

# 大地恩賜

## 國家公園礦藏介紹

Precious Gifts Hidden Underneath  
Mineral Resources in National Parks

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太魯閣國家公園著名景點水簾洞的岩壁上方，亦結有石灰華晶礦 / 柯煒煜攝  
The rock ceiling of the Water Curtain, a famous tourist attraction at Taroko National Park, contains crystal limestone  
ores. / by Wei-yu Ke

西元15至17世紀的全球大航海時代，臺灣不僅是令航海家眼睛一亮的「福爾摩沙」，在探險家登陸之後，驚嘆地發現它是蘊藏豐富礦脈資源的寶藏島。列強見獵心喜，以武力征服臺灣後，急切的想挖掘北部的煤礦與硫磺、南部的鹽礦與磷礦，東部的金礦與大理石，以做為資源的使用。

1950年代，臺灣正值經濟起飛，礦產開發興盛，然而雖帶動社會榮景，但所為其犧牲的殘破的大地，猶令人惋惜。所幸，環境倫理與永續經營的保育浪潮衝擊到臺灣，1980年代，臺灣密集設立國家公園，將許多重要礦脈列入生態保護範圍。寶藏藏身處已經不是秘密，唯有全民加入守衛者行列，它們才能永留臺灣，一代傳承一代。

### 陽明山國家公園：硫磺礦

陽明山國家公園向來以特有的火山地形地貌著稱，園內火山口、硫磺噴氣口、地熱及溫泉等景觀齊備。蘊藏在火山岩層底下，有豐富多樣的礦物資源，這裡更是臺灣唯一的天然硫磺產區。

「臺灣最大的陶瓷工廠以前是在北投，原料即來自陽明山及其周遭，新竹最早的玻璃原料，也有部分來自陽明山。」踏查陽明山礦業史已20年的陽明書屋管理站主任呂理昌指出：「魚路古道早期其實是採硫與運硫的產業道路。」

清康熙年間得知臺北盆地盛產硫磺，在軍事上具有重大效益，西元1696年(康熙35年)，即派郁永河來臺採硫。乾隆年間以後，民變頻繁，官方為防止亂民採硫滋事，每季仲月皆派「河南勇」兵至草山封禁硫穴，不許民眾採硫，不但將硫磺口

Taiwan charmed navigators by its beauty and was hailed Formosa during the Age of Discovery from the 15th to 17th century. The explorers then found and acclaimed Taiwan a treasure island rich in mineral resources. After conquering Taiwan by military forces, excited great powers were eager to exploit mineral resources around the island: coal and sulfur in the North, salt and phosphate in the South, and gold and marble in the East.

The 1950s saw the heyday of mineral exploitation when Taiwan's economy took off. The society prospered, regrettably, at the expense of environmental degradation. Fortunately, impacted by the global trend of natural conservation and sustainable development, Taiwan established several national parks in the 1980s and thus protected many critical mineral veins. It is the duty of all people in Taiwan to preserve and pass them down to future generations.

### Sulfur at Yangmingshan National Park (YMSNP)

YMSNP has been renowned for its volcanic landforms, hosting volcanic craters, sulfur vents, hydrothermal vents, and hot springs. Rich and versatile mineral resources lie underneath volcanic rocks. It is notably the only natural sulfur reservoir in Taiwan.

“Beitou was once home to Taiwan's largest ceramic factories. One of their sources of raw materials was Yangmingshan, which also partly supplied materials for the glass-making industry in Hsinchu,” says Li-chang Lu, Chief of Yangmingshan Service Station, who has been investigating the mining history of Yangmingshan for two decades. “Fishermen's Trail was actually developed to mine and transport sulfur in the early days.”

The Qing government realized that Taipei Basin was abundant in sulfur, which bore great military importance. So in 1696, Yonghe Yu was sent to Taiwan for sulfur mining. During Qianlong Emperor's reign, the government organized troops from the mainland every three months to seal Mt. Datun from illegal civilian

硫磺礦生成種類 Types of Sulfur Mine	
<p><b>沉澱硫磺礦：</b> 由爆裂火山口湖噴出的硫磺瓦斯遇水形成硫磺粒或硫磺粉末，再與土砂混合，堆積在低窪沼澤地，形成礦層。</p>	<p><b>Precipitated Sulfur:</b> Sulfur gas gushing from exploding crater lakes meets water and forms sulfur prill or powder. Mixed with soil and sand, it accumulates in low-lying wetland and then forms precipitated sulfur.</p>
<p><b>昇華硫磺礦：</b> 含硫氣體或硫磺瓦斯附著在硫氣孔或附近岩石、土砂表面，形成鮮黃的結晶。</p>	<p><b>Sublimed Sulfur:</b> Sublimed sulfur is made when sulphate or sulfur gas attaches sulfur vents, surrounding rocks, or soil and sand surface and forms bright-yellow-colored crystals</p>
<p><b>礦染硫磺礦：</b> 噴出的硫氣或硫質溫泉侵滲在岩石中，將岩石分解、交替而形成硫磺礦。</p>	<p><b>Rock-formed Sulfur:</b> Rock-formed sulfur is formed when sulfur gas or sulfur hot spring permeates and dissolves rocks.</p>



早期陽明山國家公園的大油坑採硫過程。左圖為製硫廠 / 陽管處提供  
The process of sulfur mining at Dayoukeng in YMSNP back in the era of mining industry. The picture on the left shows a sulfur factory./  
Provided by YMSNP Headquarters

堵住，並且火燒芒草叢，以防民眾躲藏夜盜。清軍駐紮的營盤，今日在魚路古道上仍然可見，稱作「守硫營地」。

冷水坑是全臺唯一沉澱硫磺礦，大油坑則是最大的昇華硫磺礦床，區內數處大硫氣孔，時常以轟隆音響噴出大量硫氣，氣勢極為猛烈，難於接近，採取法是在噴氣孔設冷凝管，採得的硫磺純度達99.5%。死磺子坪曾擁有全臺最大硫磺產區頭銜，平均月產量200-300公噸，其品質也是臺灣礦染硫磺中最優者。

二次大戰之後，美國、日本的硫磺佔有世界市場，大量輸入臺灣。因本土採硫成本高昂，品質亦無法與進口硫磺競爭，只得相繼停業。1980年代，產自煉油副產品的回收型元素硫，迅速取代了自然元素硫，陽明山的硫磺礦因喪失經濟價值，反而得以留存命脈。

### 太魯閣國家公園：礦石

中央山脈與九份至金瓜石一帶，同列為臺灣金礦主要分布區，根據經濟部礦務局資料，包括南湖大山、中央尖山、合歡山、屏風山、能高山及玉山地區皆有含金石英礦脈，立霧溪、花蓮溪、秀姑巒溪、卑南大溪等河川則有砂金礦床。

16世紀初，葡萄牙人來到東臺灣，在今立霧溪下游發現黃金，即以葡國的產金地 Rio Duero 命名，意思是「黃金河」，而其譯音「哆羅滿」也成了花蓮的古地名。

日據時期開鑿八通關越嶺道，目的之一就是為了採礦。瓦拉米地區一帶是金礦與銅礦的主要蘊藏點，附近越嶺道旁即可發現日人探勘所挖掘的坑道。1939至1941年間，臺灣總督府雇用一千名工人，在中央山脈各河系探勘砂金，總計探出38條河

miners. Sulfur vents were blockaded and Miscanthus weeds burned to prevent illegal miners from hiding. The troops' bases can still be seen today along Fishermen's Trail.

While Lengshuikeng contained Taiwan's only precipitated sulfur reserve, Dayoukeng had the island's biggest sublimed sulfur deposit, accompanied by giant sulfur vents that often blasted huge amount of sulfur gases and made the vents barely reachable. To extract sulfur, condensers were installed around the vents, producing sulfur at 99.5% purity. Sihuangziping was the largest sulfur production site in Taiwan, rendering an average of 200 to 300 tons of top quality sulfur per month.

U.S. and Japanese sulfur began to dominate global markets and flood into Taiwan after the end of WWII. Taiwan's sulfur miners closed down as local mining costs hovered and local sulfur paled imported products in quality. In the 1980s, recycled elemental sulfur, a byproduct of oil refining, quickly replaced natural sulfur. Thus, sulfur in Yangmingshan lost its economic value yet was able to be preserved.

### Stone Mines at Taroko National Park (TNP)

Taiwan's gold mine spread across Central Mountains and the area from Jiufen to Jinguashi. According to the Bureau of Mine, MOEA, quartz veins containing gold are found on Mt. Nanhu, Mt. Jhongyangjian, Mt. Hehuan, Mt. Pingfeng, Mt. Nenggao, and Mt. Jade; sand gold riverbeds are found in Liwu River, Hualien River, Siouguluan River, and Bainan River.

Gold was found downstream of Liwu River when the Portuguese got to eastern Taiwan in the early 16th century. They named the river Rio Duero, or the Golden River, after the Portugal golden mine.

Japanese occupants constructed Batongguan Traversing Trail partly for mining purposes. Japanese probing tunnels could be seen nearby Walami, where gold and copper concentrated. From 1939 to 1941, the colonial government hired a thousand workers to explore, and found sand gold in 38 rivers spanning from Central Mountains. The government



川含有不等量的砂金。日本政府開放民間申請淘金，正計畫大規模開採時，太平洋戰爭爆發，迫使採金計畫中斷。

國府時期，退輔會接收立霧溪出海口採礦權，但中央山脈地勢陡峭、交通十分不便，加上一年四季不時有天災阻絕，開採成本高昂，於1991年停止作業。此時，黃金礦脈蘊藏較富的地區，大多已劃入國家公園範圍，例如：屏風山地區劃入太魯閣國家公園，玉山地區劃入玉山國家公園內，中央山脈永遠成為傳說中的金寶山。

淘金夢難圓，礦業主於1960年代起，將目標投注轉移到礦石。位於中央山脈東翼的太魯閣山區是臺灣最古老的地質帶，蘊藏豐富的石礦資源，其中最主要的是大理石與白雲石。因大理岩硬度不高，不耐久磨，若長期暴露在酸性雨水下又容易受蝕，1980年代後，漸漸被進口的花崗石所取代，礦區陸續停採。邁入21世紀之前，太魯閣國家公園內已禁絕大理石的開採。

then allowed the public to apply for panning for gold, but the project was suspended as the Pacific War broke out.

The Veterans Affairs Commission took over the right for mining at the estuary of Liwu River. Yet the cost of mining remained high due to the steep Central Mountains, transportation difficulties, and frequent natural disasters. Mining stopped in 1991 when most high-concentration golden veins had been included in national parks. Since then, Central Mountains had become a legendary gold treasure range for long.

With unfulfilled gold prospects, the mining industry turned to target stones from the 1960s onward. Located on the east of Central Mountains, Taroko had the most ancient geology and was rich in stone resources, especially for marble and dolomite. With low hardness and durability and high vulnerability to long-time acid rain, marble was gradually substituted by imported granite, and marble quarries began to close down from the 1980s. Marble-mining within Taroko National Park has been prohibited since before 2000.



## 金門國家公園：花崗岩礦

金門地質主要以沉積岩及火成岩為主。火成岩體包括花崗岩、煌斑岩；沉積岩體則覆蓋在火成岩之上，主要為石英砂、瓷土、紅土礫石。花崗石和瓷土是兩大主要具有經濟價值可供開採的礦石，金門因而以花崗石材和陶瓷產業聞名。

金門島嶼的花崗岩分佈相當廣泛，先民們便就地取用各種石材興築房屋、街道，或是運用到生活中的各個角落，如鎮煞驅邪的石像、石塔、立碑、牌坊等。戰備時期，國軍自堅硬的花崗岩開鑿出各式坑道，作為戰事陣地、指揮通信據點、庫儲設施乃至於醫療場所，而路口、荒野隨處可見的碉堡，也都是由花崗石堆疊而成的重重固壘，金門可以說到處充滿了石頭文化的氣息。

著眼於金門花崗石的市場潛值，金門花崗岩廠於1971年8月正式設廠，先後探勘開挖料羅、陽明、夏興、田浦等數個礦區，但是90年代以來，由於環境變遷、環保意識抬頭、外來石材削價競爭，經營日益困難，陸續關閉。金門國家公園設立後，原園區內的少數礦區也在管理處的協調下結束開採，目前金門的各礦區並已陸續除役。

數十年來，「戰事陣地」總是成為金門的代名詞，下次遊訪時不妨尋看金門島上由花崗岩所組成各有風味的建材，來場另一種不同的歷史人文「石地」之旅。

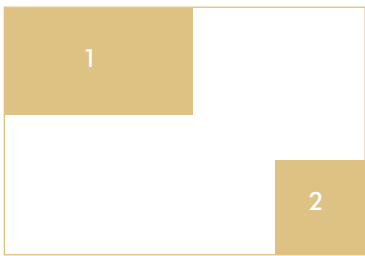
### Granite at Kinmen National Park (KMNP)

Kinmen's geology is primarily composed by igneous and sedimentary rocks. The former include granite and lamprophyre. Laid on top of igneous rocks, sedimentary rocks are mainly quartz sand, clay, and laterite gravel. That is why Kinmen is famous for its granite and ceramic industries.

Granite, widely distributed in Kinmen island, has long been the major construction material used by local residents. Granite fills people's life in all sorts of buildings, such as houses, road pavements, religious sculptures, towers, monuments, and wartime bunkers, military forts, and even hospitals. Mineral stones and rocks have definitely been an integral part of Kinmen architecture and culture.

Due to the lucrative potential of granite, Kinmen Granite Quarry was founded in August, 1971, followed by operations in Liaolu, Yangming, Xiaying and Tianpu. But since the 1990s, they had been closing due to environmental changes, rising conservationism, foreign competitions, as well as the establishment of KMNP.

Kinmen has been known for its military importance for decades, but the granite-based buildings across the islet is another equally distinctive feature and historical heritage that is worth exploring for tourists.



1. 花崗石是金門的主要建材之一 / 戴進元攝  
Granite has been a major construction material in Kinmen./ by Jin-yuan Dai
2. 時代的變動與環境的限制，讓淘金已轉變為民眾體驗過去生活的參觀活動之一 / 林茂耀攝  
With time changing and the limits on environment imposed, gold-panning has become a demonstration activity for tourists in modern-day Taiwan./ by Mao-yao Lin



### 東沙環礁國家公園：磷

清朝初年稱東沙為「落漑」或「南澳氣」，史料裡已經提及這裡的自然資源——磷礦，但不知其成因。

西元1866年，英籍博物學家 Cuthbert Collingwood 曾經隨探險船意外的在此登島一天，留下一篇調查紀錄。他描述當時島上有數以百計的白腹鯉鳥，在礁岩空地築巢與育幼。白腹鯉鳥從海中攝食魚類，由於魚體內磷的成份，無法被鳥類消化，而以鳥糞的方式排出堆積在陸地上，久而久之就形成磷礦資源。

1901年，日本人西澤吉治遇風漂流至東沙島，他挖取鳥糞回臺灣化驗，確認具有大量開發的經濟價值後，便於1907年召集了200多人至島上。他拆毀原有的大木廠和祠堂等建物，接著修建鐵軌、製淡水廠及辦公所等，甚至還發行「西澤島」專用鈔票。後來清廷與日本交涉，雖然終止了西澤的強佔行為，但他所造成的破壞已經無法彌補。

19至20世紀初，滿清與國民政府在經營東沙時，曾經發出許多許可證，特許一些民間公司開採磷礦，磷礦資源幾乎消耗殆盡。及至1937年中日戰爭爆發，日軍侵佔東沙島建為軍事基地，做為南侵的中繼點，將僅存的鳥糞挖掘一空。

### Phosphate at Dongsha Atoll National Park

Phosphate resources on Dongsha Island were recorded in the early Qing Dynasty with the cause of formation unknown.

In 1866, British Naturalist Cuthbert Collingwood landed on the island for one day in a ship accident. In his record Collingwood described hundreds of Brown Boobies (*Sula leucogaster*) building nests and rearing baby birds on the island. Brown Boobies ate fish in the sea yet could not digest the phosphate in the fish, and thus excreted it on land as guano manure, which formed a reservoir of phosphate over time.

In 1901, a Japanese named Nishizawa Yoshizi was drifted to Dongsha Island on a ship. He collected guano manure, brought back to Taiwan for testing, and confirmed its economic value for large-scale exploitation. In 1907, he recruited 200 people to the island, tore down existing buildings, built infrastructure, and even issued special Nishizawa banknotes. Although the Qing court finally ended his illegitimate occupation, the damage to the resources had been made.

Phosphate on Dongsha was nearly depleted from the 19th to early 20th century when the Qing and ROC government granted private mining of phosphate. After the 2nd Sino-Japanese War broke out in 1937, the Japanese seized Dongsha and turned it into a military base; thus, the remaining phosphate was finally emptied.

Dongsha Island is administered by Cijin District, Kaohsiung City. The establishment of Dongsha Atoll National Park in 2007 was a symbolic leap towards environmental conservation.

白腹鯉鳥曾為東沙島帶來豐富的磷資源 / 高介志攝

Brown Boobies (*Sula leucogaster*) had once brought to Dongsha Island an abundance of phosphate. /by Jin-zhi Gao



東沙的行政轄區隸屬於高雄市旗津區，2007年東沙環礁國家公園的成立，象徵邁向保育的一大步。回復兩百年前的東沙環境可能是一個遙遠的夢想，不過，可以確定的是：營造更多樣化、豐富的東沙生態，指日可待。

### 台江國家公園：海鹽

炎炎夏日來臨，日照強、風力大成了臺灣西南沿海地區特有的氣候條件。酷陽下，一望無際的鹽田、魚塢在台江內海濕地展開，鋪著陶片的地面結起了一片片如薄冰的鹽礦，這裡是臺灣鹽業最早發展區域，也是臺灣重要產鹽區。

台江鹽產業奠基於明清，直至日人將沿海濕地闢建為鹽田而達到高峰。開闢於1919年的安順鹽場是第一個新式鹽田，在臺灣的近代鹽業史上具有重要意義。鄰近的許多港口都曾因運鹽而興盛一時，而曬鹽也成為該地居民賴以維生的傳統產業。

爾後因為產製成本過高及都市發展需求，鹽田景觀日益消失。台江國家公園管理處成立後，規劃保留七股濕地的鹽田，保存臺灣四百年來的常民生活型態，使行之有年的經濟產業文化能與其保育共存。

目前安順鹽場已整修為「鹽田生態文化村」，在修復部分的瓦盤鹽田後，重新在此地曬鹽，來訪遊客可以親自下田掃鹽。而運鹽港口碼頭建築至今保存完整，並列為臺南市定古蹟，靜靜訴說著台江的貿易歷史。📍

Though to restore a primitive Dongsha may be a distant dream, we are sure to see a more diversified and versatile ecosystem on the island.

### Salt at Taijiang National Park (TJNP)

Taiwan's southwestern coast features hot summer with intense sunlight and strong winds. At the Taijiang wetland, vast salt pans and fish ponds spread under the scorching sun as thin slates of ice-like salt emerges on clay-paved ground. The area is the frontier of Taiwan's salt-producing industry and a major production site.

Taijiang's salt industry dated back to Ming and Qing Dynasties. It peaked when the Japanese turned coastal wetlands into salt pans. Anshun Salt Works was developed in 1919 as the first modern salt pan of its kind. Many neighboring harbors prospered thanks to salt shipping, and salt-producing became a major traditional industry for the locals.

Later on, salt pans diminished as a result of high production cost and the need for urban growth. TJNP managed to preserve salt pans in Qigu Wetland as well as the lifestyle led by local people for 400 years, striking a balance between conservation and economy.

So far Anshun Salt Works has been re-created as a Salt Field Eco-Culture Village. The clay-paved salt pans was restored, allowing visitors to experience hands-on salt-mopping, while the well-preserved salt-shipping harbor has been listed as a municipal historical site. 📍

台江內海濕地是臺灣鹽業最早發展區域，也是臺灣重要產鹽區 / 戴進元攝  
The wetland in Taijiang is the frontier of Taiwan's salt-producing industry and a major production site. / by Jin-yuan Dai