霧林春暖 大地生息
Cloud Forests and Land
走進國家公園霧林帶
An Intellectual Tour to the Cloud Forests in the National Parks

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霧，使台灣森林更豐富 /elwynn 攝
Fogs have enriched the ecology in Taiwan's forests. / by elwynn

台灣很小，在世界地圖上得花點眼力才能找著，這樣的小島，卻因為得天獨厚的條件，造就了島上許多珍奇美妙的現象。

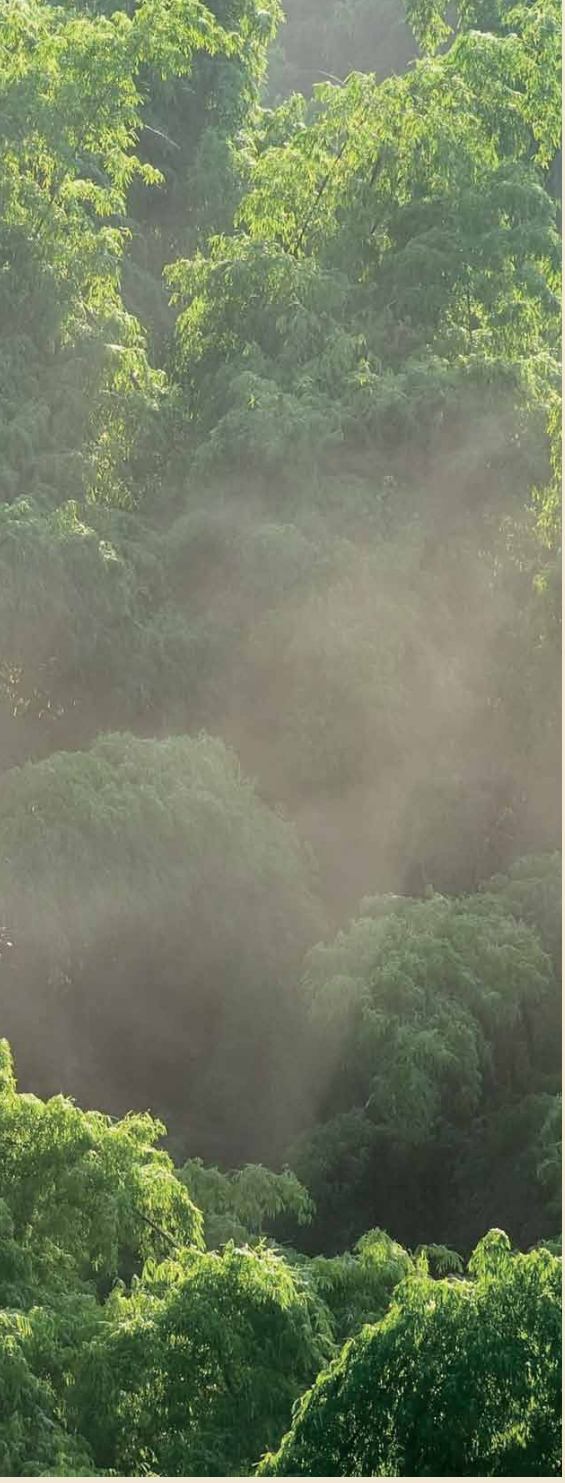
曾有人是這麼形容台灣的：又大又小、又老又少。「又大又小」是指生態面積很大，但土地面積很小；這使台灣擁有出色的生物和棲地多樣性，成為北半球陸域生態的縮影；「又老又少」是指地質非常年輕，但卻擁有相當古老的物種。

只是，台灣這些讓人嘖嘖稱奇的獨特之處，對於居住在這塊土地上的人而言，是已經習以為常呢？還是心懷珍惜？

Though as tiny as a dot on a world map, Taiwan is endowed with numerous unique spectacles.

Some describe Taiwan is both large and small, and that both old and young. It means the island has a large area in terms of ecology and a small area of land, boasting great diversity in life forms and habitats. And it is also young in geology, but owns age-old species.

But has this amazing uniqueness been taken for granted by people living on this land? Or has it been truly appreciated and cherished?



彈丸大小　卻擁有多樣美景

住在台灣的你我對於山區林間虛無縹緲的雲霧，不以為奇，但其實和台灣同位於北迴歸線上的陸地，多半是沙漠、半沙漠和疏林，少有綠意盎然的森林。

「與台灣同緯度的沙烏地阿拉伯、美墨邊界、埃及等，都是乾旱沙漠，生態單調，而台灣卻是潮濕多雨、地貌多變、生態豐富，主要便是受造山運動、火山噴發、海洋調節、東北季風盛行的影響。」對台灣林相有深入研究的東華大學榮譽教授徐國士說明著。

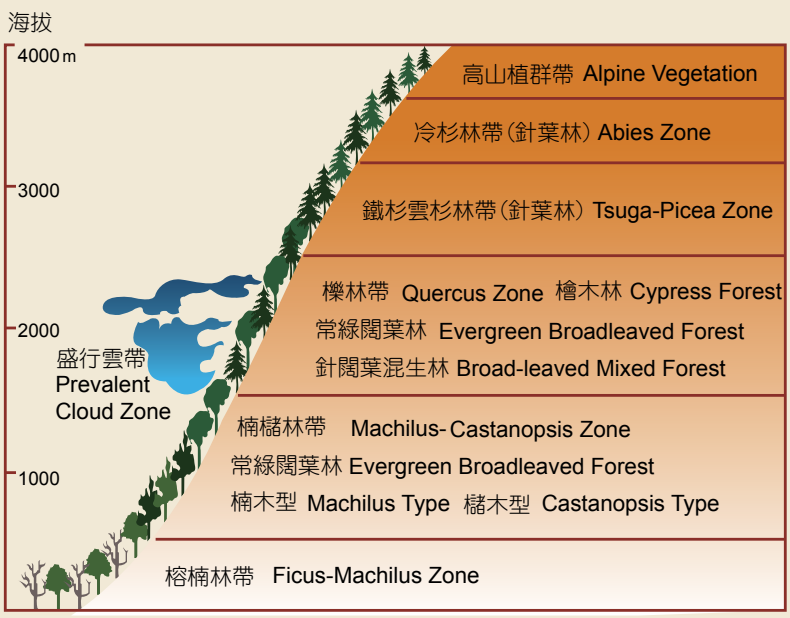
幸運的台灣因處東北季風與西南氣流交匯帶，又居海洋型氣候與大陸型氣候的過渡區域，上層空氣極不穩定，加上高山與平地海拔落差大，海拔超過3,000公尺的山頭就超過250座。高山攔截夏季的西南氣流和冬季的東北季風帶來的水氣，大氣壓力與溫度變化使得向上移動的氣流更為強勁，導致海拔1,800至2,500公尺的山區容易形成雲霧，山勢地形效應使得白天陽光照射，水氣上升，午後山區溫度漸降，水氣停滯形成雲霧或雨滴，如此日復一日，中高海拔森林即形成生態豐富的神秘霧林帶。

Small but Diversely Beautiful

For people in Taiwan, mountains and forests bothed in fogs and clouds are seldom marveled at. But in other parts of the world around the Tropic of Cancer, such verdant landscapes are as rare as hen's teeth.

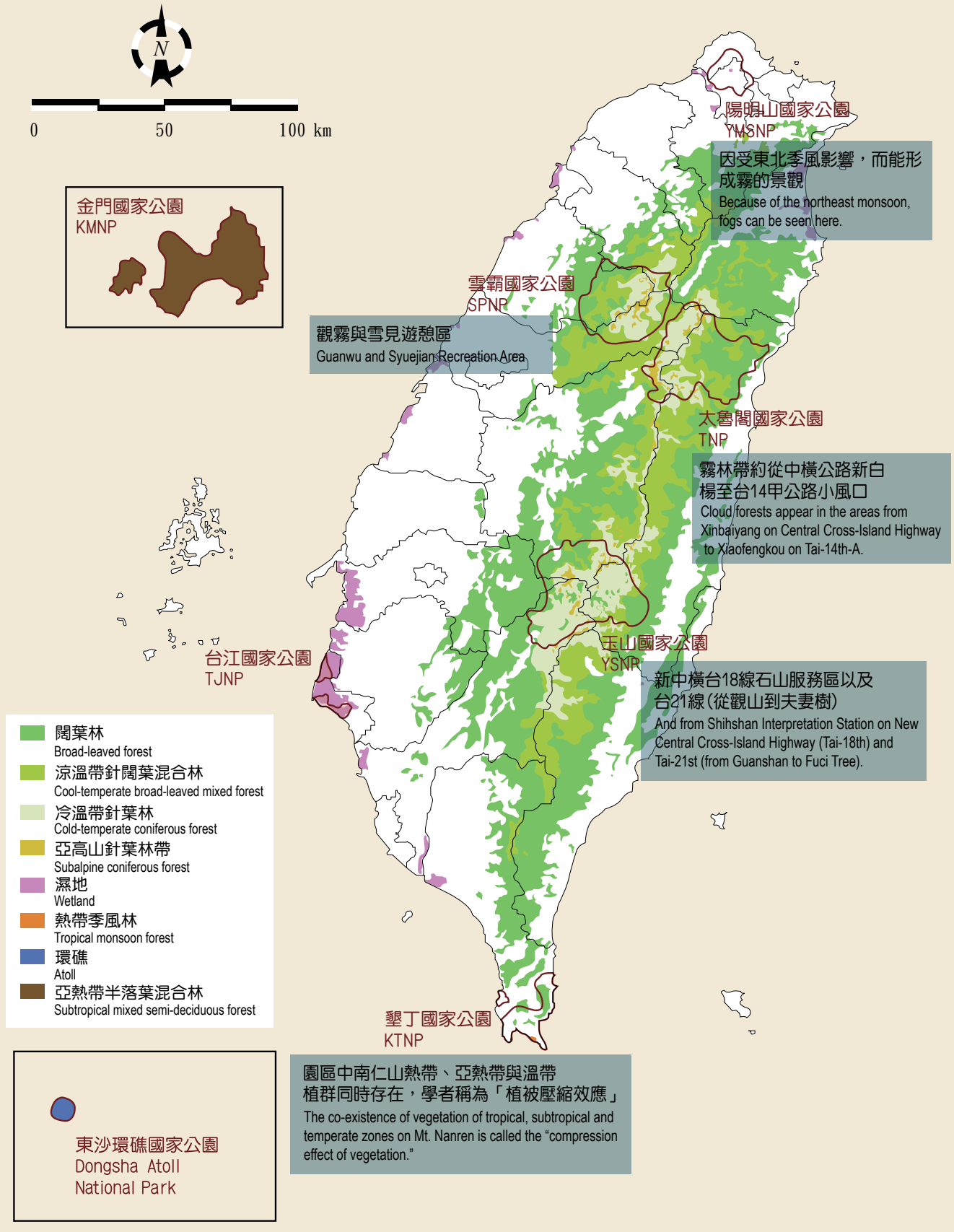
"At similar latitude, Saudi Arabia, the U.S.-Mexico border area, Egypt, etc. possess mostly dry deserts. By contrast, Taiwan is humid and rainy with a great variety of landforms and species thanks to orogenesis, volcanic eruptions, ocean regulation, and the northeast monsoon," explained Prof. Emeritus Kuo-shih Hsu of Nat'l Dong Hwa Univ.

Taiwan is luckily featured with both oceanic and continental climates and both northeast monsoon and southwest airflow. The unstable air in the upper layer, the huge elevation difference of landforms, and the large number (over 250) of 3,000m-plus mountain peaks result in great changes in atmospheric pressure and temperatures, which leads to the frequent formation of fogs, clouds or rain drops in the mountain areas from 1,800m to 2,500m in elevation. All this has contributed to the fairytale cloud forests at the middle and high altitudes of the island.



台灣植被示意圖 / 劉好音繪

The picture shows the diagram of Taiwan vegetation. / Illustrated by Hao-yin Liu



台灣國家公園霧林帶分布圖 / 劉好音繪
The picture shows the distribution map of cloud forests in Taiwan's national parks. / Illustrated by Hao-yin Liu

雲霧裊繞的陽明山，賞起花來別有一番風情 / 陳慧婷攝
The clouds and fogs in Yangmingshan add a different feel to flower-viewing. /by Hui-ting Chen

到國家公園 追雲賞霧

在台灣現有的8座國家公園範圍內，其中高山型國家公園，包括雪霸、玉山、太魯閣，以及北部的陽明山國家公園、台灣最南端的墾丁國家公園南仁山都會有霧的產生，而低海拔的陽明山、墾丁國家公園的雲霧形成原因則與高山型國家公園大不相同。

通常高山的雲霧帶海拔高度大約介於1,800至2,500公尺，但在陽明山國家公園平均海拔高度不到1,000公尺，卻也能有雲霧的產生。「陽明山國家公園有霧的景觀，造就出獨特的動植物生態，而且寒流來時還會下雪，氣候變化如此大，是因為東北季風影響，所以才會有霧的形成。」陽管處詹德樞副處長說明。

拜東北季風所賜，陽明山國家公園潮濕多雨，年雨量多達4,000毫米，降雨日數也在190天以上，而起伏大且複雜的地勢，致使山區氣候變化相當明顯。前一刻還陽光普照，下一刻卻又立刻蒙上薄霧，宛如走進虛無飄渺的仙境，時常可見「東山飄雨西山晴」、「虹橋拱立山谷」的美景，「冬日若遇強烈寒流過境，位處亞熱帶，海拔高度僅約八百多公尺的山區，還能欣賞細雪紛飛的七星山和白了山頭的大屯山，不用長途跋涉到高山卻能欣賞這樣的美景，真是種幸福。」詹副處長形容著。

Fogs and Clouds in Taiwan's National Parks

Fogs and clouds occur among 5 of the 8 national parks in Taiwan, including the alpine ones: Shei-Pa, Yushan, and Taroko National Parks, and low-altitude ones: Yangmingshan and Kenting (its Mt. Nanren) National Parks, while the causes for the formation of fogs between the two groups are different.

As fogs normally occur at an altitude between 1,800m and 2,500m, it's amazing that YMSNP can be foggy, too, with an average altitude of only 1,000m. "Fogs have brought YMSNP its unique flora and fauna as well as snow when the cold current comes. All these are made possible by the northeast monsoon," said the park's Deputy Director Te-shu Chan.

Because of the monsoon, the annual rainfall in the park reaches 4,000mm and the number of rainy days per year 190. And great difference in elevation of the park's complex terrains leads to changeable weathers and constant alternations of sunshine, fogs, mists and rainbows, composing fairy tale-like scenery everywhere. "In winter when an intense cold current passes this subtropical park, even at Cising Mountain and Datun Mountain with only about 800m in elevation could slight snow be seen at times. It's a blessing that such beautiful scenes are just a stone's throw away from the city," said Chan.

雪霸國家公園的霧水量豐富，宛如雲的故鄉 / 陳家鴻攝
Fogs bring considerable horizontal precipitation to Shei-Pa National Park, making it home to clouds. /by Jia-hong Chen

只緣身在此山中　雪霸國家公園

雪霸國家公園的觀霧、雪見遊憩區，顧名思義，就知道此處宛如雲霧的故鄉。台灣的高山會攔截季風所帶來的豐沛水氣，同時陽光照射山區所產生的蒸散作用，再加上地形效應，使得中海拔山區常形成「盛行雲霧帶」，常常有超過20%的降水是來自於霧氣。「雪霸國家公園的觀霧遊憩區一年中有雲霧的天數竟超過300天，雲霧所帶來的水平降水可達雨量的三分之一。」曾任雪霸國家公園觀霧遊憩區主任、現為中興大學惠蓀林場場長的邱清安助理教授，對觀霧地區的雲霧，再熟悉不過。

同為高山型國家公園的玉山及太魯閣，霧的成因與雪霸相同，氣溫變化大，上午山區陽光灑落樹梢，風光明媚，到了下午，就變成雲霧的舞台。雲霧像是有生命般，在不同季節、不同時間都會有上下移動、濃密不等、厚薄不一的變化，「當我們開車經過中海拔時常會置身於霧氣中，就是身處在雲霧帶之中，而當我們上到高山所見到的雲海，其實就是雲霧帶。只在此山中，雲深不知處的意境，在觀霧，很能體會。」邱場長說。

Wrapped in All That Fog—Shei-Pa National Park

Guanwu (meaning “viewing fogs”) and Syuejian (meaning “snow shown”) Recreation Areas in SPNP live up to their names as foggy places. Here water vapor from monsoons is blocked by the mountains and evaporated by sunshine, and forms in mid-altitude mountains the “prevalent cloud zone,” in which over 20% precipitation comes from fogs. “In Guanwu, the number of foggy days exceeds 300, and the horizontal precipitation brought by fogs amounts to one-third of its total rainfall,” said Asst. Prof. Ching-an Chiu, Chief of Huisun Forest Park of Nat’l Chung Hsing Univ., and former Chief of Guanwu Recreation Area.

Fogs in Taiwan’s alpine national parks, featured with dramatic temperature changes, occur by the same mechanism. Sunny in the morning and foggy in the afternoon has been the pattern in the high mountains. And fogs change in position, density and thickness. “When one drives in the mists and fogs in mid-altitude areas or sees the seas of clouds in high-altitude areas, he or she is actually right in the cloud zone. Guanwu is particularly characterized by this feel of being wrapped in all that fog,” said Chiu.

拔地峽谷舞雲霧　太魯閣國家公園

太魯閣國家公園中高海拔山區也有霧林帶，相較於其他國家公園的山區地形，太魯閣國家公園垂直的峽谷地形、還有台8線、台14甲線等景觀公路貫穿園區，遊客可以盡情飽覽熱帶、亞熱帶、溫帶至寒帶的景觀。

「太魯閣國家公園有著地利之便，從海拔高度60公尺的閣口到3,000多公尺的武嶺，開車只需兩個多小時就可抵達，放眼全世界，少有地方可以在這麼短時間內就到海拔高度如此高的地方。」近兩年都在太魯閣國家公園進行鳥類研究的東華大學許育誠助理教授說。

太魯閣國家公園內中橫公路天祥到大禹嶺的中海拔山區迎風面，每到下午便開始起霧，濃霧鋪天蓋地，將森林染成一幅幅水墨畫，帶來淒冷絕美的詩意。車行其間得小心再小心，那被洶湧雲海「淹沒」的經驗，真的令人難忘，而這濃霧也造就出太魯閣國家公園霧林帶的豐富生態。

Dances with Foggy Gorges—Taroko National Park

In addition to the cloud forests, TNP has rich vertical landform of gorges and some scenic highways of Tai-8th and Tai-14th-A, presenting scenery of tropic, subtropical, temperate and frigid zones to tourists.

“TNP is special in its landforms in that it takes a little more than 2 hours to drive from the park entrance at an altitude of 60m to Wuling at over 3,000m. Such huge elevation difference within such a short distance is truly rare around the world,” said Asst. Prof. Yu-cheng Hsu of Nat’l Dong Hwa Univ., who has studied birds in TNP for the past 2 years.

At the windward side of the mid-altitude mountains from Tiansiang to Tayuling along Central Cross-Island H’way, thick afternoon fogs permeate the forests with a chilly but poetic touch of ink paintings. This “flood” of fogs not only necessitates careful driving of visitors, but also brings them unforgettable experiences and creates a species-rich ecology to the park’s cloud forests.

太魯閣國家公園獨特的地形，讓遊客可以盡情飽覽熱帶、亞熱帶、溫帶至寒帶的景觀 / 林茂耀攝
With the unique landscape in Taroko, tourists can see scenery of tropic, subtropical, temperate and frigid zones here. /by Mao-yao Lin

雄踞一方霧腰繞　玉山國家公園

擁有東北亞第一高峰的玉山國家公園，是台灣面積最大的國家公園，位於台灣的中央地帶，橫跨南投、嘉義、花蓮及高雄4縣，群峰並峙，百岳高山多達30餘座，是典型的亞熱帶高山。玉山國家公園的景點豐富，要登高望遠還是尋幽訪勝都很適合，但如果想到園區追霧，玉管處建議遊客容易到達、且通過霧林帶地區的景觀公路包含西北園區台21線(即新中橫公路)及台18線(即阿里山公路)，另一是西南園區的台20線(即南橫公路)。

A Majestic Waist Band of Fog—Yushan National Park

As Taiwan's largest national park that boasts the highest peak in northeast Asia, YSNP contains over 30 of the island's top 100 mountains, which are scattered in Nantou, Chiayi and Hualien Counties and Kaohsiung City. The variety in scenic spots has made the park an ideal place for all kinds of sightseeing. For those interested in viewing fogs, the best and most accessible choices must be the scenic highways of Tai-21st and Tai-18th in the northwest of the park, as well as Tai-20th in the southwest.

玉山國家公園山形壯麗，海拔高度造就出霧林及雲海美景 / 莊明景攝
Yushan National Park's high mountains are magnificent, and the height has formed awe-inspiring views such as cloud forests and the sea of clouds. /by Ming-ching Chuang

高聳入天的夫妻樹給人遺世獨立的高傲與空靈感 / 陳志明攝
The towering Fuci Tree looks solitary and ethereal. /by Zhi-ming Chen

位於台21線141.7公里處的夫妻樹，兩棵經歷雷擊、森林大火的殘存紅檜，依舊傲立於公路旁，每當午後霧起，高聳入天的夫妻樹被霧籠罩著，瀟灑的樹型，給人遺世獨立的高傲與空靈感。

而楠梓仙溪林道的路途中，有一株樹形優美、造型奇特、蓊鬱蒼盛、生氣蓬勃的千年鐵杉，也很適合遊人駐足欣賞。而台20線南橫公路自「八八風災」後使山區交通不便，使得位於霧林帶上的中之關（130.5公里處、海拔約1,830公尺）到檜谷（143公里處海拔2,450公尺）的路段不易到達，讓這方密林霧鎖深山，也期待在減少人為干擾下，讓霧林帶生態更加昂然。

The towering Fuci Tree, two red cypresses that had survived thunderstrokes and forest fires and still stand at the mark of 141.7km on Tai-21st Highway, for example, look particularly solitary and ethereal when shrouded by the afternoon fogs.

A thousand-year-old hemlock at Nanzihsian River Forest Road is also worth a visit for its gorgeous and distinctive posture and lushness. Besides, cloud forests located from Jhongjhihguan (1,830m in elevation at the 130.5km mark) to Kuaigu (2,450m in elevation at the 143km mark) and made nearly inaccessible by Typhoon Morakot in 2009 are allowed to shun human disturbance and nurture an even richer ecology.

南仁湖上霧輕揚　墾丁國家公園

為於台灣最南端的墾丁國家公園，沒有高山地形，沒有典型的霧林帶，但園區內的南仁山保護區，是全台目前僅存最大面積的低海拔熱帶季風林，同時擁有丘陵、山谷、沼潭、溪流、山坡、草原等變化多端的地形地勢，因東北季風的影響，呈現高度區域性變化－迎風的山脊，樹種多屬亞熱帶或溫帶的常綠闊葉樹，如殼斗科、樟科等家族，這些樹種在台灣中、北部地區，通常分布於海拔1000公尺左右的森林，在這裡卻出現在500公尺以下之處；而背風的溪谷區，植群出現幹生花、板根、支柱根、纏勒植物等熱帶雨林特

The Misty Nanren Lake—Kenting National Park

Without either high mountains or typical cloud forests, KTNP embraces Mt. Nanren—Taiwan's only and largest low-altitude tropical monsoon forests--and kaleidoscopic landforms of hills, valleys, marshes, rivers, slopes, meadows, etc. This, under the impact of northeast monsoon, has generated the existence of broad-leaved evergreens of subtropical or temperate zones, which appear at an altitude of 1,000m in northern and central Taiwan, at the windward ridges of less than 500m in altitude here in Kenting. And the leeward valleys are characterized by vegetation of tropical rainforests, such as

墾丁國家公園中的南仁湖在東北季風影響下，具有少見的「植被壓縮」現象。/ 墾丁國家公園管理處提供
Under the impact of northeast monsoon, the rare phenomenon of "compression effect of vegetation" is seen at Nanren Lake in KTNP. / Photo provided by KTNP Headquarters

徵。學者將這種熱帶、亞熱帶與溫帶植群同時存在於南仁山區的現象，稱為「植被壓縮效應」，是南仁山森林的一大特色。

南仁山除了獨特的森林之外，還包括30公頃的水域－南仁湖，即丘陵盆地間由雨水或山澗匯集形成的湖泊與沼澤。靜謐湖面在東北季風盛行時常飄著輕霧，湖畔草木青翠，在遊人如織的墾丁國家公園有這一方寧靜的所在，著實教人驚艷。南仁山自然生態保護區每天限額400人，要申請登記才能入山，從入口步行至南仁湖需3個小時，就可以欣賞到熱帶勝地的輕霧之美。

the cauliflory, buttress root, stilt root, and strangling plants. This co-existence of vegetation of tropical, subtropical and temperate zones is called the “compression effect of vegetation.”

Also in Mt. Nanren lays the 30-ha. Nanren Lake, a marshy lake fed from rain or mountain creeks around the hill and the basin. During the season of northeast monsoon, the serene lake and the verdant plants nearby are covered by a thin layer of hazy fogs, forming a corner of tranquility in sharp contrast with the bustling parts of the park frequented by tourists. The reserve area sets up a daily quota of 400 visitors, who must register before a 3-hour walk to the misty Nanren Lake.

巨大的檜木是霧林帶裡的明星樹種 /wang 攝
Giant cypress is the celebrated tree species in the cloud forests. /by wang

生長在終年濕潤、充滿豐沛霧氣的霧林，生物種類繁多，不僅適合苔蘚、地衣、等附生植物繁盛生長，更孕育了紅檜、扁柏等世界孑遺的巨木林。「世界上檜木屬植物約6種，僅見於北美、日本及台灣，亦即北太平洋區海洋氣候因山勢地形攔截豐沛水氣才能形成。」徐國士教授說。

曾被日本學者金平亮三譽為東亞第一大針葉樹的紅檜，以及台灣扁柏，為台灣特有的檜木，其族群形成優勢的森林則稱之為檜木林，二者都是生長緩慢，綿亙香火傳承百萬年以上，不僅是台灣自然史的活見證者，也刻劃著台灣生態演化變遷的記錄。

深藏在台灣雲霧帶的檜木林間，還有許多冰河期倖存的孑遺物種，如紅豆杉、台灣杉、台灣粗榧、雲葉樹 (昆欄樹) 等等，都是見證生物演化的珍貴活化石。「有這麼多的古老物種聚集在霧林帶中是很特殊的，在學術研究和環境保育上都有不可取代的地位。」惠蓀林場邱場長說明著。

So cloud forests have been ideal for the growth of not only epiphytic plants like the moss and lichen but also world-renowned relic plants of giant trees such as Taiwan Red Crypress and Taiwan Yellow Cypress. “All the 6 species of the Genus *Chamaecyparis* are only seen in North America, Japan and Taiwan due to the abundant water vapor brought by the oceanic climate in North Pacific and blocked by mountains,” said K. Hsu.

Taiwan Yellow Cypress and Taiwan Red Cypress, the latter lauded as the largest conifer in East Asia by the Japanese scholar Kanehira Ryozo, are slow-growing million-year-old trees endemic to Taiwan. They have witnessed and recorded the ecological evolution and changes in Taiwan’s natural history.

Hidden among the cypress forests are many precious relic species from the ice age, such as Taiwan Yew, *Taiwania cryptomerioides, Cephalotaxus wilsoniana* Hayata, etc., all of which are living fossils and witnesses of biological evolution. “It’s truly unique that so many ancient plant species coexist in cloud forests. This significance is irreplaceable in both academic research and environmental conservation,” said Chiu.

森林中巨木樹幹上的附生植物 / 林茂耀攝
The epiphytic plants grow on the giant trees in the forest. / by Mao-yao Lin

更獨特的是，全球檜木中只有紅檜與台灣扁柏兩種位居亞熱帶地區，就學術與保育觀點而言，皆有不可取代的價值。由於台灣檜木為全球稀有物種，又是見證地球氣候變遷與生態演化的活化石，而檜木林獨特的生態環境，更是諸多野生動物的棲息地，在在符合世界自然遺產的認定標準，從多元的面向縱觀，與列為世界自然遺產的美國紅杉相比毫不遜色，足以登上國際舞台。

迷你　卻不可忽視的重要存在

霧林帶中不只是明星樹種讓人著迷，還有許多微小的植物，也在生態系中占有重要地位。

據調查，在霧林帶裡只要樹夠大，就是附生植物最好的寄託，所以紅檜、扁柏與其他林中植物就成了附生植物的依戀。舉凡苔蘚、圓葉鑽地風、石吊蘭、刺果衛茅、絞股藍等植物，雖然身形迷你，但在霧林帶中都占有重要地位，仔細觀察就會發現，森林中的每棵樹上幾乎都有著許多不同的植物，如：小膜蓋蕨、阿里山水龍骨、鱗瓦葦等等……可說是自成一個小型植物生態區。

What's even more extraordinary is that the two cypress species in Taiwan are the only ones living in the subtropical zone. The rarity of them as species, the importance of them as living fossils, and the value of them as habitats for many wild animals have made Taiwan's cypress forests match all the standards of World Natural Heritage and bear a status no second to that of the American sequoia in many aspects.

Tiny Plants of Great Importance

What's intriguing about cloud forests are not just those celebrated big old guys but also many little fellows of ecological importance.

Research has shown that bigger trees such as cypresses serve as the best breeding ground for epiphytic plants including mosses, *Schizophragma integrifolium var. fauriei*, *Lysionotus pauciflorus var. pauciflorus, Euonymus echinatus Wall., Gynostemma pentaphyllum*, etc., which are tiny but of great importance. In fact, each tree in the forests would develop a mini vegetative ecology of its own.



除了這些古老的樹木之外，霧林帶還有像是帝雉、觀霧山椒魚、寬尾鳳蝶、棣慕華鳳仙花、紫花鳳仙花、黃花鳳仙花、蔓烏頭、台灣胡桃、黃花著生杜鵑、鴛鴦湖細辛、台灣粗榧、台灣蝴蝶戲珠花等稀有物種，都深藏在迷霧森林裡。

「台灣的維管束植物之特有比例大約是27%，以前面提到的棲蘭山檜木林為例，植物的特有率約38.5%，明顯高於全台平均值，而且其中有很多都是稀有種，這也可以看出霧林帶的特殊性。」

雲霧 改變了什麼

霧深露重，給了中海拔森林絕佳空間，自成一格，不僅是植物把霧林帶當成最佳棲地，就連長年棲息在中海拔的鳥類，也因為濃霧及低溫改變了生態。

「除了海拔高度造就了研究生物的條件，更因為太魯閣峽谷成為天然屏障，使當年的伐木版圖並沒有延伸到這裡來，保留了棲地的完整，成為很適合研究中海拔物種的場域。」東華大學許育誠助理教授說。

近年來帶領學生在太魯閣山區做中高海拔的鳥類研究的他說，這兩年在太魯閣累積的資料，可以大概彙整出台灣中低海拔霧林帶的鳥類生態，保育程度越完整，對鳥類生態更有助益。

說霧林帶是台灣最美的地方，一點也不為過。氣溫宜人，不只是人們喜歡在前往遊憩，許多物種也喜歡在霧林帶棲息。台灣中海拔地區是生物多樣性最高的地方，無論就數量或是種類，這裡可說是台灣最珍貴的寶庫。

Other rare species of animals and plants living deep in cloud forests include: Mikado's Pheasant, *Hynobius fuca, Agehana maraho, Impatiens devolii* Huang, *Impatiens uniflora* Hayata, *Impatiens tayemonii* Hayata, *Juglans cathayensis* Dode, *Asarum crassusepalum, Cephalotaxus wilsoniana* Hayata, etc.

"The average endemism rate of vascular plants in Taiwan is about 27%, while that in the cypress forests in Cilan Mountain is 38.5%. This much higher rate and a high proportion of rare species indicate the distinctiveness of cloud forests."

Changes Brought by Clouds and Fogs

Thick fogs not only turn mid-altitude forests into a perfect habitat for plants, but also, along with low temperatures, change the ecological and biological features of birds dwelling there.

"Cloud forests in Taroko Gorge have been ideal places for research on species at mid-altitude species because of the proper elevation and the inaccessibility that has kept the logging industry away," said Y. Hsu.

After his study on birds in mid-altitude mountain areas in Taroko for the past 2 years, he has concluded that the better the cloud forests are conserved, the healthier the ecology of birds will be.

Arguably the most beautiful places in Taiwan, the cloud forests, with cozy temperatures, attract both humans and animals. No wonder they are considered the island's treasury with the highest biodiversity in terms of either amount or types of life forms.

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1. 美麗的帝雉是霧林帶常見的生物之一 / 周光瑩攝
Mikado's Pheasant *(Syrmaticus Mikado)* is one of common creatures in the cloud forests. /by Guang-ying Zhou

2-4. 霧林帶中許多看似微小的植物，也在生態系中占有重要地位。圖左到右為觀霧山椒魚、棣慕華鳳仙花、台灣檫樹。/ 邱清安提供
In the cloud forests, there are many tiny plants with great importance in ecology. Pictures from left to right are *Hynobius fuca,* Impatiens *devolii* Huang and Taiwan Sasafras *(Sasafras randaiense).* /Photo provided by Ching-an Chin

許育誠在太魯閣所進行的，是中高海拔鳥類的生活習慣。研究團隊以中高海拔、霧林帶中的山紅頭為研究主角。山紅頭是很普遍的鳥類，由於數量夠多且樣本容易採集，是研究中海拔鳥類生態習性的指標物種。

「我們針對霧林帶鳥類的叫聲變化進行調查，因為中高海拔山區長期雲霧裊繞，即便是視力很好的鳥類也看不見，便會以聲音呼喚同伴。」

研究團隊推論，因為高海拔地區空氣稀薄，低頻的聲音較容易傳達，那是不是長期棲息在霧林帶的山紅頭的叫聲已起了變化呢？「答案是肯定，霧林帶的山紅頭聲音的確比較低沉，為了適應霧林帶的環境而改變。」許助理教授說。

In Y. Hsu's research, Red-headed Babbler (*Stachyris ruficeps*) has been the target of focus since it's an index species of birds in mid-altitude mountains, and it is large in number and easy to sample.

"We've been investigating the changes in the chirps of birds in the cloud forests. The birds rely on their chirps for communication because their excellent eyesight is of little use in the perennially fog-shrouded areas."

His team hypothesized that the chirps of the Red-headed Babblers long inhabiting in cloud forests have changed because low-frequency sounds are more easily transmitted in the thin air in high mountains. "And this speculation has been proved right. The birds' chirps have indeed become lower in pitch," said Hsu.

研究團隊也發現，中高海拔霧林帶的山紅頭比平地的大，並不是因為山上太冷，山紅頭的食慾好吃太多才變胖。「體型大的生物，代謝速率慢，不易散熱因此山上的山紅頭體型較大，這是為了保暖。」

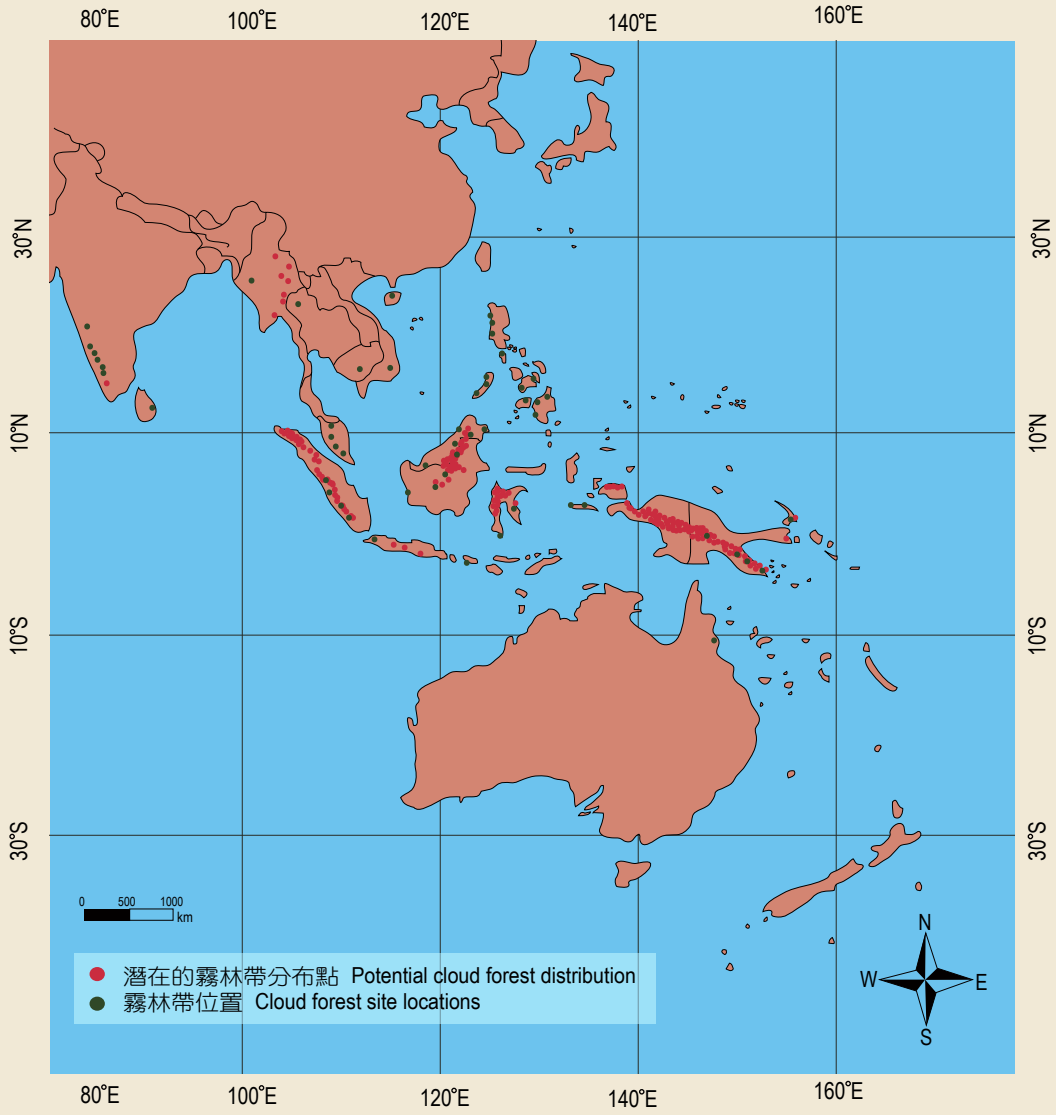
The team also found that the babblers in the cloud forests are bigger than those living at sea level. They are larger not because they have a better appetite in colder places and thus become fatter, but because "a larger body means slower metabolism and better ability to keep warm."

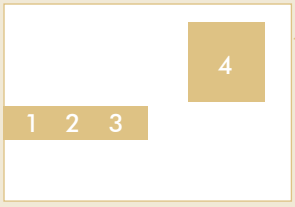
台灣霧林帶　聯合國未記載

雖然，台灣霧林帶生態處處令人驚艷，但在國際舞台上卻未獲重視。以馬告國家公園預定地的棲蘭山為例，大面積的檜木純林全球僅見，台灣檜木為全球稀有物種，又是見證地球氣候變遷與生態演化的活化石樹，而檜木林獨特的生態環境，更是諸多野生動物的棲息地，都符合納入世界襲產的條件。但因為台灣非聯合國會員國，無法參與聯合國教科文組織的相關事務，更遑論列入世界自然遺產了。

Left Out by the UN

Awe-inspiring as they are in many aspects, Taiwan's cloud forests have not earned due respect and recognition internationally. For example, the cypress pure forests in Cilan Mountain, where the proposed Ma-Kau National Park is located, are a rare species, a living fossil and a unique habitat for wildlife. But just because Taiwan is not a UN member, it cannot participate in the affairs of UNESCO, nor can its precious forests be listed as a World Natural Heritage.





1-3. 許育誠的研究團隊以霧林帶鳥類做為研究對象。圖 1 為進行收音的工作，圖 2 為粉紅鸚嘴，圖 3 為山紅頭 / 許育誠提供
Birds in the cloud forests have been the subject of Hsu's research and his team. Picture 1 shows that they are recording the bird chirps. / Photo provided by Yu-cheng Hsu. Picture 2 is Vinous-throated Parrotbill *(Paradoxornis webbianus)*, and picture 3 is Red-headed Babbler *(Stachyris ruficeps)*

4. 聯合國環境規劃署 (UNEP) 於 2004 年發表的亞洲霧林帶分布圖，其中，台灣並未被標示 / 劉好音繪
United Nations Environment Programme (UNEP) had published the distribution map of the cloud forests in Asia in 2004, but unfortunately, Taiwan's cloud forests were not included in the map. /Illustrated by Hao-yin Liu

邱場長提及，「聯合國環境規劃署 (UNEP) 就曾經繪製過全世界的雲霧森林分布圖，很可惜雖然台灣有很典型的雲霧帶，形相非常漂亮、物種極為豐富的雲霧森林，但在聯合國的分布圖中未被標明出來。」或許未被認同，但更重要的應是我們能有幸擁有如此珍貴的霧林資源，因此我們應更把握這樣的良緣，並進而加以珍惜。」

無論台灣的霧林帶是否為國際所重視，但這片專屬於台灣的珍貴山林，的確是上天賜給我們最珍貴的禮物，在國家公園範圍內的霧林帶，也會受到最妥善的保護，台灣生態相關學者仍會持續埋首於雲霧間，去一一追尋霧林裡的秘密。

Also frustrating is the fact that, as Chiu mentioned, “the UN Environment Programme (UNEP) had once drawn the distribution map of the cloud forests of the world, but those of Taiwan, typical, beautiful and ecologically diversified as they are, were left out from that map.”Though has not been recognized yet, Taiwanese people should cherish this precious cloud forests.

However, whether or not these cloud forests of Taiwan will be valued and recognized by the international society, it won’t change the fact that they are a truly precious gift bestowed to Taiwan by the heaven, and the national parks of Taiwan will well protect them while Taiwanese scholars will continue to unveil the secrets hidden in them.