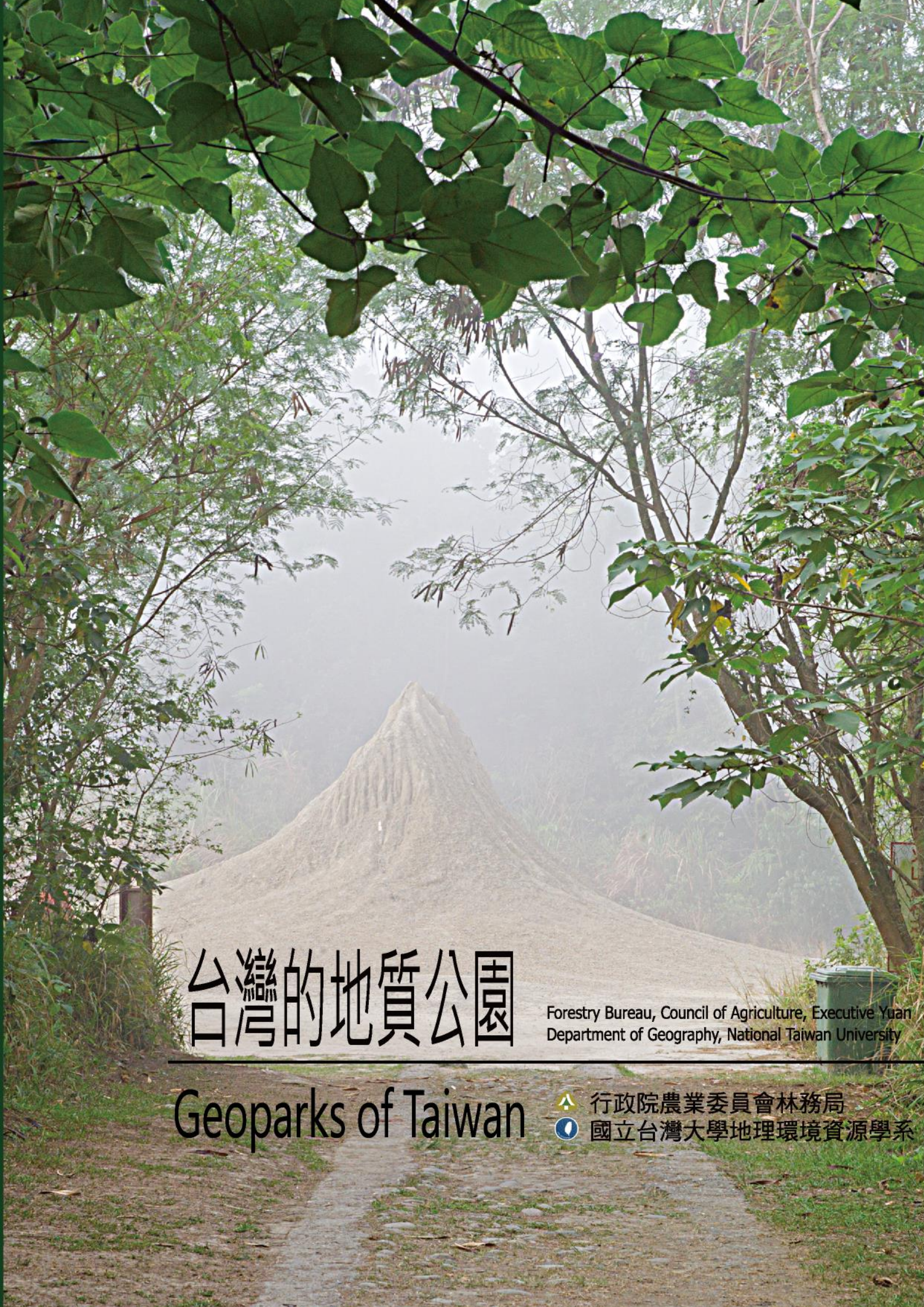


台灣的地質公園

Forestry Bureau, Council of Agriculture, Executive Yuan
Department of Geography, National Taiwan University

Geoparks of Taiwan

行政院農業委員會林務局
國立台灣大學地理環境資源學系

序

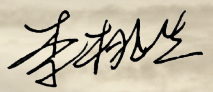
美麗寶島台灣的地景深具風華，從高山到海岸、都市到鄉村，各有特色。林務局透過地質公園之推動，希望提昇國人落實對地景認識與保護的工作，並能與國際地景保育社群交流，深化落實台灣做為國際成員之全球責任。聯合國教科文組織的地質公園網絡推動，台灣應積極參與。

林務局推動地景普查並於 2012 年完成全國 341 處地景保育景點的登錄，以為科學、教育與保育之依據。更基於對台灣地景保育的使命感，不但依文化資產保存法指定22處自然保留區，也推動「地質公園」以形成在地守護珍貴地景的力量，從 2011 年起陸續推動「澎湖海洋地質公園」、「雲林草嶺地質公園」、「台東利吉泥岩惡地地質公園」及「高雄燕巢泥岩惡地地質公園」等 4 處示範區計畫，並結合交通部觀光局的「北部海岸地質公園」與「馬祖地質公園」，形成台灣地質公園網絡，以落實地質公園核心價值並期能促使地景環境保育與在地環境資源的永續利用。

本書提供讀者理解台灣地質公園推動成立的機緣，更簡要而務實說明目前我國六個國家地質公園。從地質與地景的條件、各地質公園的特殊地景、社會文化經濟以及社區參與之狀況等，多面向的呈現給讀者。

本人期待「台灣的地質公園」一書的出版，可以讓國人了解台灣地質公園是以地景保育作為基礎核心價值，更透過環境教育和具有生態環境觀點之地質地景旅遊來保育地景，配合社區參與，作為環境永續之經濟動機與激勵誘因，並提升台灣地質公園之經營與管理，期待地質公園之推動，成為在地社區發展的另一項新契機。

行政院農業委員會林務局
局　長



謹誌

Preface

The appealing characteristics of Taiwan landscapes have their own exclusivity, all over Taiwan from the alpine peaks to the coast, from the countryside to the city. The Bureau of Forestry has been promoting geoparks since 2009. To make geoparks with solid foundation, the Bureau completed an inventory of 341 valuable geo-sites.

The inventory of the 341 geo-sites is fundamental for landscape conservation. The Forestry Bureau has exercised it auspice to make 22 of the sites into nature reserves, and the rest will be well kept for conservation partly through geoparks. Starting in 2011 the Bureau supported four geopark communities to learn and inventory their local environments, and they then networked to form an alliance to share and learn from each other. They are Penghu Marine Geopark, Tsao-ling Geopark, Li-chi Badland Geopark, and Yan-Tsao Mud Volcano and Bad Land Geopark. Along with the two geoparks, North Coast Geopark and Matzu Geopark, promoted by the Tourism Bureau, Taiwan has a total 6 geoparks. The geoparks are strategically designated to probe how communities are capable of developing geo-tourism, to conduct landscape conservation and to develop sustainable local society and economy.

This book provides an understanding of geopark promotion in Taiwan, and briefs Taiwan's six geoparks in terms of their geology, geomorphology, rural society, local economy and involvement, and community networking. Through this book, the audience will appreciate how good practices will keep the local milieu intact and the efforts of local community can bring a sustainable future.

Director-General, Forestry Bureau

Council of Agriculture, Taiwan

Lee, Tao sheng

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地質公園簡介

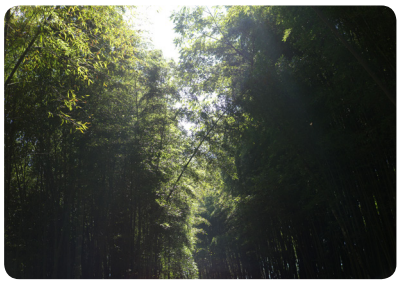
聯合國教科文組織（United Nations Educational, Scientific and Cultural Organization，UNESCO）在 1999 年的 11 月提出「促使各地具有特殊地質現象的景點共同形成全球性的網絡」這項計畫，並獲得聯合國大會會議（General Assembly, UN）的核准。這項計畫從世界各地整合一些國家性或國際性的地景保育（Landscape conservation）景點之成果，例如”Geotope”、”Geosites”，或一般所稱的地質遺產（geological heritage），這些地景為具有代表性、特殊性、不可取代性等特質，以維護它們為基礎的價值，而進行具有積極社會性目標的地球環境保育的整合，以地質公園 (geopark) 之名提倡之。各國與各領域學者對於 geopark 一詞的理解方式各有不同，一些學者以 geology （地質） 理解之，或以 geography （地理） 理解之，或以 gaia（大地之母）理解之，各有其焦點權重之別，但均含有地質公園四個核心價值。

聯合國教科文組織推動地質公園的目的，是為了達到環境保護與促進小區域的社會經濟，整合自然環境與人文社會環境使其能永續發展。藉由提升大眾對地球遺產價值的認知，增進我們對地球與環境承載力的認識。使我們能更明智地使用地球資源，進而達到人與環境之間的平衡關係。

INTRODUCTION TO GEOPARK

United Nations Educational, Scientific and Cultural Organization (UNESCO), authorized by the General Assembly of the United Nations, proposed a project "to form a global network to conserve sites of specially or uniquely geological and geographical value" in November, 1999. This project integrates the result of many national or international landscape conservation, such as "Geotope," "Geosites," and some so-called geological heritages. These sites are representative, unique, irreplaceable, and irreversible in character. They form a baseline for landscape conservation with a particular social value, where community participation and local sustainability are of concern. It is framed as geopark in the global community. Experts from different fields around the world hold different understandings of the term "Geopark." Some refer to geo- as geology, others as geography and still others consider it Gaia, all of which are included in the four core values of geoparks.

According to UNESCO, the main purpose of Geoparks is to reach environmental conservation, to enhance regional social economic development, as well as to integrate the natural and social environment in order to attain sustainability. By raising public awareness of the value of the Earth heritage and the knowledge of environmental carrying capacity, we get to make wiser use of natural resources and strike a balance between humankind and the environment.

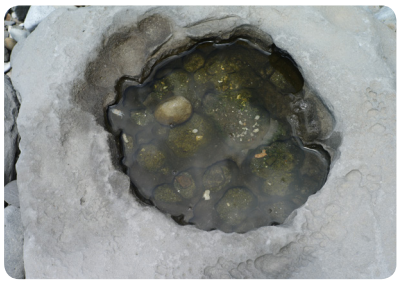


設立地質公園的目的，除了希望達到保育特殊地質、地形景觀外，同時也希望能藉由地景保育，讓環境教育紮根，也使地質或生態遊憩休閒行為更具環境敏感度考量，利用地方社區的共同參與環境與地景保育而能創造地方感，並促進區域社會經濟的發展。基於這樣的概念，臺灣每一個區域、縣市或鄉鎮市，都可以試著找出具有獨特性、代表性、特殊性的地質、地形景點，配合國土綜合發展計畫、各縣市綜合發展計畫的規劃，發展代表地方的地質公園。

台灣目前推動中的地質公園共有六處，主要由農委會林務局保育組擔當核心，由學界擔任推手，透過研習、工作坊、與在地居民的討論會等，進行推廣地質公園與地質公園網絡的概念，期望在地方社群與社區產生地景保育的力量，進而改善地方社會經濟，促成永續的社會與環境發展。

By establishing geoparks, we not only hope to conserve the special landscape, and the geographical/geomorphological landscape, but also hope environmental education can be deeply rooted into our education system and make geo-tourism environmentally responsible. Through geo-tourism, local participation in landscape conservation will create a sense of place and will expedite local economic development. Based on this concept, every place can discover its own unique, representative and special geology and landscape sites. Combined with the National Comprehensive Development Plan and the County/City Comprehensive Developmental Plan, these geosites can be developed into geoparks or geo-clusters.

There are now in total six Geoparks in Taiwan, drawn up by the Conservation Division, Forestry Bureau, The Council of Agriculture, operated by local communities, and supported by the academic community. Through workshops, networking activities and discussions with local residents, we publicize the concept of geopark and geopark networking, hoping to sow seeds and create a force of landscape conservation within local communities so as to improve the social economy and to enhance local sustainability.



地質公園核心價值

地質公園並不等同於地質的公園、或公園的地質，而是以地質和地景為基礎所發展出來的區域所在的自然與文化環境和社會內涵的整體，其價值在於人群社會的永續環境發展。

地質公園設置的核心價值有四，包含：地景保育、環境教育、地景旅遊及社區參與。這四項核心價值也是臺灣推動地質公園工作最主要的指導方向、動力的來源，更是環境保育的未來願景。四個核心價值簡要說明如下：

地景保育：地質公園以地景保育為出發點，避免特殊、具有環境價值、科學價值的景點被有意識或無意識的遭到破壞，並利用這些獨特且具有教育與學術價值的景點，作為保障人類社會生存的基礎，進而做為環境教育之場域。

環境教育：地質公園以地景保育的教育宣導為手段，提供地球科學知識、人類社會與環境互動的因果關係等知識與概念，創造一般大眾正確理解、認識、珍惜環境的行為基礎。隨著我國環境教育法的實施，地質公園正可以是實踐環境教育的優良場所。

CORE VALUES OF GEOPARK

Instead of being a park of geology or geography, a geopark represents the integration of regional scientific and cultural environments and social connotation based on certain geological and geographic landscapes. Their value lies in the sustainability of human society and environment.

Four main core values of geoparks include landscape conservation, environmental education, geo-tourism and local participation, which are also the polestar and the motivation of establishing the Geoparks of Taiwan. Brief introductions of these four core values are as follows.

Landscape conservation

Geoparks aim to conserve landscapes not only by preventing landscapes with environment and scientific values from intentional or unintentional damage, but by making these educationally and academically valuable sites the cornerstone for the sustainability of human society.

Environmental education

Through environmental education and landscape conservation, geoparks are natural laboratories and provide a knowledge base for the earth sciences, and demonstrates the interaction between human society and the environment. This gives a chance for the public to understand and be acquainted with, and thereby cherish the environment. With the implementation of the national Environmental Education Act, geoparks have become excellent locations for environmental education.

地景旅遊：以特殊地質、地形景點為主軸，吸引造訪者，利用地質公園的特色，發展與地景為本的生態旅遊活動，並可對在地社群進行具有知識導向及環境守護的旅遊解說教育與訓練，提升在地守護環境的力量，形成非資源耗竭性的遊憩，增進遊憩活動的附加價值。

社區參與：地質、地形景點作為促進社區參與及地方產業發展的場域，需要在地居民的投入。透過在地社群的動員與相互學習，在地環境資源的調查、環境解說資料統整、在地環境教育與在地社群的組織化等，就可能具有在地的本真性。這些由在地居民的投入，增強地方的社群概念，是地質公園推動的重要動力，也是創造由下而上動機的紮根力量。

Geo-tourism

By attracting visitors to geosites, geo-clusters or even geoparks with their particular beauty, we are not only developing geo-tourism activities based on geology and landscapes, but also fulfilling the local economic needs and empowering the local community with local environmental knowledge and interpretation skills. Such knowledge-oriented capacity building enhances the local economy and provides for a better and sustainable future. Such initiatives encourage local participation in environmental protection, preservation and conservation activities, and create value-added sustainable tourism.

Local participation

To make geosites, geo-clusters, and geoparks valuable for the local economy, the participation of local residents is a "must". Through local community mobilization and learning from each other, the inventory of local natural/cultural resourses, the integration of materials for environmental interpretation, environmental education and even organizations can become authentically localized. The way residents devote themselves into activities can reinforce the sense of place and local community, and enhance the motivation for better landscape conservation and local sustainability. Such mechanism is important because it creates bottom-up momentum in the establishment of geoparks.

地景保育

地質公園的首要核心是地景保育。地質公園應該保護的重要地質特徵包括有代表性的岩石、礦產資源、化石、地形和文化景觀。

加強地景保育宣導，讓進入地質公園的遊客，能清楚瞭解地景的脆弱性及不可復原的特性，避免不當的開發及破壞地景特色，例如：在聚落擴張或發展時，避免不協調的景觀破壞與設計。

地質公園並非必然是一塊全新的保護區域或景觀的所在地，它可能存在既有的國家公園或國家風景區、森林遊樂區之中，但與實行全面保護管理的國家公園、或國家風景區有很大差異。負責任的地質公園管理與管理機構，要確保地質、地形與地理遺跡的保護與地方傳統，並且在不違背法律以及個人的權利與義務之下，由地質公園所在地的地方政府與民間組織，共同決定畫定地質遺跡或地質露頭的保護力度和措施，依據保育程度可分為核心區、緩衝區和永續發展區。

Landscape Conservation

The first core value of a geopark is landscape conservation. A geopark should protect crucially representative rocks, mineral resources, fossils, landform and cultural landscapes.

The promotion of landscape conservation activities are particularly important if we are to make visitors to geoparks aware of the irreversible nature of landscapes and avoid improper development. For example, the expansion of settlements or new developments should not be detrimental to local milieu and landscapes.

A geopark does not have to be specifically a whole new category of protected area. It can be located in an existing national park or national scenic area, but with a distinct difference from the exclusively protected areas. The administrations and authorities in charge of the geopark must ensure that the protection of the geology, geography, and landscape heritages are in accordance with local traditions and legislative obligations. Apart from these, they should also make sure that the local administrations and communities work together to decide on the level and measures of protection of certain sites or geological outcrops. A geopark can be divided into core zone, buffer zone, and sustainability zone by their conservation level.

環境教育

地質公園透過各種環境教育的機會和活動，向大眾傳播相關的環境知識和環境保護的理念，例如透過生活博物館、解說教育中心、地質教育旅遊、遊憩指南、通俗文學和藝文圖照等傳播媒體宣導等。透過自主的在地社區與各種組織和大學等研究教育機構的合作，進行在地的環境研究與傳播，提供當地居民與來訪者認識在地環境。

利用各種活動和機會，如學校學生和老師的戶外教學活動、學術研討會，及環境和文化保護活動，把當地景觀與環境介紹給居民、師生與遊客，是環境教育的機會窗口。

對當地自然與人文環境的了解，有助於保育劃定的地質公園，還可增強在地居民的地方意識和自我認同感，並有利於環境與地景保育。透過在地居民的服務協助，遊客對所旅行的地方環境有深入的瞭解，體會環境的重要性及價值，進而愛護及保育這個地方。

Environmental Education

Geoparks pass on to the public the concepts of environmental knowledge and environmental protection through a variety of educational opportunities and activities. Living museums, interpretive and educational centers, guided geo-tours, popular literature and maps, modern media publicity are some examples. Through conducting research on local environment and through education program conducted by independent community organizations and research institutes like colleges, residents and visitors get to acquaint themselves with the local environment of geoparks.

A variety of activities and opportunities, such as excursions for school groups, seminars, and environmental and cultural conservation activities, take place to introduce local landscape and environment to residents, teachers and students, and tourists. These means serve as a window for environmental education.

Understanding the natural and cultural environment is a good starting point for conserving geoparks. It will in turn reinforce the local consciousness, pride and identity, which is beneficial to environmental and landscape conservation. In addition, when tourists have deep understanding of the places they visit, they will appreciate the importance and the value of it, and therefore cherish and devote themselves into their conservation.

地景旅遊

以地質公園特殊地景點為主軸的地景旅遊活動，推動地質公園的觀念，整合地質環境與在地社會文化的底蘊內涵，能促成地景旅遊的景觀解說的深度，深入認識人與環境關係的多元面向，是完整推動地質公園的基礎。

地景旅遊以地質公園的地景、地質、地理環境的整體生態，做為旅遊、休憩、欣賞的對象。重要的價值在於顧及地景及環境保育，並且維護在地社區環境及居民的福利，讓未來世代能持續以該環境為理想的生活及觀光旅遊地點，是永續發展理念的落實，也是一種對地景、環境及人類社會負責任的旅遊方式。

地質或生態遊憩必須考慮到環境承載量、環境體驗、解說品質、動植物不受干擾、尊重在地傳統、人文資源保育及居民隱私等。在地的旅遊收益轉化成實際的力量，支持在地社區與居民的地景環境保育工作，是地景旅遊最具實質意義的做法。

Geo-tourism

Geo-tourism based on the special landscapes is particularly instrumental for promoting geoparks. A tourism interpretation for geoparks is particularly influential if integrated with the local socio-economic and cultural environments. Such integration enriches the depth of environmental knowledge and gives the tourist interpretation a local flavor. The multi-faceted relationship between human and the environment of geoparks can be much appreciated as well.

Geo-tourism depends on the holistic combination of landscape ecology, geology and geographic environments. Geo-tourism is at its best when it takes into account landscape conservation and the socio-economic and cultural aspects of local communities. Its significance lies in how we take both landscape conservation and the well-beings of the local residents and their future generations. Such implement of geo-tourism is not only responsible, but also sustainable for the local community and human society as a whole.

The detailed rules and regulations of eco- or geo-tourism have to consider the carrying capacity of the environment, the environmental experience of visitors and residents, the quality of interpretation for tourists, quality of living space for creatures, support of local environmental and cultural resource conservation, respect for local traditions and residents' privacy, and so on. It is truly meaningful to transform the profits of geo-tourism into a real strength to support local communities and the conservation work.

社區參與及永續經濟

地質公園的核心價值之一就是透過社區參與地質公園的活動，協助地方的產業發展與社區的永續社會生活。也就是，透過將社區特定的地質與地理環境演育而成的物質與精神生活內容，發展成在地環境教育的基礎，進一步發展成在地社區民眾參與生態旅遊解說服務以及保育在地環境的利器。鼓勵社區利用在地環境做為發展環境教育、在地創意產業發展具有在地特性的永續經濟的實質內涵。

透過地質公園提供在地環境教育認知，讓擁有地方社區參與的地質公園產生在地的力量，使地方社群成為促成地質公園環境使命的重要推手。經由社區公眾的在地且適性的經營管理地質公園，活絡社會文化與經濟，引領社區走上永續發展的可能，是地質公園推動的終極目標。

Local Participation and Sustainable Economy

One of the strategic objectives of geoparks is to mobilize local involvement in boosting the vitality of local society and economy. That objective gives care about sustainable social life through local participation in the geoparks. Through the endeavors of the local populace, along with the help of academia or professionals, the community will be able to develop certain interpretation materials and contents that integrate both physical and human aspects of the local milieu. Such materials and contents are good for promoting localized ways of life to share with knowledge-based tourists. With such mechanism, locals are able to share their traditional knowledge, handicraft and techniques, and benefit from geo-tourism economically. Doing so, the communities turn their environment into the foundation of environmental education and local creative industry in order to develop a localized sustainable economy.

Geoparks provide local environmental education and mobilize the local people to directly contribute to the area where geoparks are. With zealous local participation, geoparks generate a source of strength to make community integral and sustained. With local community's tailored management, geoparks can not only boost the local economy, but also enhance communal cultural and social life with environmental integrity.

全球地質公園網絡 (GGN)

全球地質公園網絡 (Global Geoparks Network, GGN) 的目的是透過網絡活動與經驗分享，協助成員一起推動地質公園。經由觀摩、研習、活動、會議等方式，提供全球地質公園的夥伴，經驗分享與成長的機會，並將地質公園的概念推廣到世界各地。例如，透過分享特定地質公園的生態旅遊，可以提供當地如何維護環境並創造在地就業機會；透過經驗學習，也可用來討論改善個別地質公園的問題。

透過定期的學習分享互動，全球地質公園網絡提供了地質公園的專家、專業人員和社區成員一個合作與交流的平台，使每個重要的地質、地形與環境等特色廣為人知，並與其它地質公園的人員產生知識和經驗的交流，共同成長。

全球地質公園網絡，結合地質遺產保護策略，創造地區經濟的永續發展，帶來當地居民發展更為永續生活的可能，例如：發展永續的地質生態旅遊，以及其他地質相關產品的經濟和文化活動。截自 2013 年 9 月止，共有 29 個國家的 100 個地質公園列為正式的全球地質公園，其它尚有許多具有觀察身分的地質公園，等待著成為正式全球地質公園的一員。

GLOBAL GEOPARKS NETWORK (GGN)

Through networking activities and experience sharing, the purpose of GGN is to help members promote the benefits and significance of geoparks. Workshops, study groups and conferences provide the geopark members with the opportunity to promote the concept of geoparks. For example, by sharing geo-tourism management in geoparks, better practices for environmental conservation can be achieved. With sharing like this, not only can we learn from experiences but we can share the ways to improve individual problems of various geoparks.

With regular global conferences and sharing and interaction, GGN provides a platform for geopark experts, professionals and community members, to make public the important geology, landscapes and environment of each geopark, to exchange experiences and knowledge among geoparks, and to better the local economy.

GGN makes possible the implementation of protection policies for geological heritage and creates a local geo-related economy that aims to provide sustainable livlihoods to local residents. The means include geo-tourism, geo-products and socio-cultural activities to make local communities even more sustainable. Until September 2013, there are 100 geoparks (of 29 countries) enlisted on the global geopark list. There are still uprising and aspiring geoparks waiting to become global geoparks.

亞太地質公園網絡 (APGN)

亞太地質公園網路 (Asia Pacific Geoparks Network, APGN)，是全球地質公園網絡的成員之一，主要由馬來西亞、澳大利亞、中國等倡導組成，2009 於馬來西亞蘭卡威的會議正式成立，2011 在越南河內舉行大會，2013 在韓國濟州島舉行大會，目前仍處於初始發展階段。亞太地質公園的成員國目前包括有日本、韓國、馬來西亞、越南、中國與印尼。

截至 2013 年 9 月為止，日本有 6 個全球地質公園，他們都是亞太地質公園網絡的成員。日本尚有許多國家級的地質公園，正積極參與國家地質公園的網絡，期待成為全球地質公園。日本地質公園的管理與網絡，基本上不由國家中央政府主導，而是區域型的地質、經濟與文化組織的地質公園委員會主導，委員會由在地居民與組織、專家與學者共同組成。

中國有 29 個世界地質公園，主要由中國國家建設部主導，每個國家地質公園通常具多種旅遊名牌與等級，以此吸引遊客。

Asia Pacific Geoparks Network (APGN)

The Asia Pacific Geoparks Network is currently a member of Global Geoparks Network. It was first proposed by Malaysia, Australia and China, and was formally set up at the Langkawi Geopark Conference in 2009. A second convention took place in Hanoi, Vietnam in 2011, followed up by another one in Jeju Island, Korea in September 2013. The APGN is still in its inaugural stage. The members of APGN include Japan, Korea, Malaysia, Vietnam, China, and Indonesia.

Up to September 2013, Japan has 6 global geoparks. They are all parts of APGN. There are more so-called aspiring Japanese national geoparks waiting to be enlisted in the global list. The committee of Japanese Geopark Network (JGN), without direct financial support from the central government of Japan, is composed of local communities, professionals and academia, who consider geoparks a tool for revitalizing local culture, economy and environment at large.

There are 29 global geoparks in China. They are part of APGN as well. They are mainly established and supported by related bureaus of national construction and provincial governments.

臺灣的地質公園網絡 (TGN)

2004 年臺灣便有地質公園的提議，當時台灣大學地理學系王鑫教授帶領學術團隊參加中國北京舉辦的第一屆世界地質公園會議。2005 年在澎湖縣政府支持下，台灣大學地理環境資源學系辦理澎湖推動世界遺產與地質公園的會議，與會代表肯定澎湖的地景值得作為海洋地質公園，更倡議成立臺灣地質公園網絡。澎湖縣政府也成為全國第一個擁有地質公園推動委員會的機關。

臺灣地質公園網絡的落實，始於 2011 年的全國地景保育研討會大會，在當時的林務局李桃生副局長（現任局長）、觀光局謝謂君副局長（現任局長）的見證下成立。該會議中，總共推動六個地質公園，含澎湖海洋地質公園、北部海岸地質公園（含野柳、鼻頭角－龍洞地質公園等）、草嶺地質公園、燕巢泥岩惡地地質公園、利吉泥岩惡地地質公園和馬祖地質公園。同時宣讀認可推動地質公園的「台北宣言」。

六個地質公園各擁有特殊價值，具有科學和環境的價值，更與在地生活與生計有重要關聯。澎湖海洋地質公園以玄武岩地景與海洋生態著名、草嶺地質公園以山崩的災害地景為主、燕巢泥岩惡地地質公園因其泥火山與惡地地景受重視、利吉惡地地質公園以泥岩惡地地景為特色、北部海岸地質公園則以侵蝕海岸與奇岩地景為傲，馬祖地質公園的花岡岩和人文地景則為海上生態園地。這些地景不但具稀有性、特殊性，更具環境研究和科學教育的重要性，所在地的生態人文資源提供理解當地文化生態的基礎，創造具人文與自然環境互為表裡的地質公園。

此六個最初的台灣地質公園所在的社區、社群之間的互相學習與交流，將使環境管理經營漸臻於完善，形成健康而動態的台灣地質公園網絡。

TAIWAN GEOPARK NETWORK (TGN)

Proposal for establishing geoparks first came into Taiwan in 2004 when Professor Sing Wang of the Department of Geography, National Taiwan University, led an academic team to the first Conference on Global Geoparks in Beijing. In 2005, under the support of Penghu county government, the Geography Department of NTU held a World Heritage and Geopark Conference. Scholars and representatives from around the world and within the country all agreed upon the fact that the landscapes of Penghu are worthy of being made into a geopark, and advocated the establishment of the Taiwan Geopark Network (TGN). A county commission for geopark was formed in Penghu County in 2005 as well.

The realization of the Taiwan Geopark Network was made possible at the National Landscape Conservation Conference in 2011, witnessed and supported by Mr. Lee Tao-sheng, then deputy director of Forestry Bureau and Mr. Hsieh Wei-chun, then deputy director of Tourism Bureau. Six geoparks were identified in the conference , including Penghu Marine Geopark, North Coast Geopark, Tsaoling Geopark, Yenchao Geopark, Lichi Badland Geopark, and Matsu Geopark. The 2011 Taipei Declaration was signed into effect for the promotion of geoparks.

These six geoparks, with their own unique values and characteristics, were assessed and preparations were made for national geopark status. Each has distinguishing features with scientific and environmental values. Furthermore, the landscape within each geopark all has close connections with local life and livelihood. Penghu Marine Geopark featured basaltic landscape and marine ecology. Tsaoling Geopark featured landslides and structural landscapes. Yenchao Geopark is characterised by mud volcanoes and badlands. Lichi Badland Geopark featured mudstone badlands. North Coast Geopark featured erosion coastlines and rocky landscapes. Matsu Geopark is famous for its granite and cold war heritage and cultural landscapes. All of these landscapes are rare, unique and important for environmental education and research and are fundamental assets for local culture and eco-systems.

Communities in Taiwan's first six national geoparks will benefit from learning from each other via networking activities. Knowledge for geopark structural schemes and site management strategies are shared and should lead to a prolific and sound Taiwan Geoparks Network.

澎湖海洋地質公園

澎湖群島的澎湖海洋地質公園以顯著的玄武岩火山地形與特殊的海洋生態聞名，到處可見發達的火山地形，例如：柱狀玄武岩柱、熔岩平台等地景，以及豐富的海洋生態與長久地理與歷史孕育出的當地獨特人文活動與文化地景。這些條件使澎湖海洋地質公園具有相當特殊的價值與意義。

澎湖群島座落於臺灣西側的台灣海峽中，地質主要為基性的玄武岩質岩漿自地底噴出，逐漸冷卻而形成。因為玄武岩質岩漿物理特性的較不黏稠與高流動性的特點，澎湖群島的地形以平台為主，不若其他火山島具有高聳的火山丘山體。在許多澎湖島嶼可以發現大量玄武岩柱狀節理排列而成的斷崖，相當具有特色，吸引遊客目光。如此特殊的地質構造、海洋環境生態條件，以及 4 百年海洋歷史孕育的人為活動等的條件結合，凸顯出澎湖海洋地質公園的獨特性與重要性。

就地質地形的特色而言，澎湖群島具有臺灣較古老的火山地質景觀。反映中生代晚期以來，印度板塊和歐亞大陸板塊碰撞，所導致的擴張作用的大地構造活動歷史和板塊張裂，引起的區域火山活動歷史。張裂運動使岩漿大量溢出於澎湖海域。玄武岩熔岩流冷卻後，形成規則性高的柱狀節理，或因熔岩流營力作用的影響，而呈現彎曲傾斜的多樣性柱狀節理。這些柱狀玄武岩長年受風化和侵蝕的作用，呈現澎湖玄武岩地景的多樣性。

Penghu Marine Geopark

Penghu Marine Geopark is famous for its basaltic landscape and significant marine ecology. Magnificent volcanic landforms are found everywhere, such as hexagonal or pentagonal basaltic rock pillars and lava platforms. Unique cultural landscapes and economic activities nurtured by Penghu's particular geology, geomorphology, abundant marine ecology and historical geography, are characteristic and charming. These are the entire geological and geographical milieu that gives Penghu Marine Geopark special value and socio-economic meaning.

Penghu Islands are located in the Taiwan Strait and are made of basic basaltic rocks, as a result of gradually cooled down magma that erupted from the ground. The physical characteristics of basic basaltic magma are less viscous and with high mobility, making them different from other volcanic islands with towering hills or mounds; Penghu Islands are mainly platform-based. In addition, large numbers of columnar jointed basalt cliffs surround the border of Penghu islands in distinctive ways, attracting many visitors. With the combination of special geological features, marine ecology, and human activities nurtured by maritime history, the uniqueness and importance of Penghu Marine Geopark are beyond words.

Penghu islands have the oldest volcanic geology of Taiwan as a result of the collision between the Indian plate and Eurasian continental plate, and the subduction of the Pacific plate after the late Mesozoic. The effect of the collision was sea-floor spreading and plate divergent. It was mainly due to these divergent activities that large amount of lava flow oozed out into the Penghu archipelago area.The cooling of the basaltic lava flow formed highly regular columnar joints. These now display various slopes and shapes as a result of tectonic activity. Together with weathering and erosion, these basaltic columns exhibit diversity in forms.

澎湖海洋地質公園景點

澎湖縣政府推動澎湖海洋地質公園時，曾經規劃六個地質公園景點，隨後在觀光局的規劃中，還加上員貝、東嶼坪嶼、西嶼坪嶼以及花嶼等地，共計 10 處地質景點。

潮間帶的潮差是重要經濟活動利用的自然條件之一，例如在吉貝嶼四週的海岸潮間帶，可以見到居民利用珊瑚礁石和玄武岩所構築的石滬。這種利用潮差捕魚的環境智慧，充分顯示居民生活與海洋潮流與生物的關係是何等的緊密！

湖西鄉北寮村的奎壁山是另一種典型的例子。當潮水退去時，連接赤嶼小丘與本島的岩脈形成一片淺灘，成就了當地居民採集海洋資源的重要場域，也是遊客體驗海洋潮差與探索海中生物環境的場所之一。

西嶼鄉的小門嶼有著豐富且多變的海崖、海蝕洞等海岸侵蝕地形，以及大量貝殼遺骸所堆積、膠結而成的殼灰岩地形。小門嶼的鯨魚洞是形貌相當特別的海拱，由其岩石外貌可以觀察到不同時期火山噴發出的熔岩疊在一起，中間更夾有兩次噴發之間的風化的古土壤層。

Geosites of Penghu Marine Geopark

The Penghu government set up six geosites to form Penghu Marine Geopark. The Tourism Bureau of Taiwan then added four more geosites, including Yuanbei, Dongyuping, Siyuping and Flora islet, to form a geopark consisting of ten sites.

Shallow tidal flats surrounding the Penghu archipelago made the building of stone fishing weirs thriving and prosperous. For instance, the densely distributed stone weirs along the coast of Jibeiyu demonstrate how significant the economy of the islet depended on these structures in historic times. The stone weirs, made of coral, basalt stones and rocks show the traditional wisdom of capitalizing on the shadow tidal flats to harvest fish from the sea. This tidal fishing technique shows a close relationship between the people's daily and the marine life, and reveals the close social inter-relationships among village people.

Kuei-bi-shan in North Village, Husi, Penghu is another classic example. When the tide is low, the area between Chi-yu and main islet reveals a narrow strip of intrusion dyke which local people use as a tidal flat to collect marine resources for family use. It is also a place for tourists to experience the tidal differences and observe marine creatures.

Hsiao-men-yu is best known for its eroded coast and cliff, and biostromal limestone or Coquina. The Whale Cave is one unique sea arch, where we can observe volcanic lava stacked in different periods and in the middle are palaeo-soil layers between two eruptions.

澎湖海洋地質公園的社區參與

澎湖群島的自然環境相當適合燕鷗棲息與覓食，是長久以來賞鳥活動的亮點。自然學友會、野鳥協會、共生藻等自然保育協會或組織，扮演重要的權益關係人，對於島嶼環境的維護與保育不遺餘力。在地居民與社區因為依賴海洋環境獲取漁貝蝦與海中紫菜等植物做為經濟來源，社區或居民對於海洋環境的變化與優劣，有極為密切關係的關照。所以社區、民間社團以及 NGO 的組織，都是協助推動地質公園的重要推手。

小門、南 / 北寮、七美、望安、吉貝及二崁等社區皆因地處重要珍貴地質景點所在，而進一步理解地質公園推動的在地環境意義，正在逐漸形塑在地地景保育及環境永續社區的能量。

Community participation in Penghu Marine geopark

Various local groups and associations are zealously involved in local affairs, such as the Nature Study Club, Wild Bird Federation, Zooxanthellae Association. These groups were formed to appreciate and to protect the local unique milieu. For instance, the environment of Penghu has been an ideal habitat for migrant birds. Migrant birds such as terns come here annually for seasonal nesting and foraging and make bird watching activities highly cherished. As stakeholders, these groups are serious about nature conservation and environmental protection of the islets.

Local communities and residents show great concerns about the marine environment, because they depend on the oceanic environment for fishes and sea weeds. As a result, various communities surrounding geosites, civil societies and NGOs are all major driving forces of the Penghu Marine Geopark.

澎湖海洋地質公園的文化景觀與經濟

澎湖早期是以漁業為主要的基礎經濟，除了沿岸、近海或遠洋漁業之外，許多漁民家庭都以潮間帶的石滬漁撈工作為家計的一部分，所以石滬的建造技術與社會關係，相當受到漁業社會的重視。石滬不但是體現就地取材的傳統技藝與智慧，也曾是家戶經濟的要件，更是觀光遊憩的美學。

澎湖的許多傳統工法，例如七美的雙心石滬，二崁的公婆石滬，吉貝的石滬等，即是利用當地的岩石與珊瑚礁石等所砌建而成，是結合地形特色與當地人類活動建構出來的特殊景觀，不但具有在地技術與美學，更是結合在地環境特色的，例如望安的花宅聚落。聚落中以象徵性避邪、防風的傳統鎮風塔或石敢當，也多為就地取材的技藝美學作品，不但突顯出傳統技術與信仰，也成為今日地景生態遊憩的資產。菜宅是澎湖田園大地風光的驚嘆號，本意為了保護農作物不受盛強的東北季風或北風直接侵襲而構築的低矮圍籬，如今因其傳統工法和技藝以咕咾石及玄武岩等石材的巧妙利用，而成為文化遺產。歷史上，澎湖的文石是特有的產物，如今因為保育之需，已經禁止開採。

Landscape Economy of Penghu Marine Geopark

In early times, fishing is the main base economy in Penghu. Besides coastal, inshore and offshore fishing, many families are involved in intertidal stone weir fishing. That is why the building skills of stone weirs are of great value. The famous Double-Heart Stone Weir in Chimei, Couple stone weir of Erkan and the various fishing weirs of Jibei are good examples to show great traditional wisdom of local people in making good use of materials at hand.

Another example of traditional wisdom as a modern tourist attraction is the local bulidings. Typical Penghu houses were built with local basaltic rocks and coral stones. Houses like these are a combination of topographical features and human activities, not only requiring local techniques and aesthetics but becoming a feature worth exploring in geo-tourism. The foral settlement in Wangan is one typical example. Wind breakers are needed for many activities in Penghu. Particularly important is the wind breakers for vegetables and for settlements. Wind breakers for vegetables and plants are often built to defence against strong winter winds.

北部海岸地質公園

北部海岸地質公園位於臺灣島的北方，諸多景點環繞，如同珠寶般點綴臺灣北部的海岸線，因此又稱「皇冠海岸」。造訪皇冠海岸，可以看到北海岸多樣的自然與人文景觀，諸如白沙灣的沙灘、石門的海拱、金山的燭台石等。北部海岸主要由北海岸及觀音山國家風景區管理處與東北角暨宜蘭海岸國家風景管理處所管轄，主要景點包括觀音山、麟山鼻、石門、野柳、金瓜石、鼻頭角－龍洞、三貂角與龜山島等多個景點。在本區域內有許多特別的自然與人文景觀，從高山、火山、海洋到文化、產業等人為活動，都是區域內具有價值的景觀。

北部海岸地質公園區域內有許多體現特殊自然環境作用的海岸地形與奇岩怪石等地景，加上本區域的觀光遊憩與產業發展等活動已因接近都會人口密集區而有長久的發展歷史，每到假日或週末就人潮不絕。

North Coast Geopark

Being located in northern Taiwan, the North Coast Geopark has many attractions, reminding people of a crown decorated with jewels. That is why it is called "the Crown Coast". Paying a visit to the Crown Coast, you will see a variety of natural and cultural landscapes, such as Bai Sha Wan beach, Shimen sea arch, and Jinshan Candlestick stone. The northern coast is governed by North Coast National Scenic Area Administration and Northeast and Yilan Coast National Scenic Area Administration. Main geosites include Guanyinshan, Linshanbi, Shimen, Yehliu, Jinguashih, Bitou Cape – Long Dong, Sandiao Cape, and Guishan Island.

The North Coast Geopark has splendid landscapes and grotesque-shaped rocks that reflect differential weathering and erosion. With the increase in tourism and its close proximity to densely populated Taipei metropolitan area, endless streams of tourists flood in during public holidays and at weekends.

觀音山為大屯火山區的一部份，形態上屬於不規則狀火山。在觀音山系當中，大大小小共有約 18 個不同的噴火口，在現有的地形中可看見古熔岩流、古火山角礫岩以及古火山灰沉積等不同物理特性所發育出的地形。由觀音山頂，可以眺望欣賞到臺灣的五大地形：高山、丘陵、盆地、台地、平原，加上連成一氣的火山和海岸地形，令人不禁讚嘆寶島台灣地形的多樣性，觀音山更是值得造訪的絕佳景觀點。

野柳地質公園，是臺灣北海岸地區第一座以聯合國教科文組織推動地質公園的精神，作為轉型與經營管理目標之公園，2007 年由觀光局規劃整合入北部海岸地質公園中。野柳海岸地形多樣，主要地形是向東南傾斜的單面山以及明顯的差異侵蝕地貌、海崖及海蝕平台。造訪者可近距離觀察大寮層的砂岩，以及經風化作用所形成的各種岩石地景，為環境教育絕佳的戶外教學場所，亦為北部海岸旅遊線上最具有潛力之遊憩景點。

野柳為一向海洋延伸約 2.0 公里長的岬角，在野柳岬內隨處可見微地形，如薑石、豆腐岩、蕈狀岩、海拱、燭台石等，都是風化和侵蝕作用形成的奇石，還有化石與生痕化石等，屢屢成為遊客注目的焦點。它們所代表的科學與環境意義，值得環境教育的推廣。

Guanyin Mountain is part of Datun volcano and is categorized as an irregular volcano in shape. There are in total 18 connected volcanoes in the Guanyin Mountain. In the existing topography we can observe terrains developed by different physical processes, such as ancient lava flows, volcanic breccia and ancient volcanic ash deposition. On the hilltop of Guanyin Mountain, we can overlook major landscape types of Taiwan, including alpine, hill, basin, tableland, fluvial plain, mountain, and coastal landscape. One cannot help but be amazed at the compactness, intensity and diversity of the landscapes of Taiwan.

Yehliu Geopark is the first site in the Northern Coast transformed and run according to the UNESCO values of geopark. In 2007, it was merged into the North Coast Geopark by the Tourism Bureau. As a retreating eroded coast, Yehliu Geopark has diverse coastal landscapes. Its major landscape is cuesta, sea cliffs and abrasion platforms. Visitors can observe sandstone of Talio formation and various weathering landscapes. It is the best environmental education site for eroded coasts and the most visited tourist spot along the north coast.

Yehliu is a headland stretching about 2 kilometers into the sea. In Yehliu Geopark, we can observe many micro-landscapes. Ginger rocks, chessboard rocks, mushroom rocks, sea arches/ notches and candlestick-shaped stone are just some examples of weathered grotesque rocks under spotlight. Fossils and trace fossils are commonly found in the park as well. They are particularly interesting to school kids. The scientific and environmental significance that these landforms represent should be promoted with good practice of environmental education.

北部海岸地質公園景點

北部海岸地質公園有許多特殊景點。例如，龍洞鼻頭角地區，為一向東北海域延伸之海崖，而其南方的龍洞岬則因其岩石組成為相對堅硬的龍洞砂岩突出海岸，形成岬角。不同地形作用在此地個別形塑出差異的地形風貌；不同的交錯層理、差異侵蝕，創造了地景獨特性與多樣性。

龜山島是臺灣較年輕的火山島嶼，位在宜蘭海岸外的島嶼，其組成主要以安山岩、火山碎屑岩為主，因狀如海中之巨龜，故得名。此地區目前仍有殘留火山活動，硫磺與溫泉，成為宜蘭與龜山島相當重要的環境教育景觀與資源。

自三貂角起至大里為止的海岸，有一系列發達的海蝕平台，其中微構造影響形成的線形排列，具有相當高的美學價值，為一相當特殊的自然地景。

Geosites of North Coast Geopark

Sites of North Coast Geopark manifest themselves into various special attractions. For example, the area around Bitou Cape and Long Dong is a sea cliff sticking out to the north-east. The Long Dong Cape sticks out into the sea and forms a headland because it is composed of hard sandstone. Various marine processes create different landscapes. Cross-bedding and differential erosion create the uniqueness and diversity of landscapes.

Situated off shore of Yilan coast, Turtle Island, its name originated from its shape of a turtle in the sea, is a relatively young volcanic island of Taiwan. It is composed mainly of andesite and volcanic clastic rocks. Today there is evidence of volcanic activity on the island, and the sulfur emissions and hot springs are important for environmental education.

The coastline from Sandiago Cape to Dahli is lined with well developed abrasion platforms, whose linear arrangement was affected by micro-tectonic activity. Such special linear natural landscape has great aesthetic value.

北部海岸地質公園的景觀與經濟

由於北部海岸獨特的岬灣地形，灣澳常成為當地闢建漁港的地方。漁業是當地重要的經濟來源，來到北部海岸地質公園一定要品嚐當地的海鮮。另外在福隆的沙雕季，野柳在元宵節的神明淨港文化及宜蘭的龜山島賞鯨豚等，都是造訪北部海岸地質公園，可以結合地景與生態文化的不同體驗。

北海岸由於地形因素，隆起的高山、岩岸及狹小沖積平原錯置散落，人口分散，地方各具產業特色。北海岸依山傍海，坡地農業與漁業並盛，近年來觀光業也成為重點發展。坡地農業過去多種植水稻、甘藷、茶等，但受制氣溫與東北季風帶來的降雨，稻米、茶產量與品質不佳，因此改種植茭白筍或山藥，現已成為主要農產品，也有部分轉種花卉，收入頗豐。

石門有高經濟價值的海產，龍蝦與鮸魚是外銷日本的高經濟作物。一般尚有蟹、石斑、鯛魚、鱙仔魚和魩魚等，更是市場上的寵兒。北海岸地區近年來也在農會輔導下，推動觀光農園、咖啡座，並利用其特殊的海岸地景、傳統漁業文化，作為營造環境氛圍的基礎，發展觀光遊憩產業。

Landscape Economy of North Coast Geopark

Because of the special headland and cape landscape, bays are usually where the fishing ports are constructed. The fishing industry is an important economy and local seafood is a must when you visit the North Coast Geopark. Fulong International Sand Sculpture Festival, Religious Purification Festival of Yehliu and Whale-watching around Turtle Island are experiences that combine geological, ecological and human cultures in the North Coast Geopark.

Narrow alluvial plains scatter among hills and rocky shores. Settlements are separated in such a way that each has its own unique characteristics and economic activities. Surrounded by water and hills, the north shore settlements often have thriving terraced agriculture and fishing industries, which lately has evolved into a tourism industry. In the past, rice, sweet potatoes and tea leaves were major crops from the terraced agriculture. But as high summer temperature and seasonal monsoon rains are common, rice and tea leaves are often of poor quality. Water bamboo and Chinese yam have replaced them to be the main crops, and part of the land is now planted with flowers that produce a better income for some communities.

Shimen produces seafood of high economic value. Lobsters and brown croakers are expensive cash crops exported to Japan. Crab, grouper, snapper, and some other tiny bycatch are popular in the market. In recent years, under the auspices of the Council of Agriculture, the north coast area has developed some tourist agriculture and countryside cafes. These have in fact drawn the metropolitan population into the countryside as a leisure activity. The unique coastal landscapes, traditional fishing and newly developed activities have brought new life and economic opportunities for the locals.

北海岸地質公園範圍廣大，包含宜蘭縣與新北市，其中主要的社區有三芝、金山、萬里、及石門。金山舊名「金包里」，因大屯特產硫磺礦，又有採硫之地之稱，目前有推動社區營造及生態保育的相關活動，深耕地方。

石門依山傍水，因腹地不大，氣候不佳，發展空間受限，但老梅著名的牽罟活動已從過去的經濟活動轉變為觀光產業，說明地方與海洋的關係密切。近年來的石門風箏節對觀光發展與高經濟價值的漁業共同成基礎經濟。

萬里區背山靠海，漁農並重，因區內的野柳地質公園而聲名大噪，觀光業蓬勃發展，萬里蟹更是近年來的重要經濟漁獲。野柳地質公園以其小小範圍內擁有多樣的地形景觀，又因部分蕈狀岩形似女王或公主，而吸引許多國內外旅客，也因此野柳社區對於特定地景帶來的經濟利益有高度的依賴，並主張以科技奈米保護女王頭等特定微地形，而開創台灣的地質公園「保護」和「保育」觀念的對話，是公民社會探索人與環境關係的一個練習題。

North Coast Geopark has a large spatial extent, of which Jing Shan, Wanhli and Shimen are the major communities. Jing Shan used to be called "Jing Bao Li" and because it was rich in sulfur, it was nicknamed "the Land of Sulfur." The majority of the population settles mainly on the plain, and some are scattered between the plains and the hills creating a fascinating settlement landscape. Good practices of landscape and ecological conservation continue to help the local community to lead a sustainable and ecological lifestyle.

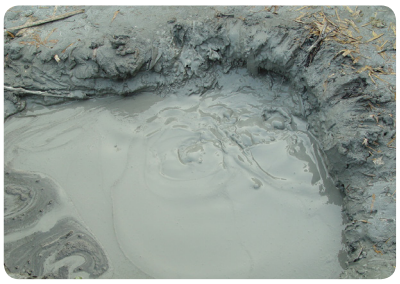
Shimen is located in the narrow strip between the sea and the hills. Limited by the extremely small hinterland and undesirable climate, economic activity is restricted. Luckily, some communities have become affluent through high value-added fishing. In addition, one famous activity is an ancient communal net fishing (Kan-gu, in Taiwanese language) that has transformed from a traditional fishing into a tourist attraction. These activities demonstrate a strong connection between the local economy and the ocean environment. Tourism activities have also been boosted by the Kite Festival in recent years.

Wanli, where the Yehliu geopark is located, has both terraced agriculture and fishery as the base economy. Yehliu Geopark is a significant tourist location and attracts more than 2,500,000 tourists per year. The annual Purification Festival during the Lantern Festival period attracts crowds of tourists, allowing people not only to enjoy the unique landscape of Yehliu, but also to experience the vibes of traditional festival and culture. The issue of "protection vs. conservation" for certain Yehliu landforms is under spotlight and manifests the society's understanding of the relationship of mankind and the environment.

燕巢泥岩惡地地質公園

燕巢泥岩惡地地質公園位於高雄市燕巢區，泥岩惡地與泥火山地形是本區域的特色，如烏山頂泥火山、滾水坪泥火山以及新養女湖等為區內著名的特殊景點。烏山頂泥火山已於 1992 年 3 月 12 日依照文化資產保存法，公告為自然保留區。

泥火山為一類似火山構造之假火山，所代表地質條件為地底下受壓的天然氣伴隨著泥、水等物質，沿著岩層間的裂縫自地底溢出，堆積形成許多錐狀的小地形。由於在此區域地表的組成物質為泥岩，因此當天然氣逸出並與泥質物質及水混和的結果，再以泥漿的形式噴出地表，形成泥岩與泥火山並存的地景。由於接近都會區及高度交通的易達性，使得本地的地景遊憩以及環境教育成為燕巢泥岩惡地地質公園之發展主軸。



Yenchao Geopark

Yenchao Geopark, distinguished for its mudstone and badland, is situated in Kaohsiung City. Major scenic spots include Wushanding mud volcano, Kuansuiping mud volcano and Shinyannui mud pond. In accordance with the Cultural Heritage Preservation Act, Wushanding mud volcano was designated as a Natural Reserve Area as of March 12th, 2003.

The Mudstone area is home to mud volcanoes and mud domes. Mud volcanoes are pseudo-volcanoes where underground natural gas, liquid, and mud are pressured and erupt along earth fractures to form micro-landforms. Mudstones are made of silt- and clay-sized particles that are too small to see; they dry up to form small pictorial patterns and pile up to form cone-shaped "volcanoes", both attractive to visitors. The co-existence of mudstone and mud volcanoes makes environmental education for school kid's fun. With close proximity to the metropolitan area of Kaohsiung, Yenchao Geopark is famous for its bad land with good people and wonderful fruits.

燕巢泥岩惡地地質公園景點

烏山頂泥火山為一典型之錐狀泥火山，區域內共有數個頻繁噴發的噴發口，最大的噴發口目前為全臺灣可見最高的泥火山。使烏山頂泥火山無論是在地質學或是地形學的研究中皆具有其特殊性。這樣的特殊性不僅是科學上的，更具有教育上以及美學上的價值。

燕巢地質公園周遭的養女湖、中寮山、雞冠山等知名景點，吸引了許多自行車愛好者們目光，成了單車運動趨之若鶩的朝聖地，也是最環保的新運動。

惡地溝谷密布，缺乏平坦可耕地，居民常在谷底堆起低矮的土堤，一方面蓄水成池，提供農業用水，另一方面等池塘淤滿之後就形成可耕種的平坦地。惡地池塘成為充滿自然與文化意涵的地景，顯示人們適應惡地環境所形成的生活方式。

Geosites of Yenchao Geopark

Wushanding mud volcano is a typical conical mud volcano. In the area are a number of frequently erupting vents, and the biggest one is currently the highest mud volcano visible in Taiwan, which gives Wushanding mud volcano, in geology and geomorphology studies its own uniqueness. Such uniqueness is not only scientific, but also educational and aesthetic.

Yangnui Lake, Jhongliao Hill, Jiguanshan and other famous attractions in Yenchao Geopark, appeal to many cycling enthusiasts. They have become a Mecca for cyclists, as cycling has become an eco-friendly and fashionable sport.

Each year between October and April, due to the shortage of rainfall, the badland areas are full of gullies and little farming takes place. Local residents build low dikes and reservoirs to keep water for irrigation. Badland reservoirs and ponds are landscapes full of natural and cultural meanings, showing how people adapt to the badland environment.

燕巢泥岩惡地地質公園景觀與經濟

燕巢主要產業為農業及觀光業，以農業而言，該地屬泥火山泥岩層之青灰岩土質，內含鈉（硫酸鹽）與氧化鎂的元素，適合番石榴、棗仔及西施柚，果肉脆度高。燕巢芭樂種植面積約達 1600 公頃，一年四季都可收成；棗子為燕巢全鄉的冬季特產，果粒大、皮脆、汁甜；西施柚、芭樂及蜜棗合稱燕巢三寶。西施柚因汁多、甜度高，所以又稱為蜜柚。金山社區推廣的燕巢金山棗樂趣活動便是主打燕巢三寶。

以觀光業和環境教育而言，燕巢有烏山頂泥火山、滾水坪泥火山以及新養女湖等特殊地景，且交通易達性高，具有觀光業與環境教育的發展潛力。遊憩、觀光、休閒和環境教育的結合，是燕巢泥岩惡地地質公園發展的重要面向及動力，因為不但滿足區域人口的休憩需求，在地社區的環境認識及監測、導覽解說的發展等，均動員並結合地方的人力資源與文化，可說是典型地景經濟的特色。

Landscape economy of Yenchao Geopark

Agriculture and Tourism are two main economies of Yenchao. Agriculturally, this badland consists of soils from mud volcanoes of slight gray quality, containing sodium (sulfates) and magnesium oxide suitable for guavas, jujubes and grapefruits. Guava trees take up 1,600 hectares and can be harvested year round. Jujubes are a specialty of Yanchao in winter. Grapefruits, guavas, and sweet jujubes are three treasures of Yanchao. Jujube Fun activity of Jinshan community is targeted at promoting these three fruits.

As for tourism and environmental education, Yenchao has Wushanding mud volcano, Kuansuiping, and new Yangnui Lake. The convenient accessibility to the area enhances its potential for tourism and environmental education. Landscape and environmental interpretation is a thriving activity as a local cultural association has taken lead in educating local community members to become capable interpreters. The combined development of tourism and environmental education is a proof of landscape economy, where the local interpreters are able to develop excellent interpreting materials and moniter the area's changing landscape as well.

燕巢泥岩惡地地質公園的社區參與

燕巢地質公園社區的參與及交流是推動地質公園的重要環節，在燕巢泥岩惡地地質公園中以高雄援剿人文協會、金山里與金山里社區發展協會常與各地質公園進行交流，學習如何將社區產業與文化和地質公園結合，促進地方發展。芭樂與棗子是當地重要的經濟作物與象徵，金山社區發展協會以「金山棗樂趣」做為社區營造的核心概念，呈現農村的富饒活力。

金山社區，2009 年曾獲農村再生培根計畫金種子獎，2011 年更推動燕巢金山棗樂趣產業文化活動，推廣社區古蹟、文化與產業，2012 年也協助舉辦烏山頂泥火山繪畫創作暨地景保育展。金山是一個有濃厚情感及向心力的社區，不僅有獨特的「阿嬤炊粿隊」，傳承古早味；還有風味特殊的農產品，發展惡地生態，活化地方觀光產業，這些都是社區的軟實力。

援剿人文協會推動燕巢鄉社區營造之地方文史建立，再創新燕巢鄉獨特的環境背景，特質與文化，找尋社區之美，並以田園教學和環境教育向下紮根。經常以當地的特有文化來舉辦相關的活動，促進當地民眾認識在地文化。

燕巢所在地共有五個大學，社區如何在具有社區自主的基礎中，尋求與在地的大學攜手合作，在當地的環境基礎上共創具有學習服務特質的社區，是值得期待的未來。

Community Participation in Yenchao Geopark

Local participation and community networking are important for Geoparks. In Yenchao Geopark, Yuanjiao Humanist Association, Jingshan Li and Jingshanli Community association are vital institutions active in promoting local beauties and networking with other geoparks. People combine community economy and badland characteristics to boost local development. Guavas and Jujubes are important cash crops and local cultural symbols. The activity of Looking-for-Fun-in-Jujube-Field has become a core promotion activity for the community.

Jingshan community promotes its natural landscapes, traditional buildings and culture and agricultural economy through well planned activities. Jingshan is a place of hospitality and team spirit. Granny's rice cake team is zealous in promoting local recipes that uses local produce. With its communal soft power, Jinashan has become the rear garden of Yenchao.

Yuanjiao Humanist Association promotes rural culture and history and opens a new window to the discovery of unique environments for Yenchao. The association combines the cultural assets and natural beauties so that people are proud and willing to safe keep the local environment. Holding activities related to unique local culture helps people to understand own culture and to conserve it.

There are five colleges in Yenchao. Local communities can seek cooperation from the colleges. How local people work together and create a novel community of networking to learn from one another can be enhanced by college service learning.

利吉泥岩惡地地質公園

利吉惡地，不但在地球科學板塊聚合隱沒研究上有特殊性，在景觀與觀光也具有特殊的價值，地球科學家可以輕易看到板塊碰撞的痕跡，以及各種海洋地殼的岩石組成。利吉惡地植生不易，發育許多溝蝕地形。這些溝蝕地形具有容易且快速沖刷變化的特性，對了解板塊擠壓的地形發育有相當的重要性。

利吉泥岩惡地地質公園有發育良好的惡地，也是欣賞超基性蛇綠岩系的最佳露頭。利吉不但有獨特的地質條件與地形景觀，在其中發展的人類文明也因此特性而具獨特性，可由農業與原住民文化凸顯之。

地質公園範圍內可見泥岩惡地與海岸地形共構出惡地特有的植生與產業，以及豐富的原住民文化。這是由於泥岩邊坡植物不易生長、土壤不夠肥沃，地質公園周邊居民相應而生的農業土地利用及人文景觀，發展出殊異的農業產業文化與技術，是本地經濟與社會的特殊地景。

Lichi Badland Geopark

Lichi badland is not only significant for geological and scientific research on subduction of convergent plates, but also valuable for eco-tourism. Earth scientists can see the marks resulting from plate collisions and the rock formations of different oceanic crusts. In the area of Lichi badland, we observe large amounts of developed gullies. The nature of gully landscape and its erosion is significant in research on convergent plates.

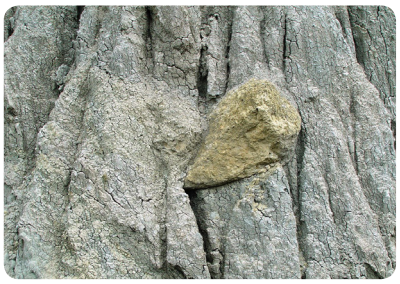
Lichi Badland Geopark has a well-developed badland landscape. The argillaceous rock is sculptured by water runoff and form well-developed gullies. The area is also a good site to observe badland landscape. The ultrabasic rock of ophiolite suite is evident here as a result of tectonic collision. The uniqueness of the local geology and scarcity of the landscapes gives this area its unique characteristics.

Due to the fact that muddy badlands are not good for planting and that the soil is poorly developed, the land use and cultural landscapes that surround the geopark are unique and much shaped by its geomorphological processes. Abundant aboriginal culture as well as unique badland agricultural practices can be observed in the area.

利吉泥岩惡地地質公園地景

利吉泥岩惡地地質公園，具有菲律賓海板塊與歐亞大陸板塊碰撞擠壓所留下來的重要證據 -- 利吉層（利吉混同層），長久以來即為國內外地球科學研究的重要地區，而泥岩所形成的惡地地形，則成為卑南溪下游非常顯著的地景。

利吉層大致呈狹長的帶狀，分布在海岸山脈的西緣地區，北從花蓮縣玉里附近的樂合起，往南斷斷續續的出露，至台東縣卑南鄉海岸山脈南端台東大橋附近為止。利吉層主要以灰色泥岩為基質，夾雜許多種類繁多而大小不一的外來岩塊，多為大陸邊緣沉積物的砂岩及海洋地殼蛇綠岩系岩石碰撞所產生的混同層；在形成的同時，因強力剪切作用，使利吉層中的基質泥具有緻密的鱗片狀葉理，其剪切方向與今日的大地應力方向一致，應為更新世後的碰撞運動之產物。由於泥岩層缺乏明顯的層理，且因易沖刷流失而常形成惡地景觀，常見雨溝、土指、天然橋等地形。



Geosites of Lichi Badland geopark

Lichi Badland Geopark delivers important proof of the collision of the Philippine Sea Plate and the Eurasian plate, Lichi Mélange. It has long been a significant area for international earth science and geological research. Badlands formed by argillite is a noteworthy landscape on the downstream of Beinan River in Taitung.

Lichi Mélange distributes in a long stretch along the west side of the Coastal Range, extending from the north at Yuli of Hualien to the south at Beinan of Taitung County. Lichi Mélange is mainly composed of grey shale, mud rock or argillite, mixed with various foreign rocks of different sizes. The foreign rocks are results of tectonic collisions where the sandstones (originally deposited on the edges of the continental plate) and ultrabasic rocks of ophiolite suite are mixed. At the time of collisions, the shearing function made the basic muds to form scaly foliation. The directions of the shearing and the tectonic stress are proven identical and thus the collisions were considered occurred in the Pleistocene epoch. Due to the lack of clear bedding in argillite, the badlands are easily eroded by flush and therefore commonly formed are gullies, earth fingers and natural bridges.

利吉泥岩惡地地質公園地景與經濟

台東縣卑南鄉利吉地區，為東部少見的惡地地形，不利農業，但經農會輔導而開發出許多果園，以惡地釋迦與芭樂最廣為人知，風味特殊，成為利吉的重要產業。處偏遠山區而交通不便，使其特殊的惡地地形與生態保存相對完整。惡地水果與生態，如棲息其中的環頸雉，使此區極富休閒觀光條件，透過利吉泥岩惡地地質公園的系列活動，不僅打開利吉的知名度，更使地質公園概念向下紮根，與社區生活韻律和節奏密切結合，共創永續社區的基礎。

利吉泥岩惡地地質公園範圍的社區周邊環境各有其特色。利吉村以惡地環境中所栽植的水果釋迦以及芭樂聞名。富源村則是以惡地與海岸交會的特殊地形見長。富山村優美的海岸線，屢屢成為旅人駐足的焦點。富岡村則以富岡漁港為核心，是台東區域漁業的運作中心，也提供外島的連結。富峰村的原住民則保存截然不同的原住民文化景觀。

Landscape Economy of Lichi Badland Geopark

Lichi area is a scarcely seen badland landscape in Taitung. Muddy and easily eroded badland area is not suitable for agriculture, but recently Lichi has developed many fruit orchards, with the policy support of farmers' association from the Council of Agriculture. Among the well-known and popular fruits are guavas and sweet wax apples. Although Lichi is remote and hard to reach, its special fruits, landforms and ecology still appeal crowds of tourists. The geopark promotion activities in recent years not only increase the area's visibility, but also initiate local response to the core values of geopark. The rhythm and tempo of community life become accordant to its natural environment and cultural/economic wisdom and make it more sustainable.

Each of the communities within the Lichi Badland Geopark has its own distinctive characteristics. Lichi village is famous for badland fruits, such as sugar wax apples and guavas. Fuyuan village is known for its spectacular landscape between the narrow strip of hill between the sea and the mountain. Fushan has a heavenly beauty of bay which is always in the spotlight. Fugang serves as a fishing port and a node linking Orchid and Green islands. Lastly but not least, Fufong possesses a rich aboriginal traditional culture.

利吉泥岩惡地地質公園與社區

利吉泥岩惡地地質公園內主要以富源和利吉二大社區為主。社區居民在地的情感與認同，配合專家知識與活動構思，地質公園的發展建立在社區共同的集體參與形式，強化地質公園在地居民間緊密的連結，形成環境的生命共同體。

推動地質公園最早主要的合作對象為社區與社區中的學校，透過學校所在地的學生家庭的生活情境與家長的產業生計內容的整合，規劃與當地地景條件、產業內容與自然環境相應的環境教育內容，整合環境教育與地質公園的價值。例如山麓側的原住民農業、丘陵區的漢人畜養家畜（以雞、羊為大宗）以及熱帶水果的產業與環境的關係，均是符合地質公園價質的環境教育體現。例如，2012 在利吉國小舉辦小小解說員培訓，培訓種子地質解說員，紮根於在地教育與社區。

Community Participation and Lichi Badland Geopark

Lichi Badland Geopark is supported mainly by two communities, Fuyuan and Lichi. Local identity and affection for community development make expert knowledge easy to spread to local communities. Participatory planning and workshops organized by experts and the academia are key to the success of the geopark. In the long run, it is hoped that the geopark will incorporate all neighboring communities to strengthen geopark concepts and values for local geo-tourism and for a sustainable development of this remote area of Taiwan.

In the early stage of geopark promotion, the local community participation and partnership were critical. The geopark promotion activities also tried to incorporate local elementary schools so that a scheme of environmental education for school kids and local residents is made. With both scientific geology, geomorphology, local economic activity and cultural life, a sustainable development could be established with integrity. For example, for the community located on hills where indigenous terraced agriculture is characteristic, the physical environment is well kept. For the Han people in the plains and coastal area, live-stocking is a major economy as the soil is not as fertile and agriculture is not as easy. All these various activities involve very different views and uses of the local environment and landscape. Environmental education at the geopark can then be integrated with the value of geopark so that the concept of sustainable environment can be discussed in the area to conserve landscape and unique cultures.

雲林草嶺地質公園

雲林草嶺地質公園位於雲林縣古坑鄉，區內的草嶺山崩極富盛名，此外尚有峭壁雄風、蓬萊瀑布、石壁壺穴等特殊自然景觀。當地社區居民與地方政府不但致力於地景資源保護和環境教育，也發展以地景旅遊為本的遊憩旅遊形式，促進草嶺地區的社經發展。

草嶺是雲林縣最東邊的村里，也是雲林與嘉義、南投的縣界所在。過去即為著名風景區，921大地震使得原有著名之草嶺十景受到嚴重損壞，也形成特殊的堰塞湖景觀—草嶺潭；其後經多次颱風的豪雨影響，草嶺潭遭上游沖刷下來的土石逐漸填平。這樣快速的地景演變，說明草嶺環境對自然環境及天候的敏感度，也展現草嶺多元變動的地形景觀。雲林草嶺地質公園，始由草嶺村推動，並於 2004 年正式掛牌，雲林縣政府對於推動地質公園並結合境內動態地景與人類文化及經濟活動有相當的期待。

Yunlin Tsaoling Geopark

Yunlin Tsaoling Geopark is located in Gukeng, Yunlin County. It is well-known for its natural beauty and rapid landform evolution of landslides, huge cliffs, waterfalls and potholes. Local governments not only subscribe to the conservation of the landscape and environmental education, but also develop geo-tourism as a form of tourism to boost the area's social and economic development.

Tsaoling is the easternmost village of Yunlin, bordering Chiayi and Nantou counties. It has always been a popular tourist spot until the 921 Earthquake in 1999, when the Tsaoling Ten Most Renowned Scenes were severely damaged and a new landslide dam, Tsaoling Lake, was formed. The lake was filled with debris and rocky mud flushed down from the upstream during heavy rain. The rapidly changing landforms of the area demonstrate the sensitivity of the landform to natural power of quakes and rains. Tsaoling Geopark is promoted by Tsaoling village and supported by various levels of governments. Its national geopark status was affirmed through an opening ceremony in 2004.

雲林草嶺地質公園的地景

草嶺山崩是雲林草嶺地質公園重要的地形景觀，位於園區之西南側，為一順向坡；1999 年 921 地震產生大規模的崩塌，崩塌面積超過四平方公里 1999 年的崩塌是草嶺近 150 年來的第五次崩塌，主要是因為地震及颱風豪雨的影響，形成極大的地形災害景點。崩塌地快速變動的地形景觀，是雲林草嶺地質公園的一大特色。

雲林草嶺地質公園的峭壁雄風獨特景觀，是一露頭呈現約為 45 度角直下清水溪谷的順向坡。高差由頂端露頭到溪谷為 140 公尺。這類顯著的順向坡滑動面底部，容易造成山崩，形成堰塞湖。

蓬萊瀑布是另一個特殊地景，位於竹篙水溪的中游，瀑高約 30 公尺，水量充沛，沿著峭壁懸空而下，氣勢萬千。從草嶺往瑞里途中，可見到此懸掛於山壁之間的瀑布。

壺穴也是本地的地景特色之一。在石壁仙谷和連心池之間均可欣賞到此類特殊的壺穴群地景，甚至有成群成雙相連的壺穴，形成草嶺特色之一。草嶺地區因河流水量的變化極端，壺穴群的空間分布是臺灣少見獨特的壺穴地形。

Geosites of Tsaoling Geopark

Tsaoling landslide is situated on the southwestern dip slope of the Geopark. This landslide is among the largest in terms of total area and magnitude. A landslide happened during the 921 Earthquake in 1999, covering an area of more than 4km^2. This landslide is the fifth event that has occurred during the last 150 years. The high frequency of landslides demonstrates the area's hazardous nature and is triggered by earthquakes and persistent rains.

"Ciao bi syong fong" is a dip slope cutting into the Qingshui River at an angle of 45 degrees, with a height of approximately 140 meters. The significant sliding surface bottom is the best proof of the quake lakes formed after each separate landslide and the best way to understand environmental changes and their influences.

Penglai Waterfall is another unique landscape, located at the mid-stream of Jhu-gao-shui River. The waterfall of more than 30 meters along the cliff makes a splendid scene.

Potholes are another characteristic feature of the area. Although the most famous pothole landscape is along Keelung River in Taipei area, Tsaoling's potholes are uniquely distributed due to precipitation and geology. Pothole group landscape can be easily spotted in Shibi Valley and Lianshin Pond. Due to extreme changing river flow and water levels, pothole groups are found at different heights and scattered around the river catchment.

雲林草嶺的地景和經濟

草嶺的竹林是地質公園的一大特色，桂竹、麻竹與孟宗竹處處可見，散發陣陣竹香，在地居民的竹藝與石雕，如『竹筒』、『竹架』、『竹製柱珠』、『石臼』、『石桌』、『石椅』、『石牆』等等，都顯示草嶺傳統手藝技術的高明。除了筍乾外，草嶺的愛玉子也聞名全省。這些農產品成了地質公園內的一大賣點，或可稱為地質產品。

草嶺地區群山環抱，傳統農業條件得天獨厚，主要產業為林業、農業及觀光業。草嶺有中海拔原始闊葉森林、造林柳杉，但不以伐木維生，僅使用木材作為藝術與裝飾；森林也為草嶺增添了山林霧氣飄緲的美學色彩。草嶺因海拔、氣溫、日照等條件合宜，適合茶葉生長，茶是經濟價值頗高的農產，製茶是草嶺的一大產業，主要以金萱及烏龍為主，製茶廠以內湖、外湖、石壁最多，尤其是石壁可謂茶村。

草嶺三十多公頃的苦茶油樹，每至開花期置身其中總有誤入雪中林之感，美麗至極；就美食而言，在地餐廳研發出一道道特殊風味的茶油料理。

Landscape Economy of Tsaoling Geopark

Bamboo grove is one major feature in the Geopark. Makino bamboos, mo bamboos, and moso bamboos can be located everywhere, and the air is infused with their fragrance. Many local residents are cable of skillfully making bamboo crafts and stone carvings. Crafts, such as bamboo container, bamboo ladder, bamboo column beads, stone mortar, stone table, stone bench, and stone wall, demonstrate great traditional handicraft techniques. Besides dried bamboo shoots for food, jelly fig is also Tsaoling's famous specialty. These agricultural produce are big selling points of the Geopark, and we may call them geo-products.

Tsaoling is located in the eastern mountainous area of Gukeng, Yunlin, surrounded by hills. Logging, agriculture and tourism are main industries of the area. With a medium altitude, Tsaoling has broad-leaved evergreen forests and cedars. The local people use wood for decoration and handicrafts and the forest adds misty and faintly discernible beauty to the mountainous area. With moderate altitude, temperature, sunlight and other favorable physical conditions, Tsaoling is suitable for the growing of tea trees. Tea is of great economic value and tea-making is an important industry in Tsaoling.

Oiltea Camellia is another source of income. The trees are pretty with blossome and attract tourists to enjoy the flowering scene before the seeds are harvested. The oiltea seeds are extracted for edible oil. They are of great ecoomic value and for great recipes.

草嶺地質公園的社區參與

石壁社區營造的「五元二角社區遊憩綠廊」，是用天然素材孟宗竹打造的，漫步在這 20 公頃的竹園，不但能享受天然美景的自然風，也可以深刻體會居民參與社區景觀營造的熱情與地方的認同感。這成果當然也創造社區的文化和產業的特色。

「繪本旅館」是草嶺頗具特色的民宿，館內的繪本與工藝創作展覽室更展現草嶺的地景、生態及人文，深具在地文化特色，更說明在地產業善用地方地景、技藝、故事、文化與人力資源，所創造出來的特色創新。

草嶺地質公園由草嶺村推動，聚集各村落力量，共同合作。草嶺與樟湖村之人口主要以閩南人為主，村落分佈形式較為集中，多居住於地勢較平坦處。社區各有特色：草嶺村，原是一小農村，1976 年轉型為觀光區，以草嶺十景聞名全國，但受 921 大地震影響後僅存二景，觀光衰退，而後社區開啟重建計畫，於 2004 年推動草嶺地質公園。樟湖村的樟湖風景區內有十六處景點，以瀑布最具代表性。樟湖社區與學校合作，將社區生態資源與學校教育連結，發展永續的社區產業與文化。華山村風景優美有雲林縣「後花園」的美譽。

Community participation in Tsaoling Geopark

Shibi community built over 20 hectares of bamboo garden, called "Wu-yuan-er-jiao bamboo canopy", using moso bamboos and dried bamboo leaves and stalks. Walking under the green canopy and within the bamboos, tourists can enjoy the natural beauty. The enthusiasm of local residents can be felt simply by witnessing how the locals introduce the green canopy to tourists. Through the building of this green canopy and arcades, local identity is reinforced by closer relationships and mutual trust within this community.

Tsaoling's distinctive "E-Hon Hotel" is run by a couple who love hand painted picture books. In addition to providing room and board, the exhibition rooms of the hotel display hand-made picture books in which Tsaoling's characteristic landscape, ecology and cultures are highlighted. They are true representatives of the beauty of the local environment.

Tsaoling Geopark is promoted by Tsaoling village, with the support of various villages. The population in Tsaoling is composed mainly of Hokkien people. Settlements are concentrated mainly on the plains. Each of the villages has their own character. Tsaoling village was a small village and after it transformed into a tourist attraction in 1976, its fame rose nationally with its Ten Most Renowned Scenes. However, among the scenes, only two survived the 921 earthquake and its tourism declined. The community then started a reconstruction plan and succeeded in 2004 in the establishment of Tsaoling Geopark. The communities often cooperate with local schools and utilizes local ecological resources to develop environmental education programs and to sustain cultural economy.

馬祖地質公園

馬祖位於臺灣西北方，面臨閩江口，行政隸屬連江縣，下轄南竿鄉、北竿鄉、東引鄉、莒光四鄉，包括：南竿、北竿、東莒、西莒、東引、西引、亮島、高登、大坵、小坵，還有許多無人島嶼，馬祖地層與中國大陸相連，直到約一萬年前，冰河期結束造成海水面上升近 120 公尺，馬祖列島與中國才被海水分隔。

馬祖地質公園有非常豐富的海洋資源、生態資源等以及戰地政務創造的地景。馬祖地區的自然與人文景觀具高度資源價值與意義，包括各種漁業資源、潮間帶資源，生態資源（例如，黑嘴端鳳頭燕鷗等鳥類資源）、以及馬祖石蒜特有的植物，均顯示其資源獨特性；閩東建築文化與軍事坑道等，也記錄了過去人類活動的歷史。尤其是近數十年的兩岸對峙所創造的戰地景觀，作為文化資產，對臺灣與全球社會都有特殊意義。

馬祖列島大部份是由花岡岩組成，東引則以閃長岩為主，另外在西莒的流紋岩則顯示不同的火成岩呈現的岩石多樣性。這些岩石歷經千萬年來的海浪侵蝕以及風化作用，呈現多樣化的景觀，層次分明的節理，彰顯浪濤錘鍊與壯闊險峻的海崖、海拱、海蝕柱、海蝕洞等地景。

Matsu Geopark

Matsu, located to the north-west of Taiwan and off shore of China, facing China's Min River estuary, and is administered as Lianjiang County. Matsu is divided into four townships, of five major islets and numerous inhabited and uninhabited islets with ecological significance. The islands were separated from China geologically around ten thousand years ago at the end of the ice age when sea level rose about 120 meters.

Abundant resources can be spotted in Matsu, including marine, ecological and war relics. Fishing was the main economy in historical times; now migrant birds are the big attraction to both the locals and tourists. Terns of various sorts, in particular Chinese Crested Terns are often attractions to seasonal tourists. Plants like Matsu Lycoris radiates are unique and not commonly found elsewhere. These are all unique of Matsu. Mingdong architectural culture and military tunnels record the history of the last century. The military underground tunnels have become a characteristic part of black tourism. As war relics they are not only important for the local, but also for the globe as they symbolize the Cold War.

Matsu is mainly made of granite, with the exception of Dongying mainly composed of diorite and Siju composed of rhyolite. These plutonic rocks manifest a body of intrusive igneous rock with various influence of SiO_2. These rocks have been through erosion and weathering, and displayed the diversity of the landscape, including the magnificent crags and cliffs, sea trenches, sea arches, sea stacks and caves. All reflect the power of marine processes.

馬祖的地景與文化

馬祖因歷史際遇，成為海峽兩岸重要的戰略點，而塵封數十年。直到 1992 年戰地政務解除，並於 1994 年開放觀光。戰地風貌中以複雜多樣的坑道系統，最令人震撼。目前已開放參訪的南竿北海坑道、北竿午沙坑道與東引的安東坑道外，尚有許多不為人知的坑道與哨位砲口，深藏著官兵艱辛開鑿守衛的血淚故事。

馬祖地表花岡岩，土壤層薄，可供墾植的農田貧乏，先民多以海為生，過去漁業為最重要的經濟命脈，民國 38 年後馬祖因位居重要戰略位置，由軍方列管，因此改變了馬祖人的生活型態，為數眾多的駐軍消費成了當地人的收入來源。

1992 年解除戰地政務後，昔日阿兵哥比居民還多的景象已不復見，馬祖的經濟結構，再度面臨改變。這塊與世隔絕的淨土，以天生麗質的地理風景、重獲新生的聚落建築，以及珍貴的戰地地景與坑道系統，蛻變為觀光島嶼，純樸的居民以及自然的生活風貌，為地景環境之美加分許多。

寺廟建築格局簡單、色彩大膽艷麗，尤以「封火山牆」為特色。民宅建築以花岡岩為材，窗戶位高而小，屋頂如一方方的印章，成為淡定、卻又風格強烈的閩東建築。建築依山羅列，井然有序，彰顯自然地質與文化融合之美，是地質公園極具特色的在地元素，也是馬祖觀光遊憩景觀的極致。

Cultural Landscape of Matsu Geopark

Because of its war history, Matsu stands at a critical strategic position. Matsu had been closed to civilians for decades until 1992 when the Military administration was dismissed and in 1994 it was reopened for tourism. Of all the battlefield landscapes, the most amazing one is its military tunnel systems. Matsu has a high density of tunnels. Beside the North Sea Tunnel, Wusha Tunnel, and Andong Tunnel, there are still more tunnels and military guarding garrisons unrevealed and unknown to the public, hiding the blood and tears of the soldiers.

Matsu, composed of granite, has a thin cover of soil and farming is therefore not easy. The traditional activity was fishing, but in 1949 Matsu was controlled by the army due to its strategic military position; this changed the lifestyle of people who made their living by subsistence farming and from the consumption of the off-duty soldiers in the local military bases.

After the lifting of martial law and the withdrawal of the military administration, significant changes to the economic and social life occurred. Matsu became a new tourist attraction with beautiful natural landscape, distinctive building styles, and precious war landscape and tunnel system. The island population used to be isolated from the rest of the world and the simple characteristics of the locals and original lifestyle add extra charm to the landscape.

Temples have simple structures and bold colors, featuring distinctively colorful gables. Houses are a calm and highly stylized Fujian architecture, built from granite, with high and small windows and stamp-like rooftops. The houses are arranged in clear and good order, lined at the foot of the mountain. It is a mixture of natural and cultural beauty with unique local style.

馬祖地質公園的經濟活動

馬祖當代的養殖漁業、漁產加工及釀酒是重要產業。馬祖列島擁有豐富的漁業資源，主要的漁產包括黃魚、白鯧、蝦皮、白力魚等，海中貝類與附生動物更是屈指難數，其中淡菜與佛手具高蛋白質與高經濟價值，為漁產的亮點。另一方面，馬祖也充分利用海洋資源，發展黃魚養殖、漁產加工及磯石海釣活動等。

南竿鄉仁愛村，舊地名「鐵板」，位在南竿島的正南方，是同時具有南北雙澳口的聚落，主要的聚落位於面南澳口的斜坡上。過去主要依附澳口發展漁業，到民國三十八年因國軍進駐，影響居民從農漁產業逐漸轉變為以滿足軍人為主的三級產業，並因縣政府的設置使得鐵板成為軍政與商業中心。後因縣府遷移及駐軍的減少，鐵板社區的經濟活動逐漸趨於平淡。

南竿仁愛鐵板的轉變正是普遍馬祖經濟變化的體現。當代的觀光遊憩已成為馬祖經濟的一部份，雖然因交通條件的侷限尚稱小眾旅遊，但以馬祖的自然與人文環境條件，小眾的、深度的、具質感的地景生態旅遊，正是進行環境教育和維護永續島嶼的王道。

Landscape Economy of Matsu Geopark

Matsu is famous for its aquaculture, fishery food processing and winemaking. Matsu has rich fishery resources, and major fish catches includes yellow croaker, white pomfret, shrimp, Poli fish and other countless crustaceans, including Mytilidae and Foshou shell which have a high protein content and high economic value. Good use has been made of the ocean resources, for example aquaculture for yellow croaker, fishery food processing and rocky shore sea fishing activities.

Tae-ban community was the major economic center of the Matsu and its economic base was fishing. The influx of the military in 1949, transformed its base economy from fishing and agriculture into commerce for serving the military. Later with the relocation of the county government and the withdrawal of the military administration, its economy transformed again. Tourism now has been a vital element for the local community.

The case with Tae-ban in fact manifests a common economic transformation of entire Matsu. As quality and knowledge-based tourism has become trendy, Matsu better maintain its natural and human enviroments integral with eco- and geo-tourism.

馬祖地質公園的社區參與

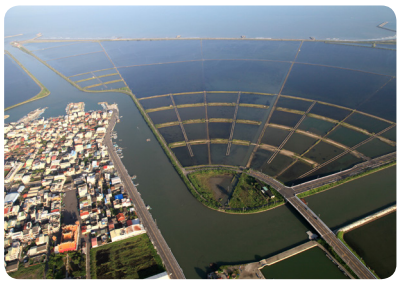
在地質公園的推動過程，社區應該扮演重要角色。雖然馬祖村庄聚落數目不少，但由於過去軍管時代自主的社群運動與社區活動並未受鼓勵，所以社區涉入馬祖地質公園發展的推動，需要一段長時間。馬祖鐵板社區及其發展協會，具有潛力，社區曾改造廢棄古厝，進行社區造景與植生綠化工作，讓整個社區空間活化，成為馬祖社區經營的典範。

南竿的仁愛、津沙、牛角等社區；北竿的芹壁、坂里等社區；東引的東湧社區；東莒的福正、大坪社區；西莒的青帆、田沃、西坵社區，均是發展馬祖地質公園的在地潛力社區。以目前這些聚落社區所擁有的自然資源及人文襲產，發展地質公園不但可以在眾聲喧嘩的大眾旅遊中逃過一劫，更可以擦亮馬祖自然和人文的地景美學。如何擦亮並突顯出在地地景美學，則有賴各種形式的力量；由上而下的力量具主導性卻未必能永續，由下而上的力量可能微弱卻能長遠，更可能創造永續的在地社區，也創造出深度旅遊經濟的一環。

Community participation in Matsu Geopark

Communities play an essential role in the establishment of geoparks. As the martial law and the military administration did not encourage communal activities and civilian spirits, many villages in Matsu lack the experience in local mobilization. It will be some time before the bottom-up mechanism takes roots in Matsu. With the auspices of the Matsu Scenic Area Administration, communities are starting to take control of local affairs in a participatory fashion.

Tae-ban community and community association have mobilized inhabitants to remodel some deserted traditional houses and landscape to improve the local milieu. Such efforts manifest the great potential of the Matsu communities. Other significant communities, scattered over the five major islands of Matsu include Chin-bi of Bei-gan, Chong-liu and Lehua of Dongying, Fuzheng, Dapu of Dongying, et al. They have proved to be indispensable for community development and for the geopark.



可能的地質公園場所

位居海洋及大陸板塊交界的臺灣，在地質作用及氣候與人文條件的影像下，地景動態變遷豐富多元，不但創造出特色地景與自然環境，更孕育出受環境影響與環境相適的社會、文化及經濟地景，也涵養出特定的人地關係與社會情況，相當適合以地質公園的價值與實踐概念，發展出永續臺灣。

除了前面介紹的六個臺灣的國家地質公園之外，臺灣尚有許多特殊美質的地景環境，兼具地景保育、環境教育、地質旅遊、社區參與以改善環境條件，非常值得做為地質公園。例如以板塊碰撞形成環境為主的海岸山脈地質公園、以峽谷著稱的太魯閣峽谷、恆春半島隆起的高位珊瑚礁、西部海岸濕地以及臺灣北部的火山地景。

ASPIRING GEOPARKS

There are other characteristic landscapes in Taiwan that exhibit and evidence the core values of Geoparks and they are worthy of nomination. There are five such sites. The East Coastal Range is the first that comes to one's mind as it has a tremendous potential as an educational asset for tectonic and environmental studies. The area of Datun Volcanic group is another possibility that show cases both natural and human activities of relic active volcanoes. A third potential site is the Taroko area with its ethnic activities. The area of Taroko National Park and its vicinity is famous not only for gorge landscapes, but also for its versatile ethnic day-to-day activities. Next is the coral reef geopark of Hengchun Peninsula. The fifth is the wetland geopark in the south-west coast of Taiwan. All five geopark will add diversity to the existing geoparks and will complete the demostration of Taiwan as a geologically dynamic state.

海岸山脈地質公園

海岸山脈為臺灣五大山脈之一，位於臺灣本島之東緣，北起花蓮，南迄台東，縱長 150 公里，北從花蓮溪口，向南延伸至台東縣的卑南大溪河口；東西之平均寬度為 10 公里。海岸山脈整座山脈是由海底火山經過板塊擠壓推升而形成。

海岸山脈東西兩側各有許多東西向的支稜，形成了雁行排列的山脈。由於海岸山脈多由海底火山作用所形成，地質上以火山集塊岩為主，夾雜部分的泥岩，火山地區常會將地底的礦物帶至地表，因此海岸山脈的部分地區早年以出產寶石聞名。

海岸山脈在東海岸更以海岸地景著稱，其中小野柳的沉積岩層及覆於其上的珊瑚礁及石梯坪隆起珊瑚礁的海階、海蝕壺穴等小地形，訴說著海岸變遷的過程。八仙洞的海蝕洞更記錄海岸山脈的隆起與海水的作用，約 15,000 年前的人類活動，更添加了這段海岸的故事性。

由於太平洋水氣的滋潤，藤蔓、蕨類、附生植物等，讓海岸山脈呈現出雨林的植物相，其中也蘊含豐富的野生動物資源；而位於海岸山脈下的富興村，自先民遷入以來，其人文、農業、生活習慣等各方面，即與海岸山脈有著密不可分的關連，社區阿美族人對於植物運用的智慧，更是值得發揚的文化資產。

Coastal Range Geopark

The East Rift Range, one of the five mountain Ranges of Taiwan, lies on the east seashore. Extending north from Hualien River to the estuary of Peinan River in Taitung, the East Rift Range has a length of 150 kilometers and a narrow average width of 10 kilometers. The range is lifted due to the compression of plate tectonics under the sea.

Many edges go east-west ward en-echelon along the East Rift Range, demonstrating the frequency of tectonic activities in the past. Volcanic agglomerate, mud stones, plentiful extrusive rocks and minerals present evidence for geological and geomorphological research and environmental education. The area used to be famous for the excavation of gemstones.

The east side of the Range is coastal, where the sedimentary layers in Hsiaoyehliu and the coral reef over their top documents environmental change. Baxian Cave evidences the range uplift and seawater erosion. The area recorded the natural and human activities over the past 15,000 years. It demonstrates the man-land relations with many colorful tales to tell. Shihtiping with various coastal terraces and marine potholes often attracts visitors.

Due to the moist air from the Pacific Ocean, the Coastal Range has a tropical rain forest biome with vines, ferns, epiphytes and other flora and fauna. Fuxing village at the foothills is a good example of how humankind has adapted and taken advantage of the Coastal range's environments since ancient time. The wisdom accumulated by the Amis people enabled them to develop sustainable livelihoods under such conditions. This is a place where nature and human activities interacted and resulting in an intricate mix of cultural assets.

火山地質公園

臺灣北部有火山地形，目前陽明山地區設有陽明山國家公園。全區向來以特有的火山地形地貌著稱，以大屯山火山群為主。地質構造多屬安山岩，外型特殊的錐狀或鐘狀火山體、火山口和火口湖等，構成獨特的地質地形景觀。

噴氣孔與溫泉是由於地表水下滲地底，被地下熱源加熱後，再由地殼裂隙冒出地面，形成火山活動的特殊景觀。大屯火山群區內的大油坑、小油坑、馬槽、大磺嘴等地，都是可見的後期火山作用景觀。

陽明山昔稱草山，由於緊鄰臺北盆地，開發歷史甚早，遺留包括凱達格蘭族、漢人、荷蘭、西班牙、日本等文化軌跡，值得我們進一步去發掘與珍惜保存。火山地景與地熱資源特殊的放射狀水系，加上不同文化的見證，都是做為地質公園最好的資源。

Volcanic Geopark

Northern Taiwan is largely made up of volcanic landscapes. Presently the Yangmingshan area is designated as Yangmingshan National Park and is famous for its volcanic landscapes that form the Datun volcano group. Its major mineral constituent is andesite. Unique conical and bell-shaped volcanoes, volcanic craters and crater lakes are landscapes that are considered to have extraordinary geological and geographic values.

In this area, the surface water infiltrates into the earth and is heated by geothermal heat, resulting in fumaroles and thermal springs (hot springs). These volcanic activities are part of the environmental resources that form the characteristic human activities of the area. Hsiaoyoukeng, Dayoukeng, Matsao and Dahuangzue are visible examples of late volcanic activity.

Yangmingshan was once called Grass Mountain, located close to and north of Taipei basin. The history of human settlement can be traced back to very early times when Ketagalan people settled and made a living and stamped their culture on the area. Various cultural heritages of the Dutch, the Spanish and even the Japanese could be identified with careful observation. Today, the area is a popular resort of the urban population for weekends and public holidays. The interesting mix of past cultures and settlements has resulted in an important archive for present and future generations to cherish.

峽谷地質公園

大理石峽谷地形是太魯閣國家公園的主軸。由立霧溪切鑿形成的太魯閣峽谷，在地質歷史上經過多次高溫、擠壓等的變質作用，使石灰岩變質成大理岩；加以 400 萬年以來的造山運動抬升、河水下切，才逐漸形成今日的太魯閣地形環境樣貌。由於大理岩具有緊緻、不易崩落的特性，經河水下切侵蝕，遂形成幾近垂直的峽谷景觀。

造山運動使本區成為見證動態地景變遷的最佳場域。從高山、峽谷到各種劇烈的侵蝕、搬運作用，都顯示本區科學上的特性與不可取代性，加以人文活動的考量，也是地質公園的最佳地點。

本區內蘊藏著史前遺址、太魯閣族文化及古道系統等豐富人文史蹟。位於立霧溪溪口的「富世遺址」，屬國家第三級古蹟，為距今 2000 年的新石器時代晚期文化。本區原住民的太魯閣族，兩百多年前從濁水溪上游遷居至此，過著狩獵、捕魚、採集與山田焚墾的生活，目前發現的部落遺址有 79 處。

從動態的地景、特殊的生態、到豐富的人類文化史蹟，在在都說明了本區做為地質公園的絕佳條件。

Gorge Geopark

The Taroko National Park is famous for its marble gorge. The Liwu River is the driving force and together with tectonic processes they have shaped this dynamic landscape. As the exposed marble is hard and resistant, with river erosion and uplift of the continents occurring at the same time, gorges form. Geologically, four million years of uplift, erosion, deposition and cutting have crafted these vertical valley landscapes of Taroko.

Orogeny makes this area an excellent witness of the dynamic landscape of Planet Earth. From high mountains to sheer gorges, from erosion, transportation to deposition, they all demonstrate the scientific principles that underpin the shaping of the area. With the addition of human cultural and economic activities, this site is surely an excellent geopark candidate.

The area of the Taroko National Park bears abundant historical monuments and relics, such as prehistoric heritages like the Taroko culture, and the ancient trail systems. For example, the Psngan Ruins, located close to the estuary of Liwu River, is a category III National Historical Relic. The river terrace site used as a settlement can be traced back to Neolithic Age, dating back 2000 years. Its inhabitants were Taroko tribe, who reportedly migrated from the upstream of Zhuoshui River to this area. The archeological evidence tells of the ancient settlements and their relationships and currently 79 archeological sites are under study.

From the dynamic natural landscape, the extraordinary ecology, to the historical monuments of human activities, Taroko area with its ethnic population is surely an ideal geopark.

珊瑚礁地質公園

位於臺灣南端的恆春半島，珊瑚礁環繞，是個隆起珊瑚礁著名的上升海岸，也是臺灣第一座國家公園的所在地。墾丁國家公園陸域的地質、地形景觀十分多樣，如隆起珊瑚礁、石灰岩台地、沙灘、珊瑚裙礁等。由於熱帶海洋生態環境的特色，蘊育出富有生命力的熱帶海濱動植物。每年秋冬眾多的過境候鳥，讓這裡成為著名賞鳥聖地。海底世界更是絢麗繽紛，種類繁多的魚種、多采多姿的珊瑚最具代表性。

隆起珊瑚礁受到地殼隆起、崩落及海水作用、風化作用的影響，形成多樣的地景。為保護此種特殊地景，行政院農業委員會公告成立「墾丁高位珊瑚礁自然保留區」，在墾丁森林遊樂區內，即可看到此種景觀。另外，許多的岩層，如墾丁層夾有混雜外來岩塊的特性，是地質學、地形學的最佳教室；許多存在的史前人類的活動遺址，也見證這個地區的發展過程，可以提供環境教育的機會。

Coral Reef Geopark

Surrounded by coral reefs, Hengchun Peninsula is located in southern Taiwan. As an uplifted coastal area, the terrestrial environment of the area, particularly Kenting National Park, is very diverse. Uplifted coral reefs, fringing reefs, limestone tableland, and beaches are just some examples. It is also home to the first National Park of Taiwan. Due to the particular tropical marine ecosystem, it is the cradle of flourishing seashores and tropical plants and animals. Migratory birds regularly come to spend their winter here, and the area is therefore a famous destination for bird watching. The underwater world of this area is even more splendid and characterized by various species of marine flora and fauna along with beautiful reefs.

Crustal upheaval (resulting in the exposure of coral reefs), toppling, weathering, and erosion have all contributed to the landscape diversity of the area. Some layers of land formation, such as Kenting mélange, composed of variously exotic blocks, rocks and layers, point to the fact that this area is worthy of in-depth study of how geology and human activities in historical times have intertwined. It is an excellent geological and geomorphological classroom, and several prehistoric archeological remains have been located, prompting development of facilities for environmental education and conservation.

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