關參考，對決定大象保育策略有所助益。

Manas 國家公園佔地 500 平方公里，位於 Manas 老虎保護區之核心區。屬亞熱帶至熱帶氣候，相對濕度 76%，平均年雨量 3,300mm，夏季平均最高溫度 37℃，冬季平均最低溫度 5℃。旱季時，大群亞洲象聚集於 Manas 和 Beki 兩條河流，

對調查工作有利。當國家公園內的草原長出新芽時，大象族群也會到此吃草。國家公園內的道路系統也使研究地點各地區都能被調查到。

Manas 國家公園亞洲象族群動態調查計畫報告，摘要如下：

首先進行問卷調查，對象包括森林工作人員、村民和象夫(mahout)，初步瞭解大象在 Manas 國家公園分佈情形。將國家公園劃分為一平方公里為單位之樣區，進行調查工作。Manas 國家公園兩季通常為 6-9 月，雨季前(pre-monsoon)為 3-5 月。但 2010 年 pre-monsoon 也有豐沛雨量，從 2 月開始下雨，因持續降雨，造成植被繁茂，雙重因素，造成觀察到大象情形比預期低。

2010 年 1-4 月進行調查，5-7 月雨季無法調查，8-10 月繼續調查，共調查 86 次，徒步調查和車輛調查都有執行，所有吉普車可達之處都有調查。因動物行動造成的小徑，則以徒步調查方式進行。共有 12 次遇到單隻或成群的象，沒有重複觀察到相同的象，摘要如下：

- 第一群 7 頭：1 頭有牙雄象(tusker)、3 頭雌象、2 頭幼象(calves)、1 頭性別不明亞成年(sub-adult)象。下兩半小時，雨後天晴，中午 12 點發現象群橫跨 Manas 國家公園道路。
- 第二群 16 頭：1 頭有牙雄象、8 頭雌象、3 頭幼象、4 頭亞成年象(雌及雄)。2010 年 2 月下午 3:30 於 Manas 國家公園中央地區發現象群正在草原進食。
- 第三群 9 頭：2 頭雌象、3 頭幼象、3 頭亞成年象、1 頭性別不明象。晴天時由車上觀察此群 11 分鐘，象群於樹林間進食。
- 第四群 11 頭：本群被發現時在草原和森林交界處，象群偵測到調查人員立即退入森林中，來不及判別性別組成。2010 年 4 月 23 日發現此群，當日陰天，後來下小雨。
- 在 Kuribeel 草原發現 1 頭沒有牙雄象(makhna)，當日天氣晴朗，下午時發現此象。這頭象經常走出國家公園外破壞農作物。
- 五月發現另 1 頭沒有牙雄象。當日下雨，此象正穿越道路。
- 六月在國家公園路上觀察到 1 頭有牙雄象。下午 4:42 發現，但此象立刻躲入草原中，調查人員視線被長草遮蔽，無法繼續觀察。
- 乾季時發現 1 頭沒有牙雄象。此象正處雄象生殖季節之狂暴狀態(musth)。
- 第 9 群 18 頭：1 頭有牙雄象、5 頭雌象、6 頭幼象、2 頭亞成年雄象、另外 6 頭藏在草原中無法判別雌雄。乾季焚燒草原時，於下午發現此群正在進食。
- 另發現三群大象，但來不及照相。其中一群中有 1 頭沒有牙雄象，另二群之組成無法評估。

Photographic documentation of Asian elephant Elephas maximus in Manas National Park, India

Final Report submitted to Taiwan Forestry Bureau



Santanu Dey, Alolika Sinha & Bibhab K. Talukdar
Aaranyak

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CHAPTER I

INTRODUCTION

The Asian elephants *Elephas maximus* once widely distributed are now confined to few biologically rich tropical forests of Asia (Sukumar 2003). Nearly half of Asian elephant's 873 000 km^2 range is in habitat that is both fragmented and under serious human impact (Leimgruber *et al.,* 2003). India, in spite of accounting for just 17 % of the Asian elephant's geographic range, is believed to hold nearly 60 % of its extant population (Sukumar, 2003). The estimated population of Asiatic elephants in India at present ranges from 21,000-25,000 making it the highest in the world. Out of these, about 11,000 are found in the northeast alone making it one of the largest populations in the Indian subcontinent (Choudhury 1999). But India's elephant population have been reduced to 5 disjunct sub-populations with little or no scope for genetic exchange in the North Uttarakhand, Uttar Pradesh), South (Karnataka-Kerala-Tamilnadu, Andhra pradesh), Eastern (Jharkhand, Bihar-Orissa-West Bengal) and the North-eastern (Assam-Nagaland-Arunachal Pradesh, Meghalaya, Tripura, Mizoram Manipur, West Bengal (North)) states and a small feral population in Andaman Nicobar islands (source: project elephant website).

The Asian Elephant is at high risk for its survival because of habitat loss, poaching for ivory, fragmentation and degradation of its habitat in the country. The two-third of the elephant ranges within India is in severe threat because of human activities. As a result, the future of elephant in India hangs not just on the ability to meet the main threats of habitat loss and degradation but also on gaining a better understanding of the increasing interface between people and elephants and ivory poaching (Sukumar, 2003). While habitat loss, degradation may reduce the forage resource affecting the entire population, the mortality rate from ivory poaching and conflict with human is considerably high in case of the adult male segment of the population. As the adult male possess tusk in Asian elephant making it more vulnerable to poaching, their high mortality played a major role in skewing the sex ratio (male: female) from *c.* 1:5-6 in the late 1960s to 1:10-20 by the late 1990s in south India (Sukumar, 2003). Skewed sex ratio may have some devastating impact on the entire population. Manas Tiger Reserve is the key conservation area in the Bhutan Biological Conservation Complex harboring 658 elephants (Government of India, 2005). While sex ratio in northeast population is historically female biased in comparison to southern India, civil unrest in the Manas landscape during 1980s and 1990s provided opportunity for the poachers to further contribute to the skewedness. Hence the

current male elephants (tuskers) in Manas constitute a small and declining fraction of the total population. Hence there is an urgent need to monitor the abundance and other demographic factors associated especially for male elephants. This study has attempted to assess the abundance of male elephants (including *tuskers, makhana* and *ganesh*) in Manas National Park.

OBJECTIVES:

The study was initially conceptualized to understand the population dynamics of the Asian elephants in Manas National park using the photographic capture-recapture method. The objectives formulated were to determine the abundance of the male elephants, to know the group composition in the herd and to determine the changes in the density of the elephants in the park. But due to time and fund constraints the initial objectives were subjected to change. Also the prolonged monsoon in Assam this year hampered the activities and smooth running of the project. The present study was aimed to assess the following:

a. To identify the different herds in the Park.
b. To find out the group composition in a herd.

CHAPTER II

STUDY AREA

Location

Manas National Park (26°35'-26°50'N, 90°45'-91°15'E) with a total area of 500 km^2, the core area of Manas Tiger Reserve, forms an important part of Eastern Himalaya Biological hotspot. It is located in the Baksha and Chirang districts of Bodoland Territorial Council, Assam, India. It forms a part of Malayan and Indo-Bhutan realms and is a key conservation area in the *Jigme Dorji-Manas-Bumdaling* conservation landscape in the eastern Himalayan ecoregion (Wikramanayake *et al.* 2001). It spans on both sides of the Manas River and is restricted to the north by the international border of Bhutan, to the south by thickly populated villages and to the east and west by reserve forests.

The Reserve is situated in the eastern duar and has extensive *Bhabar* and some *terai* areas, typical of Himalayan foothills. These *terai* like tracts are more or less flat. The natural gradient of the land is gentle sloping southward and area along the southern boundary is more flat and get water-logged during the rains.

Vegetation & fauna

There are three main types of vegetation: sub-Himalayan alluvial semi-evergreen forest, east Himalayan mixed moist and dry deciduous forests, the commonest type, and grasslands. The semi-evergreen forest is characterized by the species like *Aphanamixis polystachya, Anthocephalus chinensis, Syzygium cumini, S. formosum, S. oblatum, Bauhinia purpurea, Mallotus philippensis, Cinnamomum tamala, Actinodaphne obvata;* Tropical moist and dry deciduous forests are characterized by *Bombax ceiba, Sterculia villosa, Dillenia indica, D. pentagyna, Careya arborea, Lagerstroemia parviflora, L. speciosa, Terminalia bellirica, T. chebula, Trewia polycarpa, Gmelina arborea, Oroxylum indicum* and *Bridelia spp*. There are 43 different grass species, *Imperata cylindrica, Saccharum narenga, Phragmites karka* and *Arundo donax* predominating (Menon, 1995) in eight major associations (Lahkar, *In prep*). There is a wide variety of aquatic flora along riverbanks and in the numerous pools (Jain & Sastry, 1983). Some 374 species of dicotyledons, including 89 trees, 139 species of 6 monocotyledons and 15 species of orchid have been identified (Project Tiger, 2001). With this diversity in the forest types, Manas harbours a total of 55 mammals, 450 birds, 50 reptiles and three amphibians (Project Tiger, 2001). Manas contains 22 of India's Schedule I (Wildlife Protection Act, 1972) mammals and at least 33 of its animals listed as threatened, by far the greatest number of any

protected area in the country. Important fauna includes Tiger, Leopard, Clouded leopard, Elephants, Gaur, Wild buffalo, Sambar, Hog deer, Swamp deer, Pygmy hog, Golden langur, Bengal Florican, etc.

The landscape experiences moist tropical to sub-tropical climate with up to 76% relative humidity. The mean annual rainfall is 3330 mm. The mean maximum summer temperature is 37°C and the mean minimum winter temperature is 5°C (WPSI, 2002). During dry season, there is huge congregation of elephant herds in perennial Manas and Beki River inside the Park ensuring the sighting possibility. While during this period most of the new grasses emerges in the grassland areas in the Park and herds frequents here for grazing. Besides, a broad good quality road network (148.38 km, *Courtesy: GIS Lab, Aaranyak*) inside the Park makes the study area to be covered regularly.

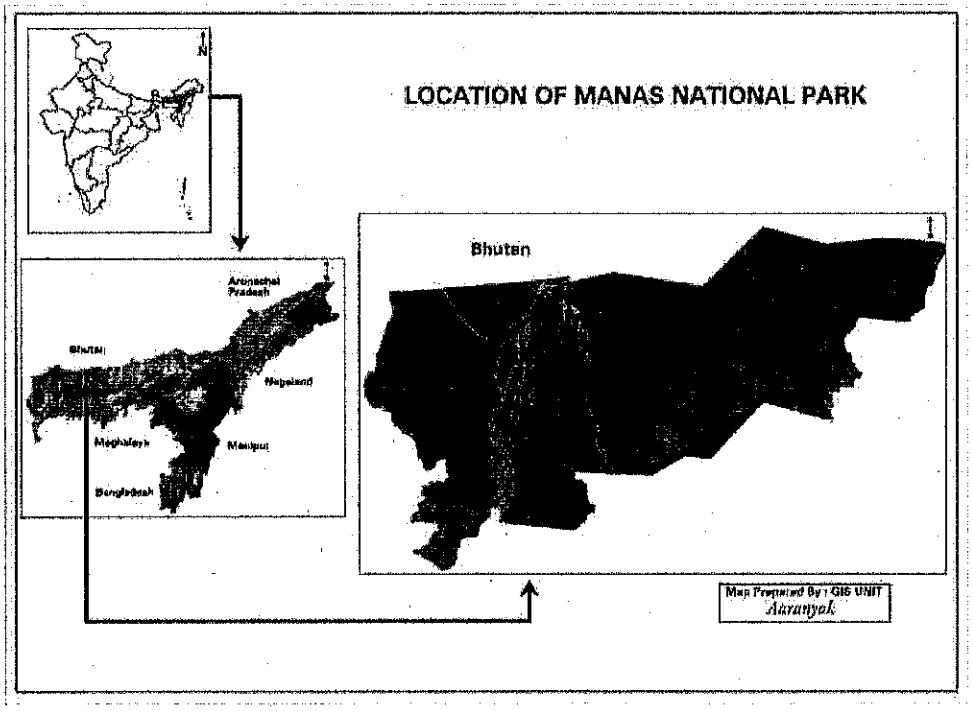


Fig 1: Location of Manas National Park, Assam.

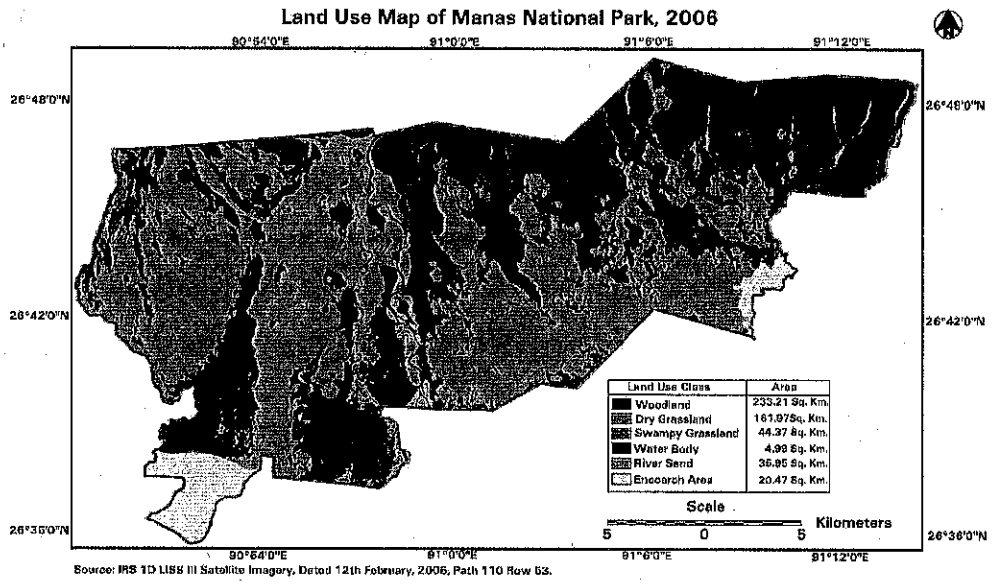


Fig 2: A GIS map of Manas National park depicting the different landuse patterns.

CHAPTER III

METHODOLOGY:

Field methods

Initially secondary information regarding the distribution of the elephants in the study area was collected in the form of questionnaire. Structured questionnaire were prepared to interview the forest officials, villagers (preferably elders) and *mahouts* (domestic elephant keepers) to get the whereabouts of the elephants in the Park. The Park was gridded in 1 km^2 grids and then sampled accordingly.

Manas National Park experiences its pre-monsoon season from March- May and monsoon from June – September. But this year the pre-monsoon season was accompanied by heavy rains which started from February itself. Owing to the incessant rains the sightings of the elephants were considerably low. Due to the rains the vegetation of the park has become quite dense; which reduced the sighting opportunities. Hence, the encounter rate of elephants was less than expected.

The field work started from January and continued until April. Field visits were not possible during the monsoon seasons (May - July); but the work resumed in August and data on elephant sighting were recorded till October 2010. Each visit was considered as a single sampling unit. A total of 86 visits inside the park were done. Transects using both vehicles and on foot were monitored to locate the herds of the elephants. All the jeepable roads were traversed by vehicles. The natural trails made by regular movement of the animals were walked. On twelve occasions elephants were encountered, both herds and loner. No herds of elephants were recounted. The details of the elephant sighting along with necessary parameters are described below in the result section.

During our field survey we came across another three herds of elephants, but could not photograph those animals. Among them was a *makhna* elephant found while walking the natural trail in the eastern range of the Park. The composition of the other two herds could not be assessed.

CHAPTER IV

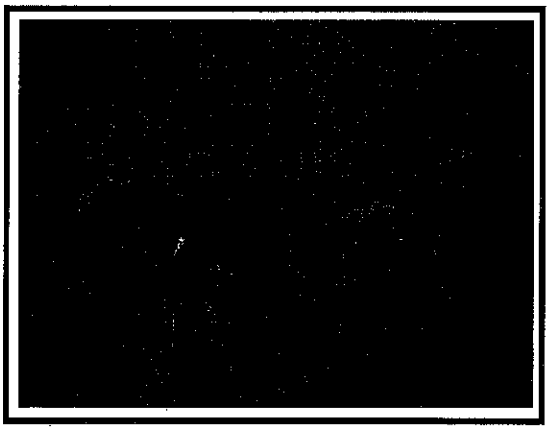
RESULT

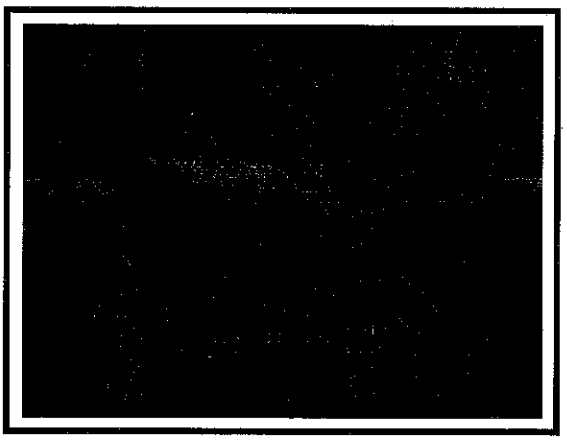
Herd 1: The herd was found on the main road comprising of one male elephant, three females, two calves and one sub-adult (sex unidentified). The herd was crossing the road at around 12 pm. The weather was sunny after a rain which lasted for half an hour.



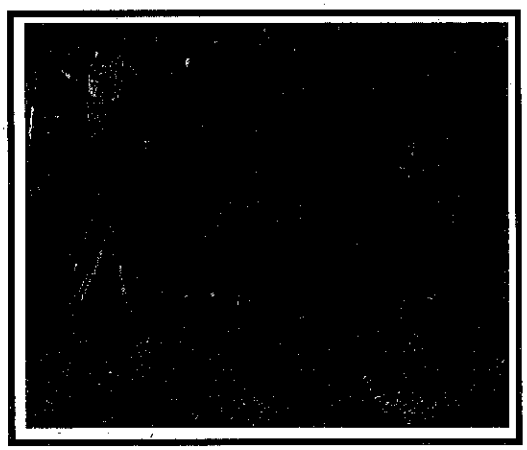


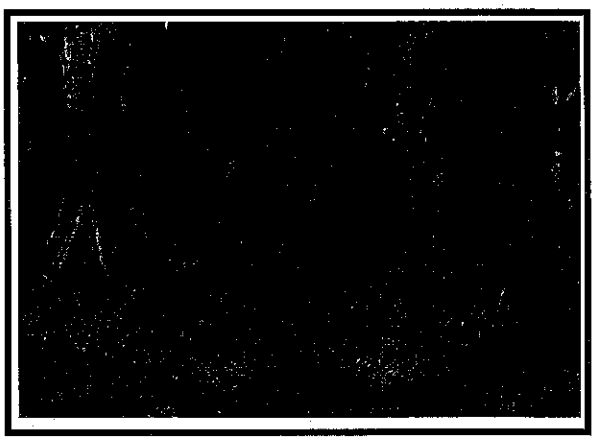
Herd 2: This herd was encountered in February 2010, in late afternoon at around 3:30 pm. The herd consists of 16 individuals including a male (tusker) along with three calves, eight females and four sub-adults (both male and female). The herd was found in the central range of Manas National Park, Bansbari Range in grassland of Buraburi beat area. During the time of observation the herd was found to be feeding.





Herd 3: The herd consisted of nine individuals: three sub-adults, two females, three calves and one unidentified individual. The herd was found in the woodlands of Raisingila area in a sunny day. The elephants were observed for 11 minutes while surveying through vehicle. The animals were found to be feeding.



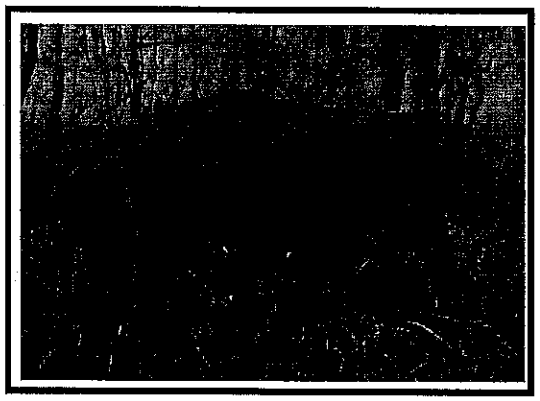


Herd 4: On 23rd April 2010 a herd of eleven individuals was found in Goruchara area of the central range. On seeing the team the elephants tend to flee away inside the woodland which was on the edge of the grassland where the herd was seen. The activity of the herd could not be observed. The weather was cloudy followed by a little drizzling.

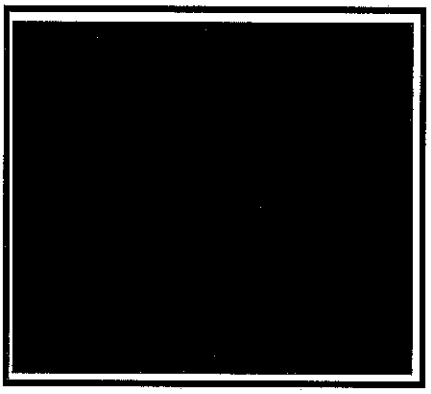




Herd 5: A *makhna* elephant (a male elephant without tusk) was observed in the grassland of Kuribeel in the central range. The elephant was seen in the afternoon with a clear weather. This particular elephant is also known to stray out in the villages and destroy the cultivation.



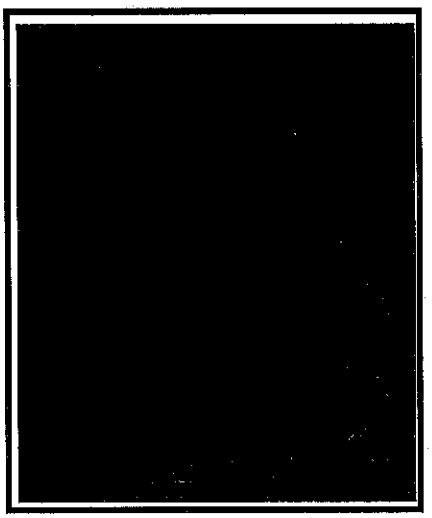
Herd 6: In another occasion in the month of May another *makhna* elephant was found crossing the road while we were walking our transects. The weather was rainy.



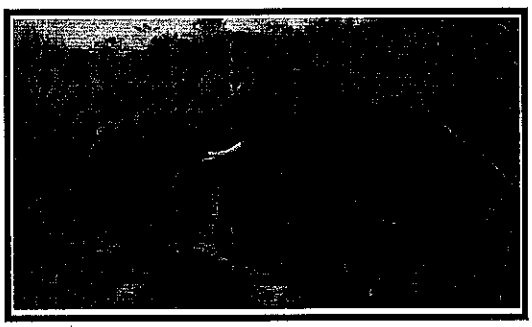
Herd 7: At 4:42 pm, a tusker was encountered on the main road in the month of June. On seeing our vehicle the animal moved inside the grassland and took cover. The long grasses reduced our visibility to zero and hence further observation was arrested.

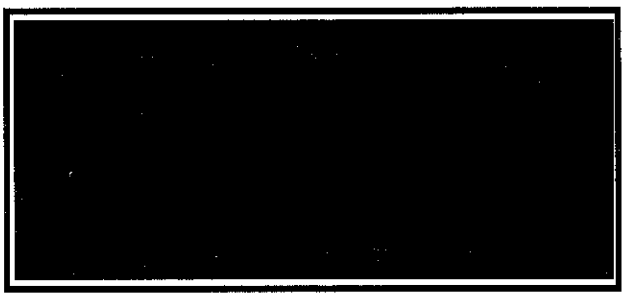


Herd 8: This makhna elephant was found in the Kanchanbari area of the Bhuyanpara range in the dry season. The elephant was in *musth,* a behaviour exhibited by the male elephants in the breeding season.



Herd 9: A herd of eighteen individuals were found in the Bhuyanpara range. The herd composed of one adult tusker animal, five female elephants, six calfs, two sub-adult tuskers. Other six individuals could not be classified as they were amidst the grassland. This herd was found in the dry season during the burning of the grassland. The herd was encountered in the late afternoon while feeding.





CHAPTER V

CONCLUSION

Manas National Park harbours a healthy population of the Asian elephants. It is a part of the Chirang-Ripu Elephant Reserve (ER) , which has the third highest number of elephants along with the eastern doors ER in the northeast India (Census, BTC, 2008). During the dry season, accompanied by the grass burning, large herds of elephants are found in the park. The 2009 Elephant Census of the Forest Department revealed that the park is inhabited by about 800 elephants. This population migrates to the Royal Manas National park of Bhutan, as there is contiguity in the northern boundary. Thus Manas plays a pivotal role in the conservation of this mega herbivore in the transboundary landscape. The migratory routes need to be identified and the population needs to be monitored for ensuring the survival of this long ranging species. But the decade long civil unrest in Manas National Park has caused considerable damage to the entire park. Taking aid of the political turbulence, a good number of tuskers were wiped out by the poachers, although unreported. The habitat was destructed severely leading to the decline of many species. The human elephant conflict increased and also in the rise, mainly in the fringe villages of the southern boundary.

The long term conservation of the Asian elephant in Manas lies in a systematic data generation for consecutive years along with people's participation in conservation initiatives would be helpful to prepare a future blue print of Asian elephant conservation in Indo-Bhutan Trans-boundary Landscape (Lahkar et al. 2007). Improvement of degraded habitats is utmost necessity to provide habitats and foraging sites to elephant.

In 1992 Manas was tagged as a World heritage site 'in danger'. The state Government as well as the Bodoland Autonomous Council is trying hard to revive the Park. Infrastructure development is in a steady pace for providing better management and protection of the biodiversity. Various NGOs, local community are also working ceaselessly to bring back Manas in its former status. Research on most of the flagship species are being undertaken to collect the necessary information imparting to their conservation needs. Eco-tourism is another sector which is being developed and contributing to the economic upliftment of the local community.

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印度東北犀牛基金會計畫報告摘要

印度東北犀牛基金會(The Rhino Foundation for Nature in NE India)所提計畫執行情形，摘要如附：

印度東北犀牛基金會設立於 1994 年，已執行 16 個保育計畫。美國魚類暨野生物署(US Fish & Wildlife Service)贊助 5 個計畫，另贊助 1 個計畫的包括英國保育團體動植物保育協會(Fauna & Flora Preservation Society)和拯救犀牛協會(Rhino Rescue)，以及阿薩姆(Assam)環境和森林部(Environment & Forest Department)等。基金會榮譽行政主管為 Dr. A. U. Choudhury，研究野生動物超過 25 年，1998 年至 2004 年間，曾經兩度擔任阿薩姆環境和森林部 Deputy and Joint Secretary，為阿薩姆野生動物最高政府組織 State Board for Wildlife 委員，是 IUCN 數個專家小組的成員(例如亞洲象、亞洲犀牛、亞洲野牛、熊、貓科動物、小型食肉動物、雉類和受威脅水鳥等)，已發表 580 餘篇野生動物相關文章或研究報告，並出版 19 本有關印度東北部野生動物書籍，執行 30 項印度東北部保育或調查計畫。

我國於 2007 年贊助印度東北犀牛基金會所提「印度阿薩姆地區野水牛族群現況評估計畫」，成果報告摘要如附：

野水牛(Wild water buffalo, *Bubalus arnee (=bubalis)*)是全球受威脅物種，2004 年被 IUCN 列入瀕臨絕種(Endangered)類別。野水牛曾經廣泛分佈於印度東部和北部，分佈範圍連續延伸到越南。現在印度只有東北部有野水牛，另有少量族群出現於尼泊爾、泰國、柬埔寨和不丹。野水牛為馴化水牛的祖先，為重要遺傳資源。棲息地消失、盜獵以及與馴化水牛雜交都是造成族群減少的原因。目前印度野水牛族群大多是被分隔的小族群，1994 年時約有 3,000 頭。IUCN 2004 年紅皮書列出泰國族群已降至 40-50 頭，分佈於 Huai Kha Khaeng Wildlife Sanctuary。自 1948 年起，有許多野水牛研究，但阿薩姆最近的調查研究是 1994 年，Manas 國家公園約有全球 1/3 的野水牛，Dr. Choudhury 2006 年的調查發現族群大量減少。

本計畫主要目的為評估野水牛族群現況，並出版約 150 頁含照片的報告。所有原列於 Dr. Choudhury 報告的地點均再度進行族群調查，Kaziranga 國家公園部分由阿薩姆環境和森林部負責調查。因野水牛棲息地的草長得很高，調查工作將騎象走穿越線，並儘量拍照。為維護野水牛棲息的草原，阿薩姆環境和森林部，每年引火焚燒，避免棲息地演替為樹林。焚燒作業完成後的一段時間是重點調查時間，因為那時視野較佳。除實地調查外，也將訪談當地居民、老獵人等。

調查結果紀錄到 215 頭野水牛，70 頭雄牛，109 頭雌牛，24 頭小牛，12 頭性別不明。這些野水牛有 21 群，每群約 5-18 頭。本計畫為第 1 次全面性野水牛族群

調查，以前的調查都是局部性。本次調查未成年野牛比例為 54%，顯示族群為健康成長狀態。性別比例雄：雌為 1：1.56。Kaziranga 國家公園部分，未成年野牛比例為 35-37%，性別比例雄：雌為 1：2.97。

Dr. Choudhury 於 2010 年 8 月將該年出版之「消失之族群：野水牛 The Vanishing Herds: The Wild Water Buffalo」一書寄贈林務局，該書封面、封底和扉頁均有林務局中英文名稱及 logo。本書為第一本印度東北野水牛專書。

2009 年所提「照相追蹤調查印度梅加拉亞(Meghalaya, India)地區瀕危哺乳動物計畫」，依據計畫和報告資料，摘要如附：

本計畫調查對象為老虎、亞洲野水牛和小貓熊(red panda, *Ailurus fulgens*)。老虎和亞洲野水牛 2008 年皆被列入 IUCN 瀕臨絕種(Endangered)類別，小貓熊 2008 年列為 IUCN 脆弱物種(Vulnerable)類別。印度東北地區梅加拉亞(Meghalaya)州主要棲地是否仍有老虎、亞洲野水牛和小貓熊，以及其數量均有待確認。老虎數量不明，之前僅發現幾處獸跡和排遺。Meghalaya 亞洲野水牛棲地有限，數量稀少。小貓熊通常在喜馬拉雅山高處和中國高山中，Meghalaya 有小貓熊的報告廣受質疑，但在 Meghalaya 的 Garo Hills 發現保存良好的小貓熊皮，小貓熊能否存在於比較溫暖的 Meghalaya，又引起人們之興趣。因為森林被砍伐以供人類居住、耕作或從事其他活動，這 3 種動物的數量減少許多。以前雖有為數不少印度東北地區動物族群調查報告，但都沒有全面性的梅加拉亞州上述動物主要棲地之調查資料。本計畫調查所得資料，可提供未來保育行動計畫之重要參考資料。

本計畫調查地點包括 Meghalaya 州 Garo Hills 的 Nokrek National Park 和 Balpakram-Siju-Baghmara complex。在 Khasi Hill 的研究地點為 Trongpleng 附近。一處地點將架設至少 6 部照相機，之後再依序移至其他兩處，此過程將重複數次。也將訪談環境和森林部人員、當地居民、老獵人和其他瞭解狀況的人。計畫執行預計 2009 年 7 月開始，但野外調查將於 10 月以後進行，因為印度夏季為雨季，調查工作困難。

2009 年因研究地區爆發種族衝突(詳如計畫報告附件)，計畫執行被迫延後，預計 2011 年 3 或 4 月完成。本計畫執行進度說明如下：

- 與森林部人員和田野調查相關人員聯繫洽談計畫事宜。
- 完成調查地點現堪。
- 蒐集調查地點相關研究報告和資料。
- 取得環境和森林部研究委員會(Research Committee)申請研究許可證。
- 於 Khasi Hills 架設自動照相機，發現大靈貓(Large Indian Civet, *Viverra zibetha*)蹤影，大靈貓曾經是常見之動物，因盜獵和棲地消失族群數量減少，

2010 年被 IUCN 列為 near-threatened。

- 選址架設相機時，很難得拍攝到 Himalayan Pal Civet (*Paguma larvata*)。
- 發現數種哺乳動物之毛皮或排遺，包括豬獾(Hog Badger, *Arctonyx collaris*)、花豹(Leopard, *Panthera pardus*)、豹貓(Leopard Cat, *Prionailurus bengalensis*)、紅鬣羚(Red Serow, *Capricornis rubidus*)、赤麂(Indian Muntjac, *Muntiacus muntjac*)、大鼯鼠(Red Giant Flying Squirrel, *Petaurista petaurista*)。

2010 年所提「印度阿薩姆地區野水牛保育計畫」，為 2007-2008 年計畫(請參考上述報告資料)之延續計畫，計畫內容及執行情形摘要如附：

1960 年代，野水牛族群數量減少及分佈範圍縮小，目前全世界 4/5 族群集中在印度阿薩姆，估計有 3,000 頭。Dr. A. U. Choudhury 2006 年調查之前的研究包括 Prater (1948), Gee (1964), Oryx (1967, 1989), Sheshadri (1968), Choudhury (1994)。因林務局和重要生態系合作基金(Critical Ecosystem Partnership Fund, CEPF)之贊助，2008 年得以評估阿薩姆省不同地區野水牛族群現況，為使調查資料發揮功用，故有此延續計畫。

本計畫預計辦理野水牛保育宣導活動，除辦理視聽講座外，也將發放宣導摺頁給野水牛棲地附近村民、學校和村代表會等。宣導營邀請參加對象包括當地居民、村代表會、學校教師、森林部第一線工作人員和民間團體。摺頁內容包括野水牛瀕危情形及阿薩姆族群佔全球族群大多數，提升大眾瞭解野水牛保育之重要性。

將提供一部二手摩托車給當地保育團體 Nature Card & Friend (NCF)，NCF 過去 4 年積極參與保護區外(Kollolua-Jokai)野水牛保育工作。摩托車可於監測、反破壞及宣導活動。因稻田 4 個月的生長期間，保護區外野水牛夜晚大部分時間逗留於農田，預計設立 5 處便宜的季節性反破壞營地(運用當地竹子和茅草建造)。也將提供手電筒供營地工作人員和當地村民夜晚巡護時使用。

本計畫執行情形如下：

- 擬定計畫執行行動計畫。
- 已規劃 2011 年 2 月起辦理至少 10 梯次之野水牛保育宣導活動，地點包括 Dibrugarh district (Lengeri and Bolai near Kollolua-Jokai), Lakhimpur district (Borchapori), fringes of Manas National Park & Tiger Reserve (Batabari, Koklabari, Bhuyapara, Bansbari, Panbari, Ultapani) and Kaziranga National Park & Tiger Reserve (Laokhowa)。
- 已設計和印製保育野水牛摺頁和海報，並包括英語版和阿薩姆語版。
- 已聯繫當地保育團體共同參與保育活動。
- 2011 年 2 月採購二手摩托車供保護區外監測或宣導之用。

Project Title:

Camera-trapping of select 'Endangered' mammals in Meghalaya, India.

2nd Interim Report

Principal Investigator

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1. INTRODUCTION

The state of Meghalaya (25°02'–26°07'N, 89°49'–92°50'E; 22,429 km²) is located in northeast India (Fig. 1). It is largely hilly and mountainous. Meghalaya is part of an Archaean plateau with undulating tablelands. Shillong Peak (1,961 m a.s.l.) is the highest point on the plateau. Temperature generally ranges from less than 4°C in winter to 35°C in summer (maximum).

Camera trapping has become a useful tool for detecting presence and also assessing their relative abundance of mammals which normally dwells in dense forest and not easily seen. With compact easy-to-use new cameras, it has also become much easier than in the past when cumbersome methods such as pressure pads, etc, had to be used. At least two Endangered and a Vulnerable species, namely Tiger *Panthera tigris*, Asiatic wild water buffalo *Bubalus arnee* (both listed as Endangered as per IUCN, 2010) and Red panda *Ailurus fulgens* (listed as Vulnerable as per IUCN, 2010) whose continued presence and possible numbers in some key pockets of Meghalaya state in North East India need confirmation. The current status of the Tiger in the sites to be studied is not clear although existence of a few animals have been reported from sighting of their pugmarks and scats. The Wild water buffalo was always found in small numbers in parts of Meghalaya due to limitation of habitat (Choudhury 1994). However, due to clearing of valley areas for cultivation, the remaining population remains inside dense forest for most of the time grazing along the streams and grassy hill-slopes. Thus its sighting has become very difficult. The case of Red panda is interesting and intriguing. This is because it is known to be an animal of the higher Himalaya and the mountains of China. A small population was reported by this applicant (Choudhury 2001a), which has been received across the globe with some skepticism. Availability of a preserved skin in Garo Hills, Meghalaya has furthered interest in this elusive small carnivore in the region which is warmer than the Himalaya.

Owing to destruction of forests for human habitation, cultivation, felling of trees and development activities, the numbers and range of all these species was substantially reduced and some even eliminated from the greater part of their former range in the state. Besides habitat loss and fragmentation, hunting/poaching have also threatened the remaining populations. The study sites are shown at Fig 1.

Although references of these species in North East India are found in many publications, notably Prater (1948), Corbett & Hill (1992) and Choudhury (1994, 2001b), there is no comprehensive coverage of their status in these 'key habitats' of Meghalaya. So far as their current status in the proposed study sites is concerned, it is very poorly known. Hence, **this study is going to be a vital** one for planning any future conservation action.

2. OBJECTIVES.

To confirm the continued existence of the listed mammals, which are globally threatened (two Endangered and one Vulnerable) species in the select areas in the Indian state of Meghalaya.

Besides preparing a final report, a number of scientific papers and popular articles will also be published.

3. METHODOLOGY.

Three sites in Meghalaya. In Garo Hills, the sites are: Nokrek National Park and Balpakram – Siju – Baghmara complex; in Khasi Hills, there will be one site near Trongpleng. So far one site has been covered, i.e., Trongpleng in Khasi Hills and the process for setting cameras in Garo Hills sites are going on. Four more cameras have been procured recently, which will be installed soon (within February 2011). There is some delay in approaching the Garo Hills sites as owing to ethnic clash between two tribes along Assam-Meghalaya border, the law and order situation was not congenial (see Appendix 1). **Further details of methodology will be given in the final report, which is expected in April 2011.** The Principal Investigator (honorary) was assisted by two Field Assistants from Trongpleng village. The staff of the Environment & Forest Department, local villagers, old hunters and other knowledgeable persons were also interviewed to gather further information.

Dr Mohd. Firoz Ahmed, a field biologist with Aaranyak, a nature conservation organization based at Guwahati and who has good expertise in camera-trapping extended help and valuable advise in the field. He also camped with the Principal Investigator (honorary) in the field at Mawsynram, the nearest town to Trongpleng.



A camera-trap is being installed near Trongpleng, Khasi Hills, Meghalaya. Dr A. Choudhury (honorary Principal Investigator) (left) and Firoz Ahmed (right) with a field assistant (behind).





Above: A camera-trapped picture of a Large Indian Civet (*Viverra zibetha*) from Trongpleng, Khasi Hills, Meghalaya. This species was once common all over but declining in numbers owing to poaching and habitat loss. It has been listed as 'near-threatened' by IUCN (2010).

Below: A very rare photo of a not so rare small carnivore. The Masked or Himalayan Pal Civet (*Paguma larvata*) is very rarely seen during the day at least not roosting like this! This picture was taken while placing a camera-trap near Trongpleng, Khasi Hills, Meghalaya.

4. RESULTS.

The cameras set up near Trongpleng in Khasi Hills has yielded a single species in the form of Large Indian Civet (*Viverra zibetha*). This species was once among the commoner carnivores and used to occur all over but its population is declining owing to poaching and habitat loss. It s threat status has been upgraded and has been listed as 'near-threatened' by IUCN (2010).

Another carnivore photographed during the study was the Masked or Himalayan Pal Civet (*Paguma larvata*). In fact, it was sighted while looking around for a suitable spot to set up a camera trap. In fact it was a very rare opportunity to photograph this species that too roosting on a tree branch near Trongpleng, Khasi Hills, Meghalaya.

Evidences of several other mammals in the form of skins, droppings, etc., were seen which includes, Hog Badger (*Arctonyx collaris*), Leopard (*Panthera pardus*), Leopard Cat (*Prionailurus bengalensis*), Red Serow (*Capricornis rubidus*), Indian Muntjac (*Muntiacus muntjac*) and Red Giant Flying Squirrel (*Petaurista petaurista*).

The relatively lower density of mammals is evidently due to human-related disturbance that includes felling of trees, minor forest produce and also poaching. The forest being private and community owned, there is no government reserve in the area around Trongpleng, Khasi Hills, Meghalaya.

5. ACKNOWLEDGEMENTS.

COA, Taiwan for a small grant. Dr Firoz Ahmed for his help and encouragement. Stolly Snaitang, the headman of Trongpleng village. Cronlin Shella and Opstar Dkhar (field assistants), S. Shining (Junior Engineer, PWD, roads, Mawsynram) and Nagen Barman (Chowkidar of the PWD, roads Inspection Bungalow, Mawsynram).

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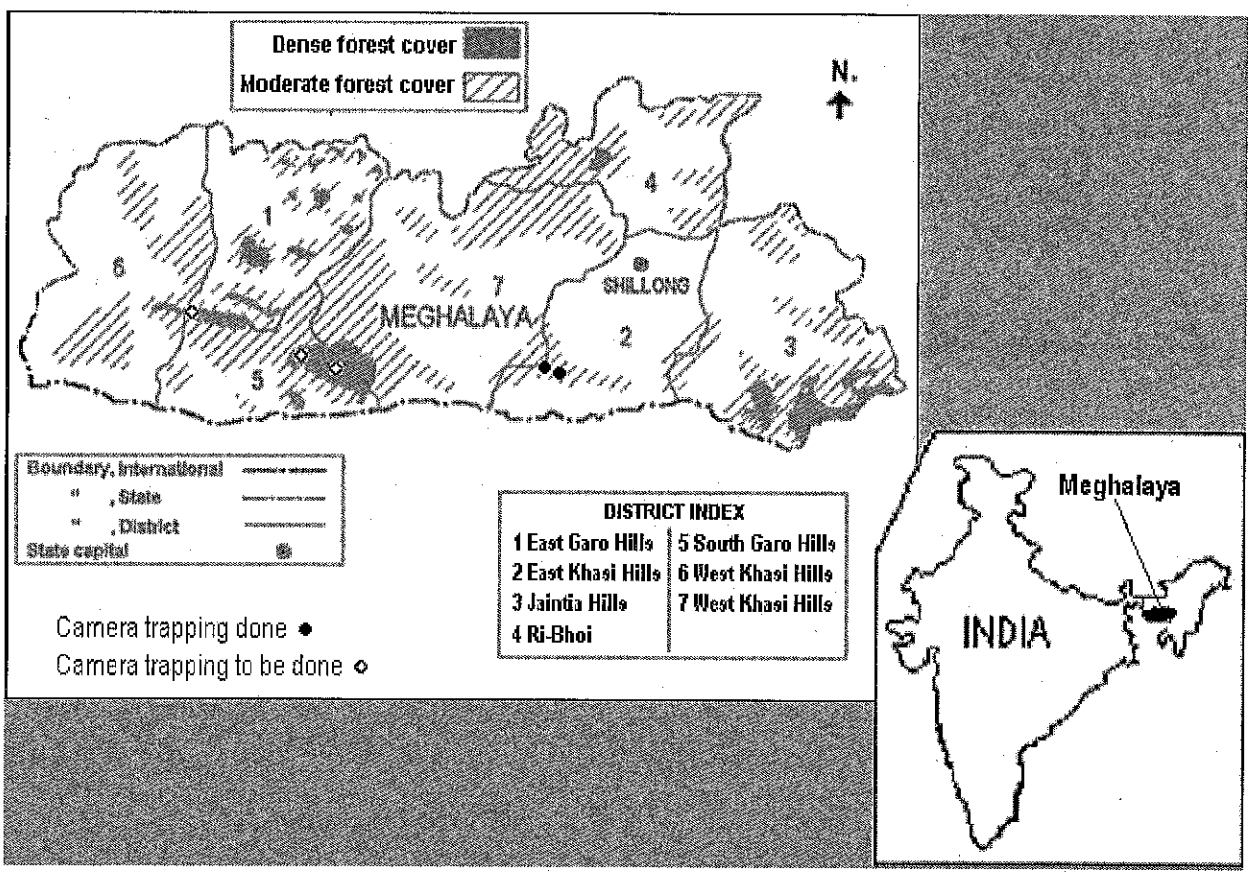
7. MAP.



Appendix 1.

THE TIMES OF INDIA

Garo-Rabha clashes: Centre rushes forces to Meghalaya, shoot-at-sight order in Assam

TIMES NEWS NETWORK & AGENCIES, Jan 10, 2011, 05.16pm IST

Ethnic violence in Meghalaya-Assam border persists

SHILLONG: The Centre has rushed additional 600 paramilitary personnel to Meghalaya to assist the state in the wake of ethnic clash between two tribal groups.

Shoot-at-sight orders were issued on the Assam side and curfew remained clamped on the inter-state border with Meghalaya as the toll in the strife at Goalpara-East Garo Hills rose to 10.

Official sources said shoot-at-sight orders were issued by the Assam government after a high-level security meeting at Dispur last night.

Goalpara Deputy Commissioner P K Goswami said over phone that two bodies were recovered on the Assam side on Sunday evening, taking the toll in the ethnic clash between the Rabhas and Garos to 10.

East Garo Hills Deputy Commissioner Pravin Bakshi said Garo-dominated Chigism, Kaldang and Kasikgara villages in Assam were attacked yesterday and 200 Garo women and children fled to East Garo Hills and sought refuge at Hudakona primary school compound during the night.

They were shifted to relief camps by army troops, who arrived on the scene early today.

Besides, a vehicle carrying relief material was also torched injuring 11 people, two of them critically at Palkan in Goalpara.

Following the arson attacks on the Garo villages, a mob frenzy began to build up since yesterday and Gendabari Rabha village on the Meghalaya side was set ablaze during the day.

Security forces with the help of army moved in swiftly and cut off all entry and exit routes between the two districts to prevent any escalation of violence, Bakshi said.

In view of the incidents, curfew remained clamped at Resbulpara subdivision of East Garo Hills and in the four police station areas of Dudhmoi, Krishnai, Dhupdhara and Rangajuli of Assam, official sources said.

Security forces have detained several arsonists from both Assam and Meghalaya and taken them under preventive detention.

Official sources said a team of the Union Ministry of Home Affairs team led by joint secretary Sambhu Singh reached the border and will hold a review meeting at Resubelpara during the day.

He would later hold another meeting at Guwahati, the sources said.

Read more: Garo-Rabha clashes: Centre rushes forces to Meghalaya, shoot-at-sight order in Assam - The Times of India http://timesofindia.indiatimes.com/india/Garo-Rabha-clashes-Centre-rushes-forces-to-Meghalaya-shoot-at-sight-order-in-Assam/articleshow/7253604.cms#ixzzIBySonPqY

Project Title:

Conservation of Wild Water Buffalo *Bubalus arnee (=bubalis)* in Assam, India – follow up of an earlier Forestry Bureau, COA project.

Interim Report

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The Wild Water Buffalo *Bubalus arnee (=bubalis)* is listed as '**Endangered**' (Criteria: A2e, C1) (Population Trend: decreasing) by IUCN (IUCN 2010). Once widespread over larger part of northern and eastern India extending up to Vietnam, this rare mammal is now mainly confined to northeastern India with small numbers in Nepal, Thailand, Cambodia and Bhutan (Corbet and Hill 1992, Choudhury 1994a, 2010). Its main concentration is now in the Indian state of Assam, where approximately four-fifth of the world population survives. This species is also the ancestor of all the domestic breeds of buffaloe in the world and hence, it is extremely important as a gene pool. The domesticated water buffaloes are found all over the world and are of great value to human. Habitat loss, hunting/poaching and cross-breeding with domestic buffaloes are the main threats faced by the remaining herds in the wild. Its distribution is highly fragmented and several populations, many of which are inviable, have been formed. The estimated world population of Wild Water Buffalo is around 3,400 (Choudhury, 2010). In Thailand, the numbers could be as low as 40 – 50, in the Huai Kha Khaeng Wildlife Sanctuary (IUCN 2004). The project area is shown at Fig 1.

References of the Wild water buffalo are found in many publications, notably Prater (1948), Gee (1964), Oryx (1967, 1989), Sheshadri (1968) and Choudhury (1994b), there was no comprehensive coverage except for a few protected areas till Choudhury (1994a). **Choudhury (2010) has documented its current position in a comprehensive work, a part of which was supported by a small grant from COA, Taiwan.**

However, unless follow-up measures to such exercises are taken, the hard work put in such activities remain inconclusive - hence, this new project proposal.

The fund for this project has been received very recently, in Janaury 2011, however, preliminary works including an action plan has already been worked out for various activities. Awareness camps for conservation of Wild Buffalo will start from February 2011 onwards. Arrangements for at least 10 such camps have been made at the following sites, Dibrugarh district (Lengeri and Bolai near Kollolua-Jokai), Lakhimpur district (Borchapori), fringes of Manas National Park & Tiger Reserve (Batabari, Koklabari, Bhuyapara, Bansbari, Panbari, Ultapani) and Kaziranga National Park & Tiger Reserve (Laokhowa). Poster, pamphlets, etc., have already been designed in both local and English language which will go to press within a fortnight. A network of local (grassroot) NGOs has been contacted for their participation in the field activities.

For a second-hand motorcycle, which is proposed to be presented to a local NGO (Nature Care & Friend) who are actively involved in the conservation of Wild buffalo in an unprotected area for the last four years, a few have been short-listed for purchase within February 2011.

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ANWARUDDIN CHOUDHURY

The Vanishing Herds

The Wild Water Buffalo



CRITICAL ECOSYSTEM PARTNERSHIP FUND

ATREE

行政院農業委員會林務局
FORESTRY BUREAU, COA

尼泊爾鳥類保育協會計畫成果摘要

尼泊爾鳥類保育協會(Bird Conservation Nepal, BCN)所提計畫及執行情形依據過去數年資料摘要如附：

BCN 設立於 1982 年，目前有 500 個會員，為尼泊爾最大及設立最早的賞鳥、鳥類研究和鳥類保育民間團體。BCN 是國際鳥盟(BirdLife International)在尼泊爾的合作組織。2005 年 BCN 完成將「Bird of Nepal」英文本翻譯成尼泊爾文的工作。該計畫由世界銀行(The World Bank)、國際鳥盟亞洲基金(BirdLife Asia Fund)和荷蘭的 Van der Hucht Funds 共同贊助。2005 年 BCN 完成尼泊爾的重要野鳥棲地(Important Bird Areas, IBAs)計畫，也辦理相關教育宣導活動。英國皇家鳥類保護協會(Royal Society for the Protection of Birds, RSPB)目前贊助 BCN 之運作。

BCN 的工作目標包括：

- 教育大眾自然和自然資源之重要性。
- 執行以知識為基礎之計畫，並引導至環境保育議題。
- 鼓勵學生參與保育相關活動。
- 與政府單位和其他國內或國際民間團體合作，以達成可測量的成果。
- 出版和分送活動相關資料。

BCN 所提 Bagmati River Nature Park (BNP) 計畫，2007 年半年之工作成果包括：

- 2007 年夏季栽種了一些樹苗後，樹苗旁長雜草，持續進行除草工作。
- 未經處理的污水流經公園至河流中，預計種植蘆葦(10x6.5 m)過濾污水，降低水污染。
- 設置金屬垃圾桶，減少固體垃圾污染。
- 2007 年 8 月至 2008 年 1 月間，BNP 派員到 45 個學校宣導保育教育、鳥類和生物多樣性等議題，其中 30 個學校(1,195 位學生，78 位老師)之後到自然公園，進行戶外教學。BNP 也與其他保育團體合辦保育宣導活動兩次。
- 每月進行鳥類調查，共記錄到 41 種鳥類。
- 自然公園中有 21 種植物，已立牌列出學名和尼泊爾語俗名，協助一般遊客和學生認識植物。
- 遊客中心(visitor center)運作正常，供一般遊客索取自然公園和尼泊爾鳥類資料，BNP 沒有正式統計造訪遊客中心的人數，通常每天有 96 人到遊客中心。
- 進行 2 次問卷調查，瞭解民眾對 BNP 經營管理之意見。
- 加入 Nepal Government Bagmati Area Sewerage and Rehabilitation Committee 會員，有利 BNP 以政府優先計畫執行相關計畫。

2008/09 半年報告，摘要如下：

- 2008 年，BNP 派員到 25 個學校宣導保育教育、鳥類和生物多樣性等議題，其中 23 個學校之後到自然公園，進行戶外教學。
- 為響應及宣導世界濕地日，於 2009 年 2 月 2 日辦理藝術創作比賽，主題為「拯救鳥類：拯救巴格馬提(Save Birds: Save Bagmati)」。
- 經營管理遊客中心，每天約有 200 人參訪。中心提供 Bagmati 河自然公園和尼泊爾鳥類相關資料。
- 增設 6 個金屬垃圾桶(原有 4 個)，6 面宣導告示牌，2 張座椅。
- 自 2007 年起，每月進行鳥類調查，迄今記錄到 69 種鳥類。
- 種植樹苗，改善環境，並進行除草照顧幼樹成長等工作。也進行步道除草工作和清理園區垃圾等工作。另因 2008 年冬季比往常乾燥，雨量減少，裝設一部抽水機，以供新植樹苗澆水之用。
- 贊助 4 名大學生於自然公園進行環境研究。

2009/2010 年計畫報告摘要如下：

- 2009 年 3 月至 8 月，BNP 派員到 20 個學校宣導保育教育、鳥類和生物多樣性等議題，其中 17 個學校之後到自然公園，進行戶外教學。
- 2009 年 5 月 22 日辦理國際生物多樣性日校際測驗比賽(International Day for Biological Diversity 2009 Inter School Quiz Contest)，測驗題目主要為鳥類和生物多樣性相關，共有 15 個學校參加比賽。
- 2009 年 6 月 5 日世界環境日(the world environmental day 2009)，辦理植樹活動，環境、科學暨科技部(Ministry of Environment, Science and Technology)部長為活動貴賓，許多機構代表和學生參加活動，共種植 500 棵樹。
- 2009 年 9 月至 2010 年 2 月，BNP 派員到 20 個學校宣導保育教育、鳥類和生物多樣性等議題，其中 5 個學校之後到自然公園，進行戶外教學。
- 持續經營管理遊客中心，約有 50 名參訪人士加入 BCN，並引發附近大學生對 BNP 之興趣，目前有 5 位大學生在 BNP 和遊客中心實習。
- 每月進行鳥類調查，2009 年 3 月至 8 月以及 2009 年 9 月至 2010 年 2 月記錄清單請參考兩份報告 Annex II，此段期間有紀錄到新出現種。
- 換新的 Bagmati River Nature Park 招牌，加列重要資料。
- 設立 2 面看板(6x4 ft)，列出不同季節可在 BNP 看到的 36 種鳥，除列出俗名和當地名稱外，也包括保育訊息。這些看板吸引許多遊客駐足閱覽，並其中 500 人向遊客中心索取看板鳥類更詳細資料。
- 預計於 2010 年 4 月 24 日(BNP 設立日)，辦理鳥展，將透過 BCN 會員和網站大力推廣，預估可吸引 2 萬人至 BNP 參訪。

2010/2011 年計畫報告摘要如下：

- 2010 年 9 月至 2011 年 2 月，BNP 派員到 27 個學校，向 1,115 位學生宣導保育教育、鳥類和生物多樣性等議題，其中 12 個學校之後到自然公園，進行戶外教學。
- 經營管理遊客中心，園區狀況持續改善，訪客因而增加。約有 80 名訪客加入 BCN 並參與相關活動及保育計畫。附近大學生對 BNP 也有興趣，目前有 5 位大學生在 BNP 和遊客中心實習。
- 每月進行鳥類調查，2010 年 3 月至 2011 年 2 月，75 種鳥類記錄清單表請參考報告 Annex II，此段期間有紀錄到新出現種。有些鳥種 2009 年有觀察到，但 2010 年未發現。9 月和 10 月各記錄到 50 和 52 種，為種類最多之月份。六月記錄到最少種類。
- 步道除草工作持續進行。因雜草種子為有些鳥類之食物，保留樹下的草，以吸引鳥類。
- 參加尼泊爾河流保育信託(Nepal River Conservation Trust)舉辦之 Bagmati River 季活動。

綜合 5 年計畫資料，摘要計畫內容如下：

巴格馬提河自然公園(Bagmati River Nature Park)位於尼泊爾首都加德滿都，加德滿都大都會區是尼泊爾人口最密集的地方，Bagmati 河自然公園是大都會區少數綠地中的一個，也是唯一為了保護自然而設立的公園，是進行環境教育的絕佳地點。Bagmati 河自然公園佔地 30ha，主要是草原和灌叢。BCN 已取得尼泊爾政府同意重整園區，以後將有草原、灌叢、森林和湖泊。

BCN 於加德滿都山谷 Bagmati 河自然公園入口附近，設立高品質的環境教育中心，設計及辦理環境教育活動。除提供 220 萬加德滿都大都市圈(包括 Kathmandu、Lalitpur、Bhaktapur 和幾處小村落)附近民眾參訪機會，為全尼泊爾唯一的環教中心，本中心的目標群眾為 5-16 歲學生。尼泊爾鳥類保育協會認為教育兒童有關野生動物、保育和環境管理是改變態度和行為的有效方法。加德滿都大都市圈目前有小學 1,228 所，國中 813 所、高中 606 所，共計約有 150,000 名學生，另外，該區大學生約有 145,000 人。BCN 經營管理此環教中心已 7 年。

本計畫目標為：

- 提升加德滿都山谷都會民眾對環境保護和經營管理之認知。
- 鼓勵大眾參與環境復育計畫。

- 加強相關機構之環境教育。
- 推廣賞鳥和保護區觀光活動。
- 辦理有創意的環境教育宣導活動或宣導品，推廣 4Rs (Reduce, Reuse, Recycle, Replacement)。

本計畫活動包括：

一、擴大自然公園遊客中心規模，改善其設施，使更多民眾有充實知識的機會。該中心位於自然公園入口附近，提供自然公園資料，也是辦理活動的重點地區，中心原可容納 150 人。
二、購買儀器或器材維持中心正常運作及辦理活動，例如視聽器材。之前已採購電腦、印表機、望遠鏡、放大鏡、小撈網(觀察池塘生物用)等。
三、架設移動性帳棚，辦理鳥類保育宣導展示活動。
四、在自然公園重要地區設立資訊看板。之前已設計展示區，介紹自然公園和野生動物，以及尼泊爾環境相關議題。
五、規劃和辦理環境教育活動，招募和訓練志工協助執行教育計畫，目前有兩位全職人員(Education Officer 和 Education Assistant)負責此項工作。
六、定期與目標團體(例如學校)及權益相關人士開會，建立夥伴關係，確保環境教育計畫成效。日前已擬定教育中心長程計畫。
七、製作各類出版品，例如傳單、海報、環境紀念品、都會區鳥類圖鑑等。之前製作的環境教育系列宣導資料，內容包括自然、環境、野生動物棲息地、個人可採取的保育行動、環境教育活動設計等。
八、辦理大型宣導活動，提倡森林和鳥類保育、賞鳥活動、永續發展等觀念。並支援下列活動，包括 2010 生物多樣性年、2011 國際森林年、2011 尼泊爾觀光年、聯合國 10 年永續發展計畫(2005-2015)中森林和自然保護區部分。
九、辦理各類活動，例如賞鳥、環境營、環境教育師資培訓(Training of Trainers, TOT)等。
十、針對社區辦理和 BCN 人員辦理能力訓練班，主題為環境教育和永續發展。

本計畫預計成果包括：

一、經由 3As (Awareness, Attitude change, Action)模式，提升社會大眾環境認知。
二、預估 30,000 名學生、50,000 位成人將受惠於環境中心準備的資料。
三、吸引為數眾多之兒童、學生、成人造訪環境中心及自然公園。
四、印製分送 2,000 份傳單和 5,000 份鳥類鑑定摺頁。

Running Environmental Education and Information Centre for Students of Kathmandu Valley at Bagmati River Nature Park (BNP)



Progress Report 10/11

Submitted to:
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Background

Bird Conservation Nepal (BCN) has been developing and managing Bagmati River Nature Park (BNP) along the Bagmati River corridor jointly with ministry of Environment / UN Park Development Committee. The aim of the project is to create suitable habitats for both the urban as well as migratory bird species and provide environmental education and experience based learning to school students. There is no any nature park or reserve within the accessible surroundings where students can learn about nature, natural habitat and environment issues.

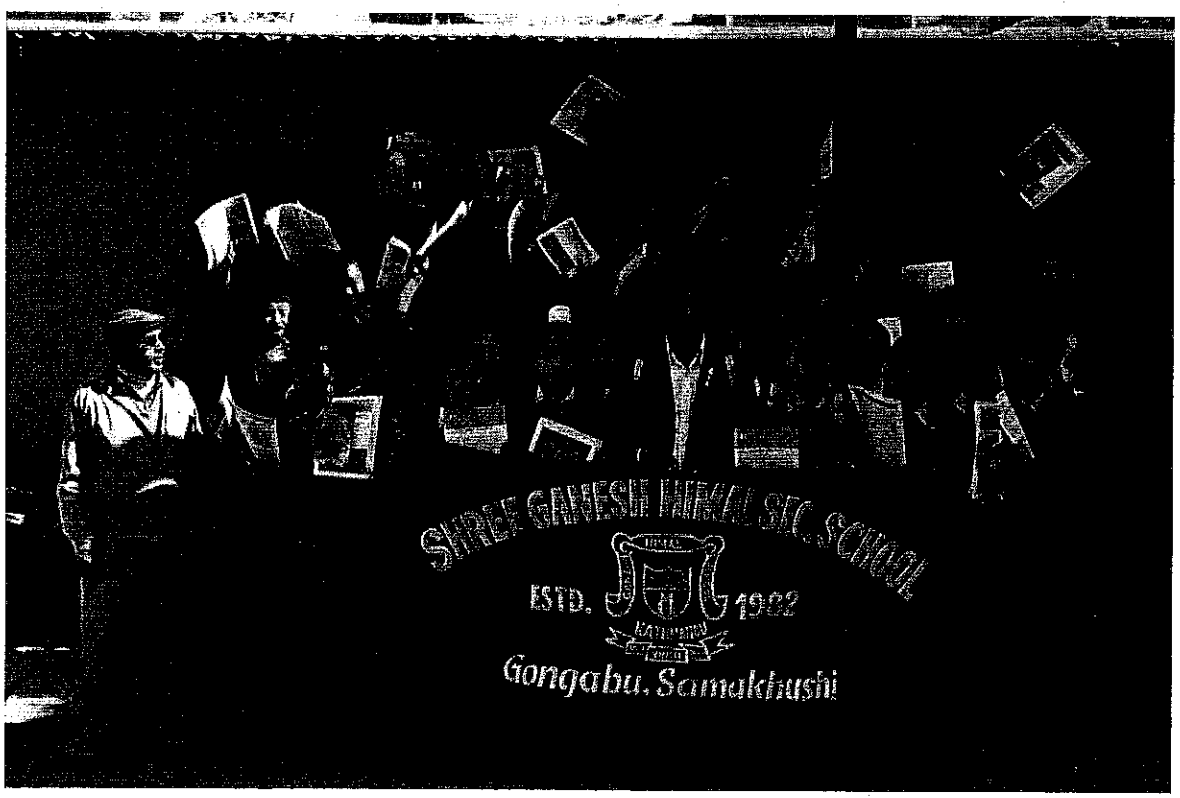
The development of the Bagmati River Nature Park offers a huge opportunity to promote conservation and environmental issues to the large urban population and school students of Kathmandu. The key focus of BCNs work is to conduct educational programme for the numerous local schools, offering excellent field educational opportunities. This programme, has been funded by Taiwan forestry Bureau since 2007. Since then we are continuously visiting different schools of Kathmandu Valley to disseminate environmental education, encouraging them to visit the Park to get field based knowledge, to participate in plantation programme etc. The development of one of the few green urban spaces within the city will offer a unique visitor experience where visitors will be able to walk and enjoy urban wildlife and habitats.

In summary, the Bagmati River Nature Park is providing people information about birds and other wildlife and gives them the opportunity to enjoy, cherish and learn about the natural environment.

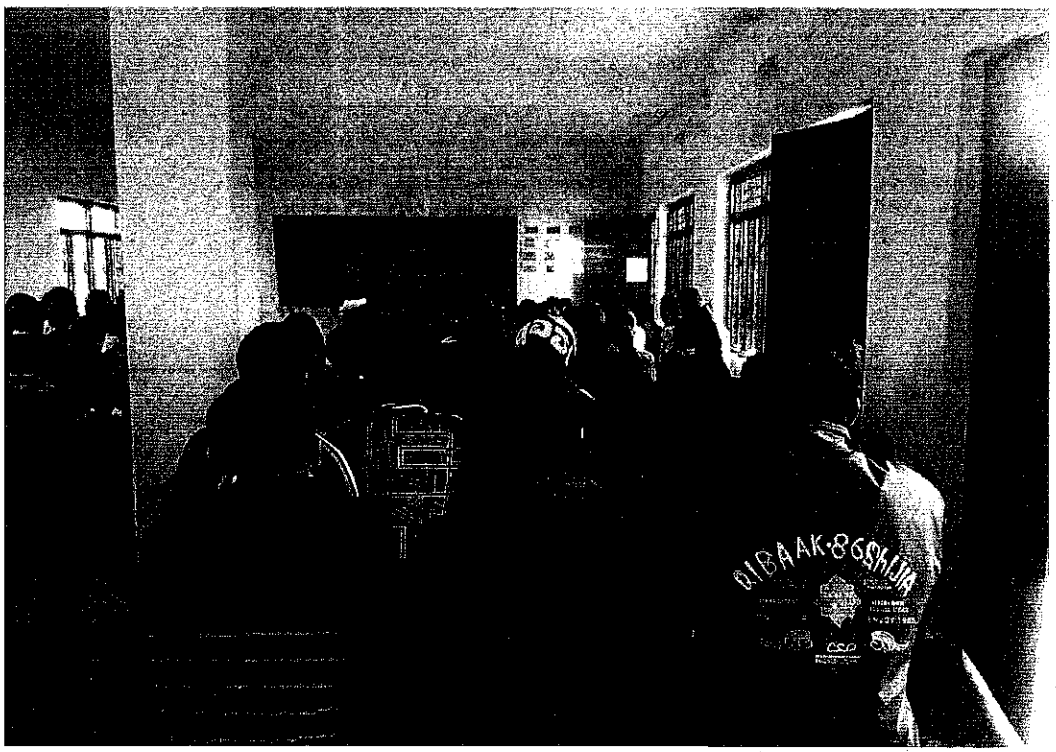
Activities

Environmental Education

From September 2010 to February 2011, altogether 1115 students of 27 different schools were directly benefited from our school educational visit program. In each school, class of approximately 1 hour was taken by our field education officer and volunteers sharing the knowledge on Bagmati River Nature Park and its importance for environment, birds and bio-diversity conservation education. Brochure of Bagmati River Nature Park and other birds' posters were distributed among the students. During this period another support staff, who could mimic many birds' call, was appointed for short term period to run awareness classes with fun. Some schools also made their visit to BNP for field based education (Annex I). During their visit students were guided for bird watching activity and briefed about plants and birds of BNP.



School visit programme



Students listening at class



Students guided during the Park visit



Students observing birds in the Park

Managing the visitor centre and updating visitors

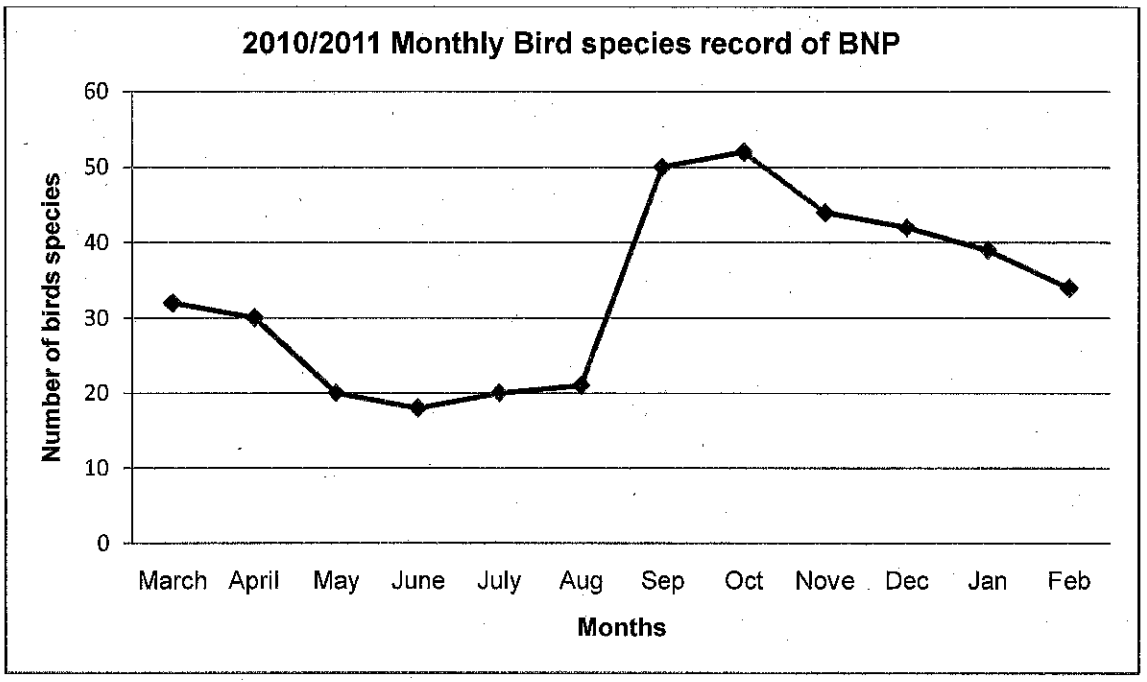
The visitor centre has been well managed and smoothly catering with information about the park, birds, plants and overall environment conservation. The park and visitor centre are benefiting the general public by providing a suitable place for refreshment as well as practical knowledge enhancement on biodiversity conservation. With the betterment of the Park visitor number is increasing. Around 80 park visitors have joined BCN membership and participated in various BCN event and conservation programmes. The visitor centre has also attracted many University students to do their internship and currently we have five interns working at BNP and visitor centre.

We have also planned to build a mobile tent to sensitize urban bird conservation issue and aware general public about BNP.

Monthly bird monitoring

Monthly bird survey of BNP has been done regularly, total 75 bird species have been recorded

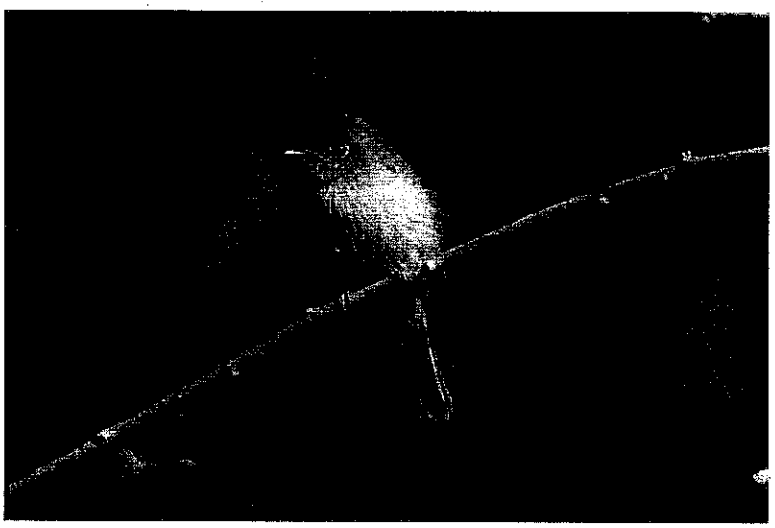
so far from this Park. Three birds like Clamorous Reed Warbler *Acrocephalus stentoreus*, Red Avadavat *Amandava amandava* and Grey-headed Canary Flycatcher *Culicapa ceylonensis* are some notable and new bird recordings added to the previous year bird list. Some birds like Common Snipe, Garganey, Shikra, Black-winged Cuckooshrike, Asian Paradise Flycatcher, Bluethroat, Nepal House Martin and Yellow-breasted Greenfinch were not observed this year.



Highest number of bird species were recorded on October and September ie 52 and 50 species and least number was recorded on the month of June.



Tickell's Leaf Warbler (Winter visitor Bird)



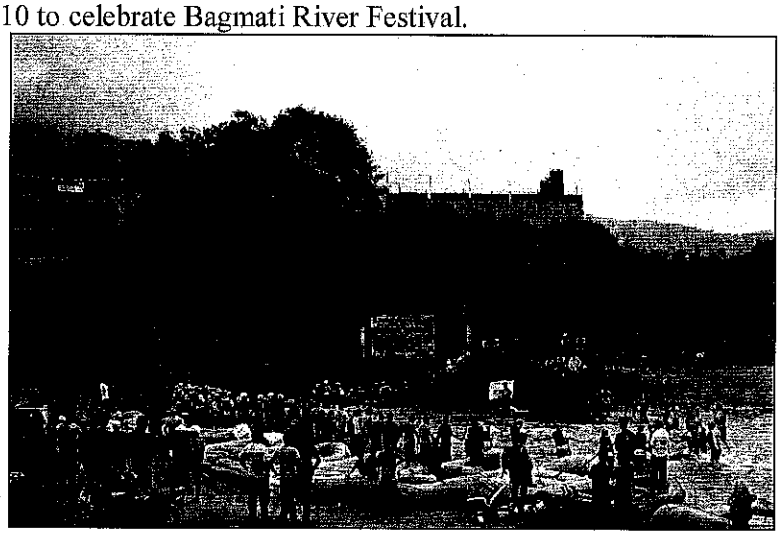
Grey-headed Canary Flycatcher (New Record)

Weeding and cleaning

Complete weeding and cleaning of walking trail has been done regularly. Since weeds' seeds are food of small birds, weeding in areas with tall trees has not been done to attract winter visitor bird like Warblers and Munias. Other plastic and non-degradable wastes thrown by visitors are collected and disposed off weekly.

Representing in Bagmati River Festival

Staffs of Bird Conservation Nepal participated in Rafting competition representing Bagmati River Nature Park. This program was organized by Nepal River Conservation Trust on august 2010 to celebrate Bagmati River Festival.



Annex- I- Detail of School Visit

Name of School	School visit	Park visit date	Standard	Student Number
New Millenium English School, Lalitpur		2-Feb-11	9	23
KIST C 6 , Kamalpokhari, Kathmandu	18th Nov	16-Feb-11	12	31
Gueniess International School, Gaushala, Kathmandu	3-Feb-11		9	21
N.K Singh Memorial English Preparatory School, Kathmandu	17-Nov-10	10-Dec-10	9	39
Pacific Academy, Baneshwor, Kathmandu	21-Nov-10		8	41
Ideal Model School, Dhobighat, Lalitpur	7-Dec-10		8&9	75
Sunshine Secondary School	15-Dec-10		8	35
B.V.M. Higher Secondary School, Pulchowk, Lalitpur	18-Dec-10		9&10	63
Awareness International Academy, New Baneshwor, Kathmandu	20-Sep-10		10	25
Deneb International School, Old Baneshwor, Kathmandu		23-Sep-10	8	15
Chantal Maudi Academy, Lalitpur	30-Sep-10		9	63
Kathmandu Southpoint Boarding School PVT. LTD, Baneshwor, Kathmandu	11-Oct-10	5-Oct-10	9& 10	57
Peacepoint Secondary Boarding School, Sinamangal Kathmandu	13-Oct-10		9	37
Shanti Shiksha Sadan, Santinagar, Kathmandu	2-Sep-10		10	32
RoseBud School, Buddhanagar, Kathmandu	14-Sep-10	8-Sep-10	9& 10	75
Gyanniketan English Secondary School, Kathmandu		19-Sep-10	10	33
Sudesha High School, Lalitpur	21-Sep-10		10	48
Simrik Co-educational Academy, Jawalakhel, Lalitpur	10-Aug-10		9	25

Rannarajya MA. VI. Kathmandu	13-Aug-10		8	47
Rannarajya MA. VI. Kathmandu	14-Aug-10		10	67
Serene Valley School, Baneshwor, Kathmandu	18-Jul-10		9	25
Saraswoti Kunj Secondary School, Gyaneshwor, Kathmandu	20-Jul-10		8	31
Nava Suryodaya Secondary School, Lalipur		26-Jul-10	10	45
Analjyoti Secondary School, Dolahiti, Lalitpur		27-Jul	10	38
ShreeBal Kumari HighSchool, Parayag, Lalitpur		30-Jul-10	10	29
Supreme International School, Kayhmandu		22-Jul-10	10	15
Gyanodaya Higher Sceondary School, Lalitpur	18-Jun-10		9	25
Pathsala Nepal, Kathmandu		21-Jun-10		30
Shree Ganesh Himal Secondary School	10 Feb - 11			25

Annex II- Birds of Bagmati River Nature Park

SN	Bird- Common Name	2010										2011	
		Mar	A	M	J	Jul	A	Se	O	N	D	Jan	F
1	Common Snipe												
2	Garganey												
3	Eurasian wryneck							+					
4	Fulvous-breasted Woodpecker												
5	Common Hoopoe	+	+					+	+	+	+		
6	White-throated kingfisher	+	+	+	+	+	+	+	+	+	+	+	+
7	Pied Cuckoo						+						
8	Eurasian Cuckoo	+	+	+		+	+						
9	Grey-bellied Cuckoo	+						+	+				
10	Rose-ringed parakeet	+	+	+	+	+		+	+	+	+	+	+
11	Alpine Swift								+	+	+		
12	Spotted Owlet		+	+	+	+	+	+	+	+			
13	Spotted Dove							+	+	+	+	+	+
14	Eurasian Collared Dove							+					
15	Oriental Turtle Dove					+	+	+	+			+	
16	White-breasted Waterhen				+	+	+	+	+				
17	Common Sandpiper	+	+	+	+	+	+	+	+	+	+	+	+
18	Green Sandpiper	+	+	+	+	+	+	+	+	+	+	+	+
19	Black Kite	+	+	+	+	+	+	+	+	+	+	+	+
20	Shikra												
21	Common Buzzard	+						+	+			+	
22	Common Kestrel	+	+										
23	Little Egret							+	+				
24	Cattle Egret							+	+	+	+	+	+
25	Indian Pond Heron	+	+	+	+	+	+	+	+	+	+	+	+
26	Brown Shrike							+	+	+	+		
27	Long-tailed Shrike	+	+	+	+	+	+	+	+	+	+	+	+
28	Grey-backed Shrike	+	+					+	+	+	+	+	+
29	Rufous Treepie										+	+	+
30	House Crow	+	+	+	+	+	+	+	+	+	+	+	+
31	Black-winged Cuckooshrike												
32	Eurasian Golden Oriole			+	+	+							
33	Black Drongo	+	+	+	+	+	+	+	+	+	+	+	+
34	Ashy Drongo								+	+	+		
35	Asian Paradise flycatcher												

36	Dark-throated Thrush											+	+
37	Red-throated Flycatcher	+	+	+				+	+	+	+		
38	Siberian Rubythroat	+	+	+								+	
39	Bluethroat												
40	Oriental Magpie robin	+	+	+	+	+	+	+	+	+	+	+	+
41	Hodgson's Redstart							+	+				
42	Black Redstart										+	+	+
43	Grey-headed Canary Flycatcher											+	+
44	Common Stonechat							+	+	+	+	+	+
45	Pied Bushchat							+	+	+	+	+	+
46	Common Myna	+	+	+	+	+	+	+	+	+	+	+	+
47	Jungle Myna						+	+	+	+	+	+	+
48	Chestnut-tailed Starling							+	+	+	+		
49	Great tit							+	+	+	+		
50	Barn Swallow	+	+	+	+	+	+	+	+	+	+	+	+
51	Red-rumped Swallow								+				
52	Nepal House Martin												
53	Red-vented Bulbul	+	+	+	+	+	+	+	+	+	+	+	+
54	Black Bulbul								+	+			
55	Oriental White-eye							+	+	+	+		
56	Common tailorbird							+	+	+	+	+	+
57	Clamorous Reed Warbler										+	+	
58	Blyth's Reed Warbler	+	+					+	+	+	+	+	+
59	Common Chiffchaff	+	+					+	+	+	+	+	+
60	Tickell's Leaf warbler	+	+					+	+	+	+	+	+
61	Hume's Warbler	+	+					+	+	+	+	+	+
62	Purple Sunbird	+	+	+	+	+	+	+	+	+	+	+	
63	House Sparrow	+	+					+	+	+	+	+	+
64	Eurasian Tree Sparrow	+	+	+	+	+	+	+	+	+	+	+	+
65	White wagtail	+	+					+	+	+	+	+	+
66	White-browed Wagtail								+	+			
67	Grey Wagtail	+	+					+	+	+	+	+	+
68	Rosy Pipit	+						+	+	+	+	+	+
69	Olive-backed Pipit	+	+					+	+	+	+	+	+
70	Baya Weaver							+	+	+			
71	Black-headed Munia							+					
72	Red Avadavat						+						
73	Scaly-breasted Munia							+	+	+			
74	Zitting Cisticola							+	+				
75	Yellow-breasted Greenfinch												
	Total	**32**	**30**	**20**	**18**	**20**	**21**	**50**	**52**	**44**	**42**	**39**	**34**

泰國保育團體大象保育聯絡網計畫報告摘要

泰國保育團體大象保育聯絡網(Elephant Conservation Network, ECN)所提計畫，執行情形如下：

ECN於1999至2002年間，進行2次大象族群調查，2005至2010年執行之計畫包括：

一、降低人象衝突計畫，由英國環境、食物和鄉村事物部達爾文計畫(Department for Environment, Food and Rural Affairs, DEFRA-Darwin Initiative)贊助。

二、廊道森林調查(Corridor forest survey)，由日本Keidanren Nature Conservation Fund贊助經費，此計畫主要調查大象使用地區，選出合適之廊道地區，泰國環境部依據計畫建議設立廊道，國會也同意於2008年9月生效。

三、Salakpra森林調查，由美國魚類暨野生動物署(US Fish and Wildlife Service, USFWS)贊助。

四、Salakpra大象生態系保育聯盟替代生計計畫。

五、保護森林巡邏計畫(由USFWS贊助)。

泰國西部 Salakpra 野生動物保護區森林復育計畫，計畫內容及成果摘要如下：

本計畫全名為 Community-based forest restoration for local people and Asian elephants in and around the Salakpra Wildlife Sanctuary, Kanchanaburi, West Thailand，計畫執行地點為泰國西部 Salakpra 野生動物保護區及附近地區。長程目標為促進以社區為基礎之森林復育計畫，提供知識、技術和方法予當地居民，以推動未來對人民、大象和其他野生動物以及國家均有利之森林復育計畫。計畫宗旨為建立知識基礎，發展當地技術，以利未來在 Salakpra 野生動物保護區內和附近土地惡化地區，推動大象森林棲地復育計畫。

本計畫目標如下：

一、強化當地社區執行森林復育計畫之能力。

二、設立以社區為基礎之本土森林物種苗圃。

三、蒐集 Salakpra 森林物種組成資料。

四、找出採集種子之最佳時機及處理方式，以加速種子萌芽和樹苗成長率。

五、邀集當地居民參與森林復育計畫及保護區監測計畫。

六、將計畫成果呈現給當地相關人士，鼓勵民眾參與森林復育計畫。

依據2008年至2010年計畫資料，Elephant Conservation Network與泰國自然資源和環境部(Ministry of Natural Resources and Environment)自然保育處(Department of Nature Conservation)合作執行本計畫，計畫核准號碼為Ref. No. NRCT 70/19。ECN並與倫敦動物協會(Zoological Society of London, ZSL)建立夥伴關係，以接受英國

政府之經費支持。本計畫之執行由ECN與清邁大學(Chiang Mai University, CMU)森林研究暨復育小組(Forest Research & Restoration Unit, FRRU)共同執行，2008年至2010年，ECN均有提供泰國國家公園暨動植物保育部(Department of National Park, Wildlife and Plant Conservation Department)、Salakpra Wildlife Sanctuary或當地社區之支持計畫信函。

ECN Jittin Ritthirat (development scientist and manager)於2009年5月13日獲頒Whitley Award。Whitley Award由Whitley Fund for Nature (WFN)設立，主要獎勵現場保育工作者所推動之對野生動物保育和當地社區都有獲益之計畫，Jittin Ritthirat努力減緩大象和農村之衝突，並與當地社區共同復育泰國最早設立之野生動物保護區。

Salakpra Wildlife Sanctuary設立於1965年，是泰國第1個野生動物保護區。當初是為了保護鄰近曼谷的大批哺乳類動物。Salakpra Wildlife Sanctuary內大象族群約佔全泰國之20%。為確保大象之持續生存及減少人象衝突，有必要協助當地社區復育保護區及周邊地區被破壞之林地，以利大象和其他野生動物之生存，同時讓社區民眾可於森林中取得非林木的森林副產品。

計畫短期和長期受益者如下：

當地社區和居民

- 學習森林復育知識和技術。
- 社區相關人士參與Salakpra Wildlife Sanctuary保育工作。
- 提供當地居民，協助保育森林之意願及機會。

大象

- 在Salakpra Wildlife Sanctuary中之棲息地面積增加。
- 當地社區參與森林生態系復育工作有助大象之生存。
- 當地居民之參與，無形中提升環境認知，有利大象保育工作。

Salakpra Wildlife Sanctuary

- 復育被破壞之森林，而後進行生態系復育。
- 因環境觀念之提升，降低非永續利用森林之威脅。
- 建立合作關係，改善保護區和當地社區之關係。

泰國

- 有助於生物多樣性公約、氣候變遷和生物多樣性行動計畫。
- 減少人象衝突。
- 更多當地民眾參與森林或保護區之保育工作。

2008年之規畫活動包括：

一、與當地居民一起規劃苗圃之設立，及復育示範區。

二、與清邁大學合作，選出當地相關人士10人，提供森林復育技術訓練。
三、清邁大學針對ECN工作人員和社區民眾，辦理2次訓練班。
四、調查當地森林物種。
五、建立生物氣候學(Phenology)資料，針對當地50種樹種蒐集9個月資料。
六、設立苗圃並建立經營管理系統。
七、針對20種樹種，蒐集發芽和樹苗生長資料9個月。

2008 年成果包括：

- 2008 年 6 月，ENC 工作人員與荷蘭保育團體帶大象回家(Bring The Elephants Home, BTEH)洽談，爭取到 BTEH 之支持，並提供經費贊助本計畫。
- 2008 年 6 月於清邁附近 Doi Suthep National Park 內的 Hmong hill tribe village 辦理 3 次植樹活動。
- 2008 年 8 月 16 日在保護區內辦理植樹活動，於 6 塊土地種植 3,200 棵樹苗 (13 種樹)。
- 於 2008 年 8 月 27 日和 10 月 3 日，於 Kaeng Plakod 召開計畫說明會。
- 於 2008 年 9 月開始監測保護區內樹苗生長率，共測量 3,000 餘株。
- 派學員赴清邁參與訓練課程前，ENC 於 2008 年 9 月 15 和 19 日，先辦理 2 次種子萌芽過程簡介課程，對象分別為當地社區和保護區工作人員。
- ENC 於 2008 年 9 月 29-30 日，在保護區內進行樹種調查，為設立生物氣候學步道蒐集資料。
- 2008 年 10 月 12-17 日，13 名計畫參與者至清邁大學(Chiang Mai University, CMU)森林復育研究單位(Forest Research & Restoration Unit, FRRU)參加密集訓練課程，之後社區和保護區工作人員開始推動苗圃設立工作。
- 設立 2 處苗圃，1 處在 Kaeng Plakod 社區森林中，1 處在保護區內的 Huai Sadong Guard Station。
- 於 2008 年 10 月 22-30 日和 2009 年 3 月進行 2 次本土森林樹種資源調查。
- 2008 年 10 月 22-30 日，設立 2 條生物氣候學步道，一條位於保護區邊界的 Kaeng Plakod 社區森林中，另一條步道在保護區中。300 棵樹(約 50 種)將予以標記，日後將持續蒐集資料並納入資料庫。以利後續種子生產和森林復育工作之參考。
- 苗圃設立後，於 2008 年 12 月 15-21 日和 2009 年 2 月 17-20 日辦理 2 次現場訓練課程。

2009 年計畫目標如下：

一、進一步訓練當地居民執行森林復育工作。
二、繼續蒐集Salakpra Wildlife Sanctuary內樹種鑑定和生物氣候學資料。
三、找出採集種子的最佳時機及處理方式，以加速種子萌芽和幼苗生長率。
四、經營管理已設立之苗圃，推動第2個社區苗圃之設立。

五、將計畫初步成果呈現給各界相關人士，鼓勵更多人參與森林復育計畫。
六、與社區居民共同規劃，於當地設立森林復育區。

2009 年計畫成果摘要如下，報告內有我駐泰國代表處赴計畫執行地區訪視照片。

- 2009 年 10 月，苗圃的竹圍籬改為細鐵絲網圍欄(chicken wire)，可改善通風狀況，以及保護萌芽的種子被老鼠或松鼠啃食。塑膠屋頂改為磁磚，以承受豪雨及提供更多遮陰處。苗圃地面鋪上塑膠布，防除雜草和白蟻。後來證實塑膠布比以前使用化學藥劑和鹽有效。
- 2009 年 5 月至 10 月，進行 7 次生物氣候學調查，另鑑定 23 種新樹種及採集種子，目前保護區樹種因而增加到 58 種。
- 進行 48 種樹種之種子處理、種子萌芽和生長率實驗，計 15,653 株樹苗。
- 2009 年 9 月 29 日至 10 月 2 日，辦理訓練班，主要課程為資料分析、經營管理、森林復育及全球暖化等。
- 2009 年 6 月 5 日於 Kaeng Plakod 社區森林，辦理植樹活動，共種植 2,325 棵樹苗(15 種)，協助的 270 位志工包括當地政府機關人員、當地領袖人物、當地駐軍，以及保護區、防火隊和區辦公室人員。3 週後監測存活率及除草，僅發現一株樹苗死亡。之後每 6 個月監測和除草一次，雨季時則除草 3 次。
- 2009 年 9 月開始進行資料分析，之後每週分析。分析結果將協助訂出採集種子時間和比較不同樹種之成長率。這兩項資料將決定 Kanchanaburi 森林復育計畫將選用哪些物種。
- 苗圃計畫主持人每月撰寫進度報告，每週檢視工作計畫和執行進度。苗圃員工每月填寫報表，每日填寫工作日誌。
- 2009 年 6 月 16 日於 Salakpra 保護區內，辦理植樹活動，約共種植 10,000 棵樹苗，參加人員 280 人，包括當地大學生、村民、觀光客志工、軍人、社區領袖和巡山員。4 週後進行第 1 次除草。(本活動 BTEH 有提供經費支援)。
- 2009 年 7 月 12 日，ENC 協助 Salakpra 野生動物保護區於村廟附近被破壞的公有地辦理植樹活動，種植 1,000 棵樹苗，參加人員有村民當地、巡山員和曼谷來的志工。
- 至苗圃訪視者包括：2009 年 7 月 17 日 Chong Sadao 地區議員；8 月 24 日泰國南部 Suratthani 省社區領袖；7 月 21 日法國電視台拍攝 ENC 降低人象衝突計畫工作情形。
- ECN 適時辦理宣導，展示森林復育海報。例如 ECN 森林復育團隊受邀參加 Pong Pad 村之最佳年度鄉鎮頒獎典禮，以及「植 9 百萬棵樹」活動時。
- ECN 苗圃和森林復育研究展現成果後，更多單位加入支持行列。例如附近的 Tha Thung 水庫和防火隊提供土壤和有機肥料；曼谷一家公司提供塑膠布改善苗圃設施；植樹時軍隊派員協助挖洞；有機農場教育中心教導 ECN 人員如何製造有機肥料。
- ECN 苗圃免費提供 1,214 株樹苗給當地社區和機關團體。

本計畫為3年計畫，2010年為第3年，計畫工作重點包括：

- 與社區居民共同規劃，增設2處森林復育示範區，預計一處設在保護區內，一處在社區森林。
- 辦理訓練班，提升計畫執行能力。訓練項目包括資料分析、實驗監測和植株存活率監測等。
- 繼續進行本土物種調查。
- 繼續蒐集生物氣候學資料，將監測物種由50種增至75種。
- 苗圃經營管理部分，將持續進行研究，提供示範區植株及推動教育宣導計畫。
- 萌芽和樹苗生長資料，將由每月蒐集50種樹種擴充至75種。
- 至少辦理3次教育宣導活動。
- 編纂「如何復育泰國西部森林技術手冊」，並於辦理研討會時發表。

2010 年計畫報告摘要如下：

- 持續種子處理、種子萌芽和生長率實驗，約 20,000 株樹苗。
- 進行本土樹種調查，共鑑定 195 棵樹(46 種)。
- 2010 年 5 月至 10 月，進行 10 次生物氣候學調查及採集種子。
- 監測並維護 2009 年栽植區，其中 8 個樹種之存活率為 65-80%，5 個樹種之存活率為 25-40%。
- 規劃和維護 2010 年栽植區，6 月種植 500 顆樹苗(25 種)，7 月種植 7,000 顆樹苗(40 種)。
- 2010 年 5 月 12-14 日和 2010 年 7 月 9-11 日，辦理兩次密集訓練班。
- 2010 年 6 月進行鳥類調查。
- 2010 年 7 月捐贈 2,000 餘株樹苗給 2 所學校和 1 個鄉鎮。8 月捐贈 3,880 餘株樹苗給 3 個社區。
- 為建立和當地社區之良好關係，2010 年 6 月 24 日本計畫團隊參加社區所辦理之垃圾移除活動。
- 於 Salakpra 保護區內辦理植樹活動。本活動由荷蘭保育團體 BTEH 贊助。
- 2010 年 4 月製作數種海報宣導大象保育和減緩人象衝突議題。
- 2010 年 12 月 24-26 日，FORRU 和 ECN 於位於曼谷之自然保育部(Department of Nature Conservation)辦理野生動物保護展。

Project Report to Taiwan Forestry Bureau
February 2011

Elephant Conservation Network

Restoring Elephant Forest Habitat in the Salakpra Conservation Area, West Thailand
Project Year 3



as part of the

Salakpra Elephant Conservation Project
Kanchanaburi Province
West Thailand

Taiwan Forestry Bureau

Report for Mar 2010-Feb 2011

1. Project Name

Restoring Elephant Forest Habitat in Salakpra Conservation Area, West Thailand

2. Organisation

2.1 Applicant organisation:

Elephant Conservation Network (ECN)

2.2 Support organisations in Thailand

Forest Research and Restoration Unit, Chiang Mai University (FORRU-CMU)
Salakpra Wildlife Sanctuary, Dept. National Parks, Plant & Wildlife Conservation

3. Project aim and objectives

The aim of this 3-year project is to create an original knowledge base for indigenous forest in West Thailand and develop local technical skills to facilitate future restoration of elephant forest habitat in degraded land in and around the Salakpra Conservation Area.

The objectives are:

- Develop local capacity to implement forest restoration activities
- Continue to gather data on tree species composition of main forest formations in Salakpra
- Find optimal seed collection times/treatments to hasten seed germination & seedling growth
- Develop and manage a community-based forest tree nursery and planting sites.
- Present initial results to stakeholders to encourage implementation of forest restoration.

4. Summary of progress

- *Developing local capacity*: two intensive training courses for ECN's project team (12-14 May, 9-11 July) led by Dr Stephen Elliott and colleagues from FORRU-Chiang Mai. Follow-up training in monitoring the phenology trails (24-28 August) was also provided by Mr Maxwell, senior taxonomist at Chiang Mai Herbarium.
- *Data on tree species in each forest formation*: data collected from tree species on phenology trail 10 times (20-21 April, 10-11 May, 2-4 + 21-23 June, 14-16 July, 2-4 + 26-31 Aug, 14-16 Sept, 12-14 Oct) and data on 195 new trees from 46 species recorded (24-28 Aug, 9-10 Sept) with Mr Maxwell on extensions to the phenology trails in Kaeng Plakod village and Huai Sadong station inside Salakpra wildlife sanctuary.
- *Data on seeds, germination and growth:* in July and Sept, seeds collected and germinated using standard experimental treatments, for 3 new species. In the other months, seeds either not available (Apr, May, Aug) or the project team was busy preparing new planting plots in the community forest and in Salakpra.
- *Manage nurseries and planting sites: saplings* trimmed, repotted, organized by species each month; 2009 planting plots monitored for sapling survival (Apr, Jun); three 2010 planting sites prepared (May, June), planted (July), fertilized and monitored (Aug, Sep).
- *Extension and outreach*: ECN posters on elephants and forest restoration displayed at nurseries and villages; presentation given on main planting day (31 July) supported by the Royal Thai Army with 1,000 soldiers and volunteers in honour of H.M The Queen.
- *Data processing & analysis*: All data, both written and photographic, is logged into the database at ECN office on a weekly basis.
- *Reporting*: Monthly reports, in Thai by project field team, prepared for ECN programme manager and FORRU Chiang-Mai team. Problems raised at team monthly meetings and solutions discussed with Dr Steve if necessary.

5. Planned project activities

a) **Nursery improvement:** no improvements have been necessary in the last six months as we did major renovations in the second half of Year 2 of the project.

b) **Nursery work:** We continue to do the seed treatment and germination growth rate trials initiated at the start of this project. The five seed treatments being tested are: soaking in hot and cold water, drying, clipping, and rubbing with sandpaper. The seeds are then planted into germination trays using four different media: forest soil only, sand only, forest soil + sand (ration 1:1), forest soil + coconut husk (ratio 1:1).

The germination experiments are done with the seeds of newly collected species as well as the seeds of species tested in the previous two years. We are repeating the trials on known species for two reasons: 1) to produce seedlings of different ages for each species to add to the specimen collection, and 2) to provide additional data if the first test does not yield sufficient information.

The Randomized Complete Block Design (RCBD) method has been used with three replications for each species in the germination trial. Each replication has 25 seeds which are monitored to determine their germination rate. Data is recorded every Monday and Thursday by project staff with help from the nursery workers. Specimens from each species in the germination trials are also photographed each week. Seedlings are transferred from the germination trays to plastic bags filled with five potting media: forest soil + bean + coconut husks (ratio 2:1:1), forest soil + cow dung + sand (ratio 4:1:1), forest soil + bamboo leaves + sand (ratio 3:2:1), forest soil + *Erythrophlem teysmannii* (*takruk*) leaves + sand (ratio 2:2:1), forest soil + coconut husk + *Erythrophlem teysmannii* leaves (ratio 2:1:1).

By June, we had almost 20,000 saplings prepared for planting in three plots (the demonstration plot in the community forest, a nearby restoration plot and another restoration plot in Salakpra) Selected samples of all species are monitored on a regular basis to determine the survival and growth rate of each species. The height of saplings is measured and photographed once a month.

c) **Identification of indigenous tree species:** After delaying his next visit for a knee operation, the senior taxonomist of Chiang Mai University and a key member of the FORRU-CMU project team, Mr Maxwell, returned for another intensive 5-day visit (24-28 Aug) to help extend this project's two phenology trails (one near the nursery in Kaeng Plakod village and community forest, and one near the nursery at Huai Sadong Guard Station in Salakpra Wildlife Sanctuary). A total of 195 trees of 46 species were identified on the trail extensions, and some other as yet-unidentified trees were named and labeled on the existing trails. At present, around 60 tree species are being cultivated in the Kaeng Plakod nursery, while an additional 40 species are being cultivated in the Salakpra nursery - a total of 100^{+} species.

d) **Phenology data study and seed collection**: In the last 6-months, from May to October 2010, we did ten phenology surveys (20-21 April, 10-11 May, 2-4 + 21-23 June, 14-16 July, 2-4 + 26-31 Aug, 14-16 Sept, 12-14 Oct). So far, we have collected and germinated the seeds of over 60 tree species in the Kaeng Plakod nursery, and an additional 40 species in the Salakpra nursery - a total of 100+ species.

e) **Monitoring and maintaining 2009 planted plots:** the 9-month old plantings in our 2009 forest restoration plots were monitored and photographed in April, though many trees appeared to have died as a result of the 2010 long dry season. Further monitoring was postponed until the rains started in June as only then could we be sure which plantings had died. We then found that the survival rate averaged 50%, disappointingly low for our hard-working team, but actually quite high compared to plots elsewhere in Thailand, according to Dr Stephen Elliot.

Eight of the species planted last year fared much better than the others, with average survival rates of 65-80%. They are:

- Bauhinia racemosa (*chongko*)
- Phyllanthus emblica (*makaam pom*)
- Pterocarpus macrocarpus (*pradu pa*)
- Oroxylum indicum (*paekha*)
- Albizia lebbeck (*ta-keuk* or *preuk*)
- Aegle marmelos (*matoom*)
- Caesalpinia sappan (*faang*)
- Sindora siamensis (*makha tae*)

Another five species had very low (ave. 25-40%) survival rates:

- Afzelia xylocarpa (*Makha Mong*)
- Cordia cochinchinensis (*Mun*)
- Azadirachta indica (*Sadao* or Neem)
- Albizia grocera (*Thon*)
- Alstonia scholaris (*Teen ped*)

f) **Preparing and maintaining 2010 planting plots:** in May, we plotted and mapped another 3 x1-*rai* (1.2 acres or 0.5/ha) in our Kaeng Plakod demonstration plot. We then surveyed naturally seeded trees over 1-metre high in the new plots, recording 272 trees of 27 species. In June, we labeled every sapling to be planted this year. In the demonstration plots, we planted a total of 500 saplings from 25 species, with at least 20 saplings per species in each of the 1-rai plots. We also prepared three types of fertilizer to use, one type per plot: cow manure, leaf compost, and organic fertilizer (purchased from villagers nearby). In July, we prepared the plots ready for planting (marking sections, digging holes) with the help of soldiers from the nearby 9th Army base. In addition to the 3 x 1-rai demonstration plots, we prepared another 17-rai of the community forest nearby. On 31st July, in honour of H.M.The Queen, 1,000 soldiers, students and local volunteers came to help plant almost 7,000 saplings from 40 species in the pre-prepared 20-rai area. In September, each planting was given fertilizer (or not) as per the experimental plan.

g) **Training and capacity building**: on 12-14 May and 9-11 July, we organized two intensive but practical training courses with Dr Stephen Elliott and two colleagues from FORRU-Chiang Mai. The first course focused on specimen collection, oven drying, written records, rapid site assessment of natural seedlings, and proposed experiments in the 2010 demonstration plots. The second course focused on data analysis using ACCESS. The second course has enabled the ECN project team to start doing some basic analysis with our data. In August (24-28), while extending the phenology trails and identifying 195 trees from 46 species, the CMU's senior taxonomist, Mr Maxwell, also gave additional training in monitoring techniques, identifying species and preparing specimens for reference collections.

h) **Data processing and analysis:** data from the nursery and planted plots is logged into the project database at ECN's office every week. Following the training in data analysis using ACCESS, the project team is now able to prepare some of the graphs and tables that will be needed in the preliminary forest restoration manual for West Thailand that we will produce as this project's final output.

h) **Reporting**: the project team leader, Ms. Oranut Suk-In, writes a monthly report in Thai for ECN's manager, Ms. Jittin Ritthirat, and for the FORRU-CMU supervisor, Dr Stephen Elliott. Progress is reviewed weekly against the work-plan so that work is implemented on time. Nursery staff also complete report forms each month while also recording their daily work in notebooks. All this data is compiled into the written reports. Progress is reviewed at ECN's staff meetings each month, problems raised and solutions decided, sometimes with the help of Dr Elliott.

6. Other activities

a) **Bird survey:** in June, we began monitoring birds in the restoration plots. Led by ECN's research assistant (a graduate in forest biology from Kasetsart University), we will survey birds for 2-days, on the third weekend of every month, to record the changes in numbers and diversity over time. This will provide day on the way in which this restoration project is restoring biodiversity as well as forest cover.

b) **Seedling donations**: in July, the Kaeng Plakod nursery donated 2,000 surplus saplings to two schools, and to the village and temple of Thung Na, for the local community to improve the natural landscape in each area. In August, another 3,880 seedlings were donated to three other communities for them to plant around their schools, temples and common land. We also gave some saplings to the Rajaphat University in Kanchanaburi to plant within its grounds. At the end of this project, we will review this policy to see how best to maximize the benefits.

c) **Community relations:** On 24 June, the project team joined a community event in Kaeng Plakod village to clear rubbish from all public areas. This activity was inspired by a similar event organized last year in Ko Buk village by ECN as part of its Salakpra Elephant Ecosystem Conservation Alliance (SEECA) alternative livelihoods programme for forest users. As a result of the SEECA event, Ko Buk now has a waste recycling centre that is run by, and benefits, the local school. It also has a much cleaner, more attractive village.

e) **Planting Outreach:** working with forest rangers and local volunteers, the FORRU project team also organized a planting event inside the Salakpra Wildlife Sanctuary that was supported by the Dutch NGO, bring the Elephants Home.

d) **Public awareness:** in April we produced several posters about this project and its relevance to elephant conservation and human-elephant conflict mitigation. These are displayed at the project nurseries, at events we attended (including the Army run forest restoration day), and in public places in collaborating local communities. From 24-26 Dec, the FORRU team joined other ECN staff to mount an exhibition at the Wildlife Protection Fair at the Department of Nature Conservation in Bangkok. When the project manager, Mrs. Oranuch, is back from maternity leave and can complete the forest restoration manual that will summarise the findings of the last 3-years and will identify the optimal framework tree species for this area.

7. Future Project Activities

- **Phenology study and seed collection:** current activities will be continued month by month, and more often when necessary, particularly for seed collection.
- **Seed germination and trials:** Seed germination and the associated trials will continue with more tree species will be added in the coming months.
- **Monitor seedling growth rates:** this data is recorded by the project team every 45 days. This includes height measurements and photographing of saplings.
- **On-site training**: More training is planned to help prepare the preliminary forest restoration manual for west Thailand that will be the final output of this project.
- **Planting plot maintenance:** follow-up work involves weeding, monitoring sapling growth and survival, and forest fires.
- **Produce preliminary manual:** the final output of this project will be a preliminary manual for restoring indigenous forest in the dry lowlands of west Thailand.
- **Disseminate lessons learned:** we will launch the manual at a final workshop with relevant community, government, NGO and university representatives.
- **Bird-survey at the planting site:** the bird survey will continue in order to assess the impact of this project on biodiversity restoration.

8. Project Schedule (2010)

Activities/Tasks	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Remarks
Nursery work and research	x	x	x	x	x	x	x	x	x	x	x	x	With ECN team
Training & data collection on-site		x		x		x		x		x		x	With ECN staff, villagers
Tree survey/ seed identification				x									By FORRU taxonomist
Phenology study & seed collection	x	x	x	x	x	x	x	x	x	x	x	x	By local project staff
Plant / weed restoration sites		x	x										Staff, villagers, volunteers
Monitor plots & photograph		x x	x x		x x		x x	x x		x	x		Plots of 2009 & 2010
Plan and prepare technical manual							x	x	x x	xx	xx	x x	Final output of this project

Photographic record of project activities (May – Oct 2010)



Above: holes dug by soldiers in the demonstration plot sited in the badly degraded community forest of Kaeng Plakod village.

Below: smart wooden frames with tree identification labels ready to protect the saplings planted by VIPs.

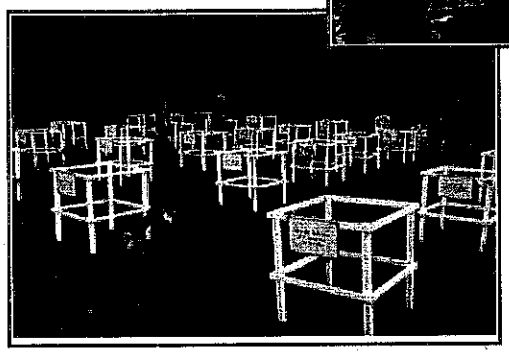
Right: a young girl carrying the Queen's flag waits patiently for the planting to begin.

Below: in the outdoor exhibition area, students learn about this project and its contribution to local environmental health and well-being



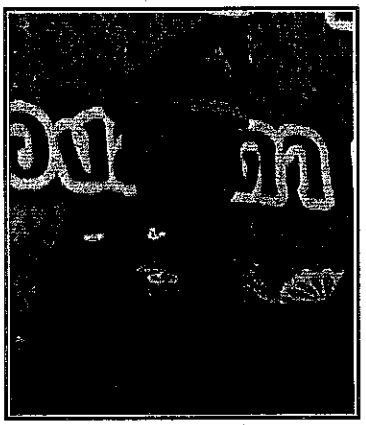


Below: forest fire fighters and other local government personnel line up to help plant trees in Kaeng Plakod









Left. ECN programme manager, Jittin Ritthirat (in pink) with senior officials
Above: the General in command of the 9th Army, based in Kanchanaburi, opens Kaeng Plakod's planting event







Above left: Teams of recruits wait to plant trees in Kaeng Plakod.

Left: One local elder took no chances with falling branches or other dangers.

Above: a local celebrity waters the sapling planted by a senior official.

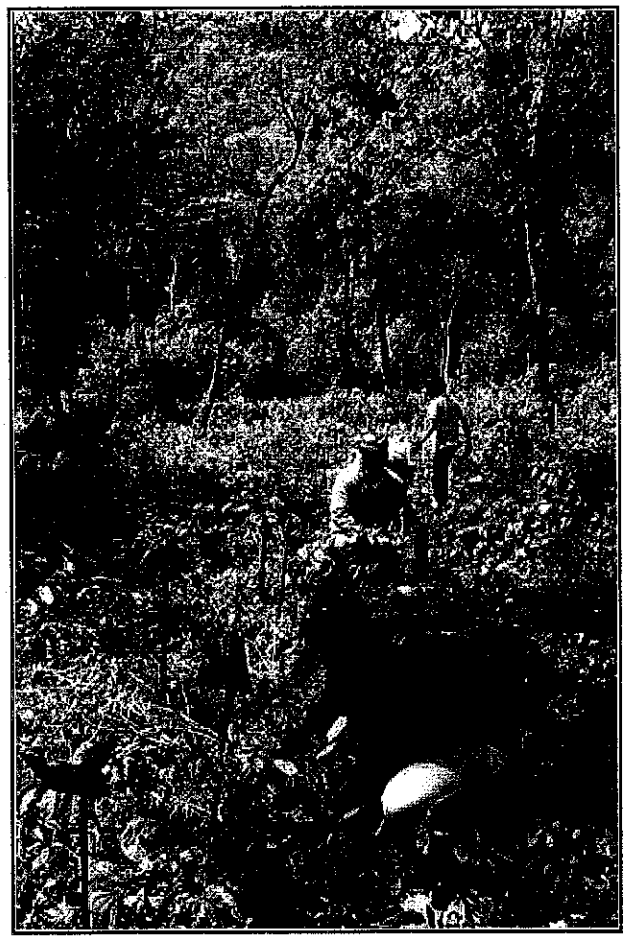




Above: a cheerful lass helps plant out saplings in Salakpra.
Right: local kids learning about seeds and seed treatments



Left: soldiers, forest rangers and other recruits line up to be photographed with Salakpra's planting day banner.



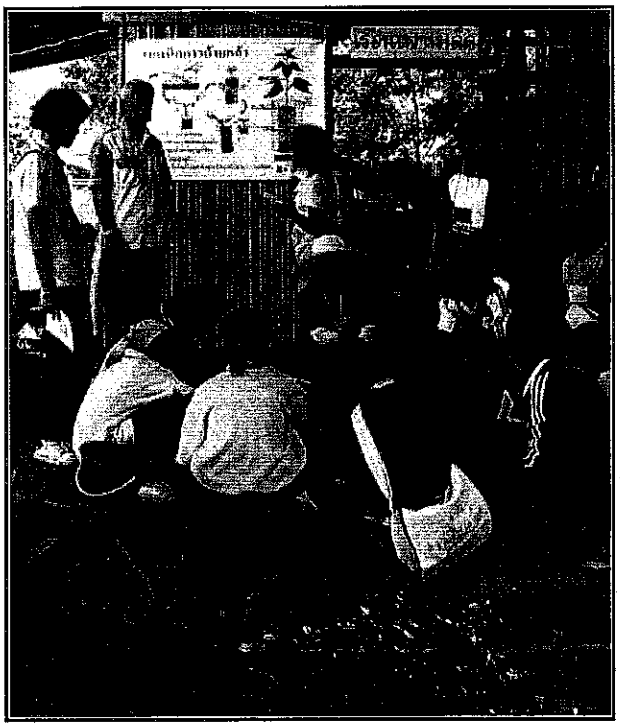
Left: one of the planting sites in Salakpra where we are accelerating forest regeneration.

Below: ECN's wildlife research assistant engages children in some outdoor ornithology



Below left: Mrs. Pannor, the Kaeng Plakod nursery manager, teaches children how to pot seedlings.

Below: inside Salakpra, local children learn the best way to plant out saplings





國際亞馬遜生物保育協會計畫報告摘要

國際亞馬遜生物保育協會(Bio-Amazonia Conservation International, BACI)所提計畫，內容及報告摘要如附：

2008 年贊助 BACI 所提「建立全球石首魚科保育聯絡網計畫—IUCNSSC 紅皮書主管單位」計畫，成果摘要如下。

國際自然保育聯盟(IUCN- the International Union for Conservation of Nature)物種存續委員會(Species Survival Commission, SSC)於 2007 年有鑑於石首魚科魚類面臨之危機日漸嚴重，設立石首魚類紅皮書主管單位(Sciaenidae Red List Authority, RLA)，以評估族群永續需採取之行動。RLA 2008 年推動之工作及成果如下：

一、邀請專家設立全球聯絡網：聯繫到來自 18 國之 28 位專家(包括臺灣 2 位)。
二、徵求優先地區或國家之石首魚科魚類專家：經由辦理和參加研討會，以及請專家推薦、聯繫，已建立東南亞、印度和東非石首魚專家名單。
三、募款贊助 RLA 成員推動小型當地計畫，辦理亞洲地區研討會，評估石首魚科現況：2008 年 12 月，IUCN 撥款 US$20,000 給全球海洋物種評估計畫(Global Marine Species Assessment Program, GMSA)，RLA 和 GMSA 原預計 2009 年辦理 2 個石首魚全球評估研討會，向我國申請 US$20,000。因提案寄出後，募得一筆經費，另外為了節省預算及增加會議效率，決定僅辦理 1 次研討會。另外，2008 年 10 月，BACI 提供水質測量儀器、水底攝影數位相機、3 種捕魚器具給印度海洋主管機關。
四、編纂石首魚科名錄和鑑定手冊：預計 2012 年完成，提前至 2009 年開始進行。
五、將「石首魚科魚類紅皮書」送 SSC，並請專家審查：原計畫預計 2016 年完成，將提前至 2010 年完成。
六、計畫重要成果包括設立全球石首魚科專家聯絡網，修訂及確認資料，建立最新石首魚科魚類分佈資料。選出優先物種，建立石首魚科網路資訊交換中心。

2009 年贊助之「全球石首魚科紅皮書評估研討會計畫」，計畫報告摘要如附：

IUCN 紅皮書評估步驟包括：
一、蒐集物種資料，如分佈、族群數量、棲息地、生態、威脅因子、保育措施等資料，並納入 IUCN 物種資料庫。
二、分類專家和各地區專家於研討會前審核物種資料。
三、研討會期間，將每一物種依 IUCN 紅皮書類別和標準予以歸類。
四、研討會後，由 IUCN 紅皮書專家審核上述結果。
五、所有資料將納入 IUCN 網站，供保育政策和研究參考之用。

全球石首魚科紅皮書評估研討會已於 2009 年 11 月 9 至 15 日於巴西召開。由 IUCNSSC Sciaenidae RLA、IUCNSSC GMSA 及巴西環境部相關單位 ICMBio 合辦，提供經費單位除林務局外，還包括 IUCN、ICMBio、GMSA 和 BACI。會場海報和布條皆有贊助單位 logo。研討會議程和參加人員名單請參考報告原文。GMSA 和石首魚 RLA 於研討會前進行 IUCN 紅皮書評估步驟第 1 至第 3 階段準備工作。第 5 階段的資料將納入未來出版的 IUCN 紅皮書中。共有 20 位國際專家和 30 位巴西專家和受訓者一起評估全球 250 種石首魚科魚類，其中 19 種(7.04%)依據 IUCN 標準被列為受威脅物種(threaten)，詳細評估情形請參考報告原文表 2。會期中也設立了 IUCNSSC Sciaenidae Authority Specialist Group。

另外，與會者也討論下列議題：

一、建立石首魚漁業和保育監測網

二、出版世界石首魚科魚類名錄

三、親緣地理學和功能行態學研究

四、建立資料和標本交換中心

五、支援當地研究

2010 年所提「建立全球石首魚科保育網計畫」主要是前兩年計畫之延續，建立聯絡網和專家小組，以及評估石首魚保育位階後，擬於臺灣設立全球石首魚科保育網(Global Sciaenidae Conservation Network, GSCN)，推動專家小組工作。預計第 1 年蒐集 100 種石首魚標本存放該館，之後陸續蒐集，目標為蒐齊全球 300 餘種石首魚標本。提案人 Professor Ning Labbish Chao(趙寧) BACI 理事長暨巴西亞馬遜聯邦大學教授於 2011 年 1 月 4 日來函說明已於屏東海生館設立上開石首魚專家小組網絡。提案人並提供與全球科學家共同參與之研究報告 The Impact of Conservation on the Status of the World's Vertebrates。

本計畫工作項目包括：

1.預備會議

與中山大學、臺灣大學、中研院、科博館和海生館洽談 Sciaenidae 合作研究計畫，所有參與專家將納入 GSCN。

2.GSCN 標本蒐集和資料庫之建立

2.1 建立石首魚標本類型資料庫

2.2 建立全球石首魚標本庫

2.3 蒐集全球石首魚組織(tissue collection)

2.4 建立世界石首魚養殖資料庫

2.5 建立資料交換中心，蒐集所有石首魚相關文學作品、報告或研究報告等

2.6 建立石首魚聲音資料庫(石首魚腹部肌肉的振動產生的聲音，即 drumming sounds)

2.7 辦理黃魚特展

3.標本蒐集

3.1 南美洲和北美洲約 50-70 種石首魚，目標國家為巴西、秘魯、巴拿馬、墨西哥和美國。

3.2 東南亞、澳洲和中國

3.3 印度洋和孟加拉灣

3.4 非洲南部和西部

4.合作

4.1 建立機構間合法交換標本之雙邊協定

4.2 提供小額經費給各國學者或學生依據標準程序進行野外調查

4.3 訓練臺灣學生參與國際保育議題

Hui-liang Yang

寄件者: Hui-liang Yang [hlyang@forest.gov.tw]
寄件日期: 2011年1月4日星期二 下午 4:45
收件者: 'Ning Chao'
主旨: RE: happy New Year

Dear Dr. Chao,

Thank you very much for providing this report and updates.

Happy New Year!

Hui-liang Yang
Conservation Division
Forestry Bureau, COA

-----Original Message-----
From: Ning Chao [mailto:piabachao@gmail.com]
Sent: Monday, January 03, 2011 11:47 PM
To: Hui-liang Yang
Cc: baoren@mail.baphiq.gov.tw; 生物馴養組-張至維
Subject: happy New Year

Daer Ms Yang:

Happy New Year!

It is my great pleasure to inform you that COA grant supported project on " Global Sciaenidae Conservation Network" has made a significant progress.

We have established the IUCN SSC Sciaenidae Red List Authority specialist group based in National Museum of Marine Biology and Aquarium in Pingting.

As the Chair of Sciaenidae Red List Authority, I have participate the authorship of an article on "The Impact of Conservation on the Status of the World' s Vertebrates" Science VOL 330, p.1509-1509, and associated on-line doucument. To be able to participate in this landmark article and associated myself with NMMBA is a great honor.

I will send you a full report later.

Scincerely Yours,

Chao Ning

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The Impact of Conservation on the Status of the World's Vertebrates

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Using data for 25,780 species categorized on the International Union for Conservation of Nature Red List, we present an assessment of the status of the world's vertebrates. One-fifth of species are classified as Threatened, and we show that this figure is increasing: On average, 52 species of mammals, birds, and amphibians move one category closer to extinction each year. However, this overall pattern conceals the impact of conservation successes, and we show that the rate of deterioration would have been at least one-fifth again as much in the absence of these. Nonetheless, current conservation efforts remain insufficient to offset the main drivers of biodiversity loss in these groups: agricultural expansion, logging, overexploitation, and invasive alien species.

In the past four decades, individual populations of many species have undergone declines and many habitats have suffered losses of original cover (*1*, *2*) through anthropogenic activity. These losses are manifested in species extinction rates that exceed normal background rates by two to three orders of magnitude (*3*), with substantial detrimental societal and economic consequences (*4*). In response to this crisis, 193 parties to the Convention on Biological Diversity (CBD; adopted 1992) agreed "to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional, and national level as a contribution to poverty alleviation and to the benefit of all life on Earth" (*5*). That the target has not been met was borne out by empirical testing against 31 cross-disciplinary indicators developed within the CBD framework itself (*1*). However, this does not mean that conservation efforts have been ineffective. Conservation actions have helped to prevent extinctions (*6*, *7*) and improve population trajectories (*8*), but there has been limited assessment of the overall impact of ongoing efforts in reducing losses in biodiversity (*9*, *10*). Here, we assess the overall status of the world's vertebrates, determine temporal trajectories of extinction risk for three vertebrate classes, and estimate the degree to which conservation actions have reduced biodiversity loss.

Described vertebrates include 5498 mammals, 10,027 birds, 9084 reptiles, 6638 amphibians, and 31,327 fishes (table S1). Vertebrates are found at nearly all elevations and depths, occupy most major habitat types, and display remarkable variation in body size and life history. Although they constitute just 3% of known species, vertebrates play vital roles in ecosystems (*11*) and have great cultural importance (*12*). Under the auspices of the International Union for Conservation of Nature (IUCN) Species Survival Commission, we compiled data on the taxonomy, distribution, population trend, major threats, conservation measures, and threat status for 25,780 vertebrate species, including all mammals, birds, amphibians, cartilaginous fishes, and statistically

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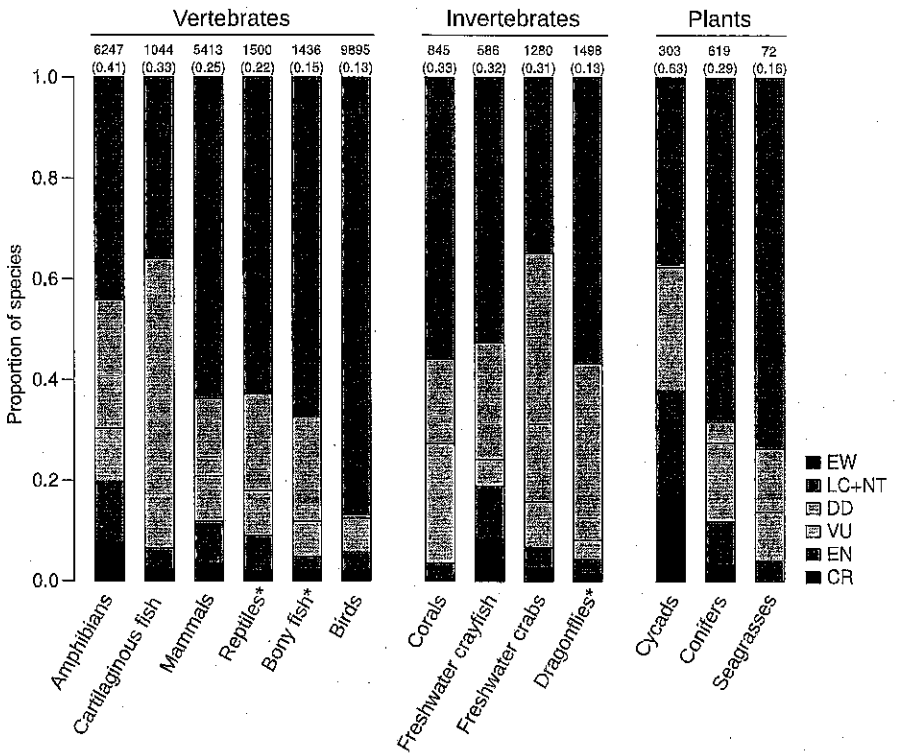

Fig. 1. The proportion of vertebrate species in different Red List categories compared with completely (or representatively) assessed invertebrate and plant taxa on the 2010 IUCN Red List (*15*). EW, Extinct in the Wild; CR, Critically Endangered; EN, Endangered; VU, Vulnerable; NT, Near Threatened; LC, Least Concern; DD, Data Deficient. Extinct species are excluded. Taxa are ordered according to the estimated percentage (shown by horizontal red lines and given in parentheses at tops of bars) of extant species considered Threatened if Data Deficient species are Threatened in the same proportion as data-sufficient species. Numbers above the bars represent numbers of extant species assessed in the group; asterisks indicate those groups in which estimates are derived from a randomized sampling approach.

representative samples of reptiles and bony fishes [~1500 species each (*13*)].

The IUCN Red List is the widely accepted standard for assessing species' global risk of extinction according to established quantitative criteria (*14*). Species are categorized in one of eight categories of extinction risk, with those in the categories Critically Endangered, Endangered, or Vulnerable classified as Threatened. Assessments are designed to be transparent, objective, and consultative, increasingly facilitated through workshops and Web-based open-access systems. All data are made freely available for consultation (*15*) and can therefore be challenged and improved upon as part of an iterative process toward ensuring repeatable assessments over time.

Status, trends, and threats. Almost one-fifth of extant vertebrate species are classified as Threatened, ranging from 13% of birds to 41% of amphibians, which is broadly comparable with the range observed in the few invertebrate and plant taxa completely or representatively assessed to date (Fig. 1 and table S2). When we incorporate the uncertainty that Data Deficient species (those with insufficient information for determining risk of extinction) introduce, the proportion of all vertebrate species classified as Threatened is between 16% and 33% (midpoint = 19%; table S3). [Further details of the data and assumptions behind these values are provided in (*16*) and tables S2 and S3.] Threatened vertebrates occur mainly in tropical regions (Fig. 2), and these concentrations are generally disproportionately high even when accounting for their high overall species

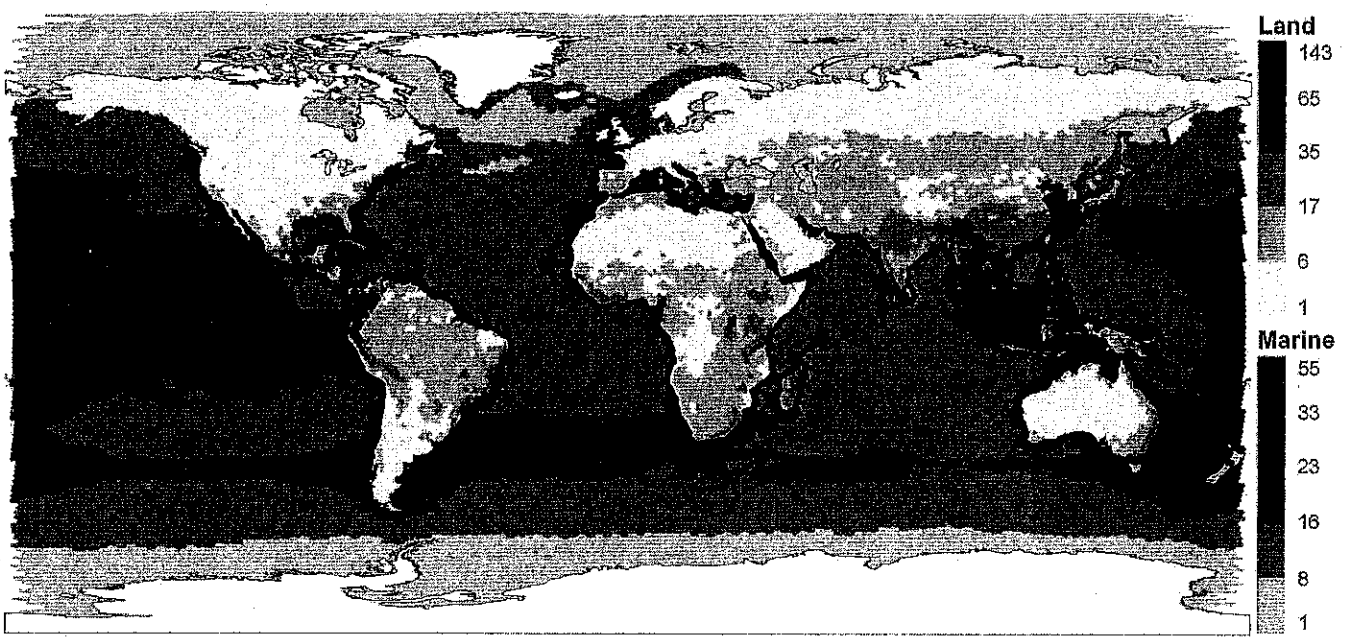

Fig. 2. Global patterns of threat, for land (terrestrial and freshwater, in brown) and marine (in blue) vertebrates, based on the number of globally Threatened species in total.

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richness (fig. S4, A and B). These patterns highlight regions where large numbers of species with restricted distributions (*17*) coincide with intensive direct and indirect anthropogenic pressures, such as deforestation (*18*) and fisheries (*19*).

To investigate temporal trends in extinction risk of vertebrates, we used the IUCN Red List Index (RLI) methodology (*20*) that has been

Table 1. Net number of species qualifying for revised IUCN Red List categories between assessments owing to genuine improvement or deterioration in status, for birds (1988 to 2008), mammals (1996 to 2008), and amphibians (1980 to 2004). Category abbreviations are as for Fig. 1; CR(PE/PEW) denotes Critically Endangered (Possibly Extinct or Possibly Extinct in the Wild). CR excludes PE/PEW. Species undergoing an improvement (i.e., moving from a higher to a lower category of threat) are indicated by "+"; species deteriorating in status (i.e., moving from a lower to a higher category of threat) are indicated by "–". Species changing categories for nongenuine reasons, such as improved knowledge or revised taxonomy, are excluded. In the case of birds, for which multiple assessments have been undertaken, values in parentheses correspond to the sum of all changes between consecutive assessments; the same species may therefore contribute to the table more than once [see (*16*)].

			Red List category at end of period							
			EX	EW	CR (PE/PEW)	CR	EN	VU	NT	LC
	Birds	EX		0	0	0	0	0	0	0
		EW	0		0	+1 (+1)	0	0	0	0
		CR (PE/PEW)	0	0		0	0	0	0	0
		CR	–2 (–2)	–2 (–2)	–7 (–7)		+16 (+19)	+1 (+3)	0	0
		EN	0	0	0	–22 (–27)		+4 (+5)	0	0
		VU	0	0	0	–10 (–11)	–34 (–41)		+9 (+10)	0 (+1)
		NT	0	0	0	–4 (–4)	–5 (–2)	–40 (–47)		+1 (+1)
		LC	0	0	0	–1 (0)	–5 (–4)	–5 (–5)	–78 (–81)	
	Mammals	EX		0	0	0	0	0	0	0
		EW	0		0	+1	+1	0	0	0
Red List		CR (PE/PEW)	0	0		0	0	0	0	0
category		CR	0	–1	–3		+3	+2	0	0
at start of		EN	0	0	0	–31		+3	+1	0
period		VU	0	0	0	–2	–39		+5	+1
		NT	0	0	0	–1	–4	–47		+7
		LC	0	0	0	0	–2	–2	–39	
	Amphibians	EX		0	0	0	0	0	0	0
		EW	0		0	0	0	0	0	0
		CR (PE/PEW)	–2	0		0	0	0	0	0
		CR	–3	–1	–34		0	+2	0	0
		EN	–2	0	–42	–77		0	+2	0
		VU	–2	0	–19	–51	–45		0	0
		NT	0	0	0	–7	–18	–32		0
		LC	0	0	0	–3	–8	–20	–92	

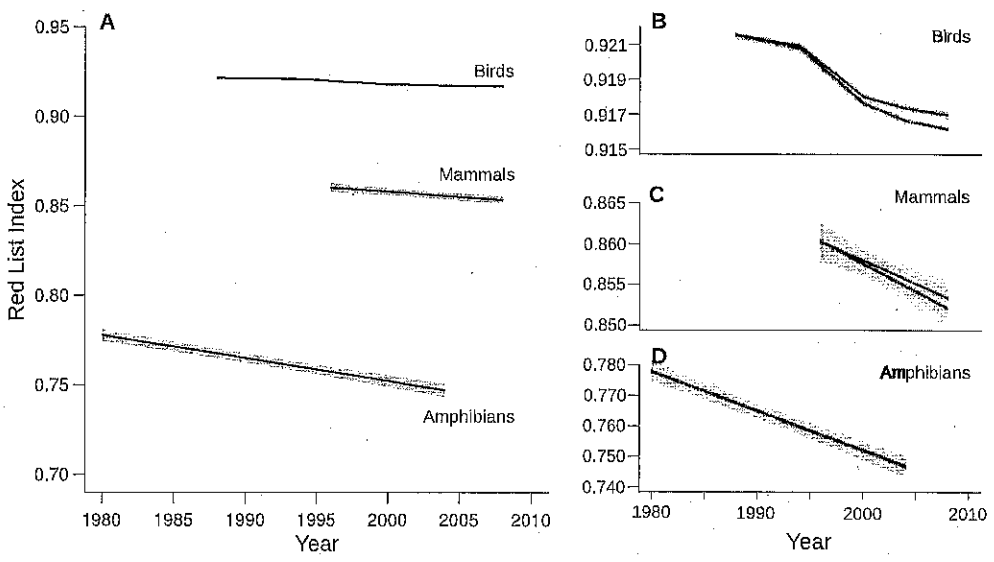

Fig. 3. (**A**) Trends in the Red List Index (RLI) for the world's birds, mammals, and amphibians. (**B** to **D**) Observed change in the RLI for each group (black) compared with RLI trends that would be expected if species that underwent an improvement in status due to conservation action had undergone no change (red). The difference is attributable to conservation. An RLI value of 1 equates to all species being Least Concern; an RLI value of 0 equates to all species being Extinct. Improvements in species conservation status lead to increases in the RLI; deteriorations lead to declines. A downward trend in the RLI value means that the net expected rate of species extinctions is increasing. Shading shows 95% confidence intervals. Note: RLI scales for (B), (C), and (D) vary.

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adopted for reporting against global targets (*1*, *2*). We calculated the change in RLI for birds (1988, 1994, 2000, 2004, and 2008), mammals (1996 and 2008), and amphibians (1980 and 2004); global trend data are not yet available for other vertebrate groups, although regional indices have been developed (*21*). The RLI methodology is explained in detail in (*16*), but in summary the index is an aggregated measure of extinction risk calculated from the Red List categories of all assessed species in a taxon, excluding Data Deficient species. Changes in the RLI over time result from species changing categories between assessments (Table 1). Only real improvements or deteriorations in status (termed "genuine" changes) are considered; recategorizations attributable to improved knowledge, taxonomy, or criteria change ("nongenuine" changes) are excluded (*22*). Accordingly, the RLI is calculated only after earlier Red List categorizations are retrospectively corrected using current information and taxonomy, to ensure that the same species are considered throughout and that only genuine changes are included. For example, the greater red musk shrew (*Crocidura flavescens*) was classified as Vulnerable in 1996 and as Least Concern in 2008; however, current evidence indicates that the species was also Least Concern in 1996, and the apparent improvement is therefore a nongenuine change. In contrast, Hose's broadbill (*Calyptomena hosii*) was one of 72 bird species to deteriorate one Red List category between 1994 and 2000, from Least Concern to Near Threatened, mainly because of accelerating habitat loss in the Sundaic lowlands in the 1990s. Such a deterioration in a species' conservation status leads to a decline in the RLI (corresponding to increased aggregated extinction risk); an improvement would lead to an increase in the RLI.

Temporal trajectories reveal declining RLIs for all three taxa. Among birds, the RLI (Fig. 3A) showed that their status deteriorated from 1988 to 2008, with index values declining by 0.49%, an average of 0.02% per year (table S4). For mammals, the RLI declined by 0.8% from 1996 to 2008, a faster rate (0.07% per year) than for birds. Proportionally, amphibians were more threatened than either birds or mammals; RLI values declined 3.4% from 1980 to 2004 (0.14% per year). Although the absolute and proportional declines in RLIs for each taxonomic group were small, these represent considerable biodiversity losses. For example, the deterioration for amphibians was equivalent to 662 amphibian species each moving one Red List category closer to extinction over the assessment period. The deteriorations for birds and mammals equate to 223 and 156 species, respectively, deteriorating at least one category. On average, 52 species per year moved one Red List category closer to extinction from 1980 to 2008. Note that the RLI does not reflect ongoing population changes that are occurring too slowly to trigger change to different categories of threat. Other indicators based on vertebrate population sizes showed declines of 30% between 1970 and 2007 (*1*, *2*, *22*).

Global patterns of increase in overall extinction risk are most marked in Southeast Asia (Fig. 4 and figs. S5A and S6). It is known that the planting of perennial export crops (such as oil palm), commercial hardwood timber operations, agricultural conversion to rice paddies, and unsustainable hunting have been detrimental to species in the region (*23*), but here we show the accelerating rate at which these forces are driving change. In California, Central America, the tropical Andean regions of South America, and Australia, patterns have been driven mainly by the "enigmatic" deteriorations among amphibians (*24*), which have increasingly been linked to the infectious disease chytridiomycosis, caused by the presumed invasive fungal pathogen *Batrachochytrium dendrobatidis* (*25*). Almost 40 amphibians have deteriorated in status by three or more IUCN Red List categories between 1980 and 2004 (Table 1).

Although chytridiomycosis has been perhaps the most virulent threat affecting vertebrates to emerge in recent years, it is not the only novel cause of rapid declines. The toxic effects of the veterinary drug diclofenac on Asian vultures have

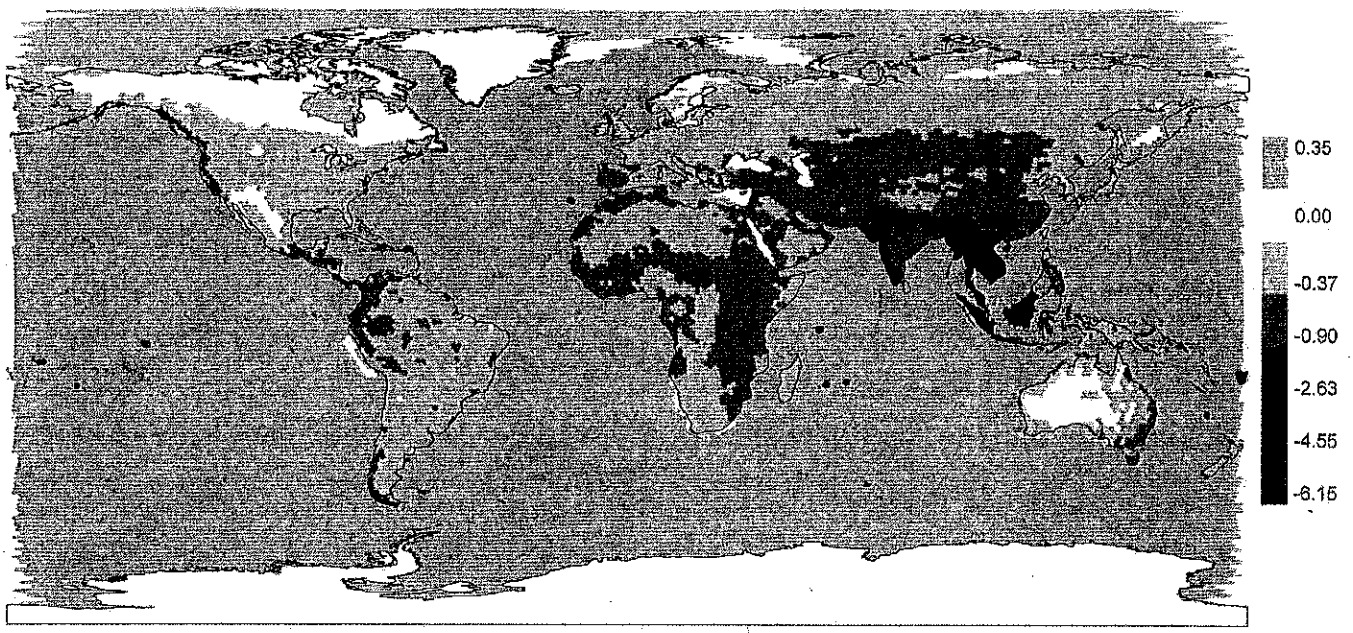

Fig. 4. Global patterns of net change in overall extinction risk across birds, mammals, and amphibians (for the periods plotted in Fig. 3) mapped as average number of genuine Red List category changes per cell per year. Purple corresponds to net deterioration (i.e., net increase in extinction risk) in that cell; green, net improvement (i.e., decrease in extinction risk); white, no change. The uniform pattern of improvement at sea is driven by improvements of migratory marine mammals with cosmopolitan distributions (e.g., the humpback whale). Deteriorations on islands [e.g., the nightingale reed-warbler (*Acrocephalus luscinius*) in the Northern Mariana Islands] and improvements on islands [e.g., the Rarotonga monarch (*Pomarea dimidiata*) in the Cook Islands] are hard to discern; islands showing overall net improvements are shown in blue. Note that the intensity of improvements never matches the intensity of deteriorations.

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caused estimated population declines exceeding 99% over the past two decades in certain *Gyps* species, and have resulted in three species moving from Near Threatened to Critically Endangered between 1994 and 2000. Numbers of Tasmanian devils (*Sarcophilus harrisii*) have fallen by more than 60% in the past 10 years because of the emergence of devil facial tumor disease (resulting in three step changes from Least Concern to Endangered). Climate change is not yet adequately captured by the IUCN Red List (*26*, *27*) but has been directly implicated in the deteriorating status of several vertebrates and may interact with other threats to hasten extinction (*28*). However, there is no evidence of a parallel to the systemwide deteriorations documented for reef-building corals affected by bleaching events related to El Niño–Southern Oscillation occurrences (*29*).

Most deteriorations in status are reversible, but in 13% of cases they have resulted in extinction. Two bird species—the kamao (*Myadestes myadestinus*) from Hawaii and the Alaotra grebe (*Tachybaptus rufolavatus*) from Madagascar—became extinct between 1988 and 2008, and a further six Critically Endangered species have been flagged as "possibly extinct" during this period (Table 1 and table S5). At least nine amphibian species vanished during the two decades after 1980, including the golden toad (*Incilius periglenes*) from Costa Rica and both of Australia's unique gastric-brooding frog species (genus *Rheobatrachus*); a further 95 became possibly extinct, 18 of them harlequin toads in the Neotropical genus *Atelopus* (23% of species). No mammals are listed as Extinct for the period 1996 to 2008, although the possible extinction of the Yangtze River dolphin (*Lipotes vexillifer*) would be the first megafauna vertebrate species extinction since the Caribbean monk seal in the 1950s (*30*).

Estimates of conservation success. These results support previous findings that the state of biodiversity continues to decline, despite increasing trends in responses such as protected areas coverage and adoption of national legislation (*1*, *2*). Next, we asked whether conservation efforts have made any measurable contribution to reducing declines or improving the status of biodiversity.

The RLI trends reported here are derived from 928 cases of recategorization on the IUCN Red List (Table 1 and table S6), but not all of these refer to deteriorations. In 7% of cases (68/928), species underwent an improvement in status, all but four due to conservation action. For example, the Asian crested ibis (*Nipponia nippon*) changed from Critically Endangered in 1994 to Endangered in 2000 owing to protection of nesting trees, control of agrochemicals in rice fields, and prohibition of firearms; the four exceptions were improvements resulting from natural processes, such as unassisted habitat regeneration (tables S7 and S8). Nearly all of these improvements involved mammals and birds, where the history of conservation extends farther back and where the bulk of species-focused conservation funding and attention is directed (*31*). Only four amphibian species underwent improvements, because the amphibian extinction crisis is such a new phenomenon and a plan for action has only recently been developed (*32*).

To estimate the impact of conservation successes, we compared the observed changes in the RLI with the RLI trends expected if all 64 species that underwent an improvement in status due to conservation action had not done so (*16*). Our explicit assumption is that in the absence of conservation, these species would have remained unchanged in their original category, although we note that this approach is conservative because it is likely that some would have deteriorated [in the sense of (*6*)]. The resulting difference between the two RLIs can be attributed to conservation. We show that the index would have declined by an additional 18% for both birds and mammals in the absence of conservation (Fig. 3, B and C, and table S4). There was little difference for amphibians (+1.4%; Fig. 3D) given the paucity of species improvements. For birds, conservation action reduced the decline in the RLI from 0.58% to 0.49%, equivalent to preventing 39 species each moving one Red List category closer to extinction between 1988 and 2008. For mammals, conservation action reduced the RLI decline from 0.94% to 0.8%, equivalent to preventing 29 species moving one category closer to extinction between 1996 and 2008.

These results grossly underestimate the impact of conservation, because they do not account for species that either (i) would have deteriorated further in the absence of conservation actions, or (ii) improved numerically, although not enough to change Red List status. As an example among the former, the black stilt (*Himantopus novaezelandiae*) would have gone extinct were it not for reintroduction and predator control efforts, and its Critically Endangered listing has thus remained unchanged (*6*). Among the latter, conservation efforts improved the total population numbers of 33 Critically Endangered birds during the period 1994 to 2004, but not sufficiently for any species to be moved to a lower category of threat (*33*). As many as 9% of mammals, birds, and amphibians classified as Threatened or Near Threatened have stable or increasing populations (*15*) largely due to conservation efforts, but it will take time for these successes to translate into improvements in status. Conservation efforts have also helped to avoid the deterioration in status of Least Concern species. Finally, conservation actions have benefited many other Threatened species besides birds, mammals, and amphibians, but this cannot yet be quantified through the RLI for groups that have been assessed only once [e.g., salmon shark (*Lamna ditropis*) numbers have improved as the result of a 1992 U.N. moratorium on large-scale pelagic driftnet fisheries].

Confronting threats. Species recovery is complex and case-specific, but threat mitigation is always required. We investigated the main drivers of increased extinction risk by identifying, for each species that deteriorated in status, the primary threat responsible for that change. To understand which drivers of increased extinction risk are being mitigated most successfully, we identified, for each species that improved in status, the primary threat offset by successful conservation (table S6).

We found that for any single threat, regardless of the taxa involved, deteriorations outnumber improvements; conservation actions have not yet succeeded in offsetting any major driver of increased extinction risk (fig. S7). On a per-species basis, amphibians are in an especially dire situation, suffering the double jeopardy of exceptionally high levels of threat coupled with low levels of conservation effort. Still, there are conservation successes among birds and mammals, and here we investigate the degree to which particular threats have been addressed.

Conservation actions have been relatively successful at offsetting the threat of invasive alien species for birds and mammals: For every five species that deteriorated in status because of this threat, two improved through its mitigation. These successes have resulted from the implementation of targeted control or eradication programs [e.g., introduced cats have been eradicated from 37 islands since the mid-1980s (*34*)] coupled with reintroduction initiatives [e.g., the Seychelles magpie-robin (*Copsychus sechellarum*) population was 12 to 15 birds in 1965 but had increased to 150 birds by 2005 (fig. S8)]. Many of these improvements have occurred on small islands but also in Australia, owing in part to control of the red fox (*Vulpes vulpes*) (Fig. 4 and fig. S5B). However, among amphibians, only a single species—the Mallorcan midwife toad (*Alytes muletensis*)—improved in status as a result of mitigation of the threat posed by invasive alien species, compared with 208 species that deteriorated. This is because there is still a lack of understanding of the pathways by which chytridiomycosis is spread and may be controlled, and in situ conservation management options are only just beginning to be identified [e.g., (*35*)]. Meanwhile, the establishment of select, targeted captive populations with the goal of reintroducing species in the wild may offer valuable opportunities once impacts in their native habitat are brought under control [e.g., the Kihansi spray toad (*Nectophrynoides asperginis*), categorized as Extinct in the Wild because of drastic alteration of its spray zone habitat].

For mammals and birds, the threats leading to habitat loss have been less effectively addressed relative to that of invasive alien species: For every 10 species deteriorating as a

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result of agricultural expansion, fewer than 1 improved because of mitigation of this threat. Protected areas are an essential tool to safeguard biodiversity from habitat loss, but the protected areas network remains incomplete and nonstrategic relative to Threatened species (*17*), and reserve management can be ineffective (*36*). Numerous Threatened species are restricted to single sites, many still unprotected (*37*), and these present key opportunities to slow rates of extinction. In the broader matrix of unprotected land, agri-environmental schemes could offer important biodiversity benefits, provided that management policies are sufficient to enhance populations of Threatened species (*38*).

Hunting has been relatively poorly addressed in mammals (62 deteriorations, 6 improvements) when compared with birds (31 deteriorations, 9 improvements). In birds, successes have resulted mainly from targeted protection [e.g., Lear's macaw (*Anodorhynchus leari*) changed from Critically Endangered to Endangered as a result of active protection of the Toca Velha/Serra Branca cliffs in Brazil], but also from enforcement of legislation (e.g., hunting bans) and harvest management measures. Many mammals subject to hunting occur at low densities, have large home ranges, and/or are large-bodied. Although active site-based protection has contributed to an improvement in the status of some of these species, site protection alone is often insufficient if not complemented by appropriate legislation, biological management, and effective enforcement (*39*). For example, a combination of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) and enactment of the Vicuña Convention, which prohibited domestic exploitation and mandated the establishment of protected areas, has helped to improve the status of the vicuña (*Vicugna vicugna*) from Near Threatened to Least Concern.

The threat of fisheries has been mitigated relatively more effectively for marine mammals (4 deteriorations, 2 improvements) than for birds (10 deteriorations, 0 improvements), reflecting both the time when drivers first emerged and the past influence of supranational conservation policy. Among historically exploited, long-lived mammals, for example, the humpback whale (*Megaptera novaeangliae*) has benefited from protection from commercial whaling (since 1955) and has improved from Vulnerable to Least Concern. Declines among slow-breeding seabirds (particularly albatrosses and petrels; fig. S9) are mainly a consequence of increasing incidental by-catch resulting from the growth of commercial fisheries, primarily those that use long-line and trawling methods. Legislative tools, such as the recently enacted multilateral Agreement on the Conservation of Albatrosses and Petrels (*40*), may yet deliver dividends by coordinating international action to reduce fisheries mortality of these highly migratory species. Binding legislation and harvest management strategies also are urgently needed to address the disproportionate impact of fisheries on cartilaginous fishes (fig. S10).

We have no data on the relationship between expenditure on biodiversity and conservation success. A disproportionate percentage of annual conservation funding is spent in economically wealthy countries (*41*), where there are generally fewer Threatened species (Fig. 2 and fig. S4B) and the disparity between success and failure appears less evident (Fig. 4). Southeast Asia, by contrast, has the greatest imbalance between improving and deteriorating trends, emphasizing the need there for greater investment of resources and effort.

Conclusions. Our study confirms previous reports of continued biodiversity losses. We also find evidence of notable conservation successes illustrating that targeted, strategic conservation action can reduce the rate of loss relative to that anticipated without such efforts. Nonetheless, the current level of action is outweighed by the magnitude of threat, and conservation responses will need to be substantially scaled up to combat the extinction crisis. Even with recoveries, many species remain conservation-dependent, requiring sustained, long-term investment (*42*); for example, actions have been under way for 30 years for the golden lion tamarin (*Leontopithecus rosalia*), 70 years for the whooping crane (*Grus americana*), and 115 years for the white rhinoceros (*Ceratotherium simum*).

Halting biodiversity loss will require coordinated efforts to safeguard and effectively manage critical sites, complemented by broad-scale action to minimize further destruction, degradation, and fragmentation of habitats (*37*, *39*) and to promote sustainable use of productive lands and waters in a way that is supportive to biodiversity. Effective implementation and enforcement of appropriate legislation could deliver quick successes; for example, by-catch mitigation measures, shark-finning bans, and meaningful catch limits have considerable potential to reduce declines in marine species (*19*). The 2010 biodiversity target may not have been met, but conservation efforts have not been a failure. The challenge is to remedy the current shortfall in conservation action to halt the attrition of global biodiversity.

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Supporting Online Material

www.sciencemag.org/cgi/content/full/science.1194442/DC1
Materials and Methods
Figs. S1 to S10
Tables S1 to S9
References
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