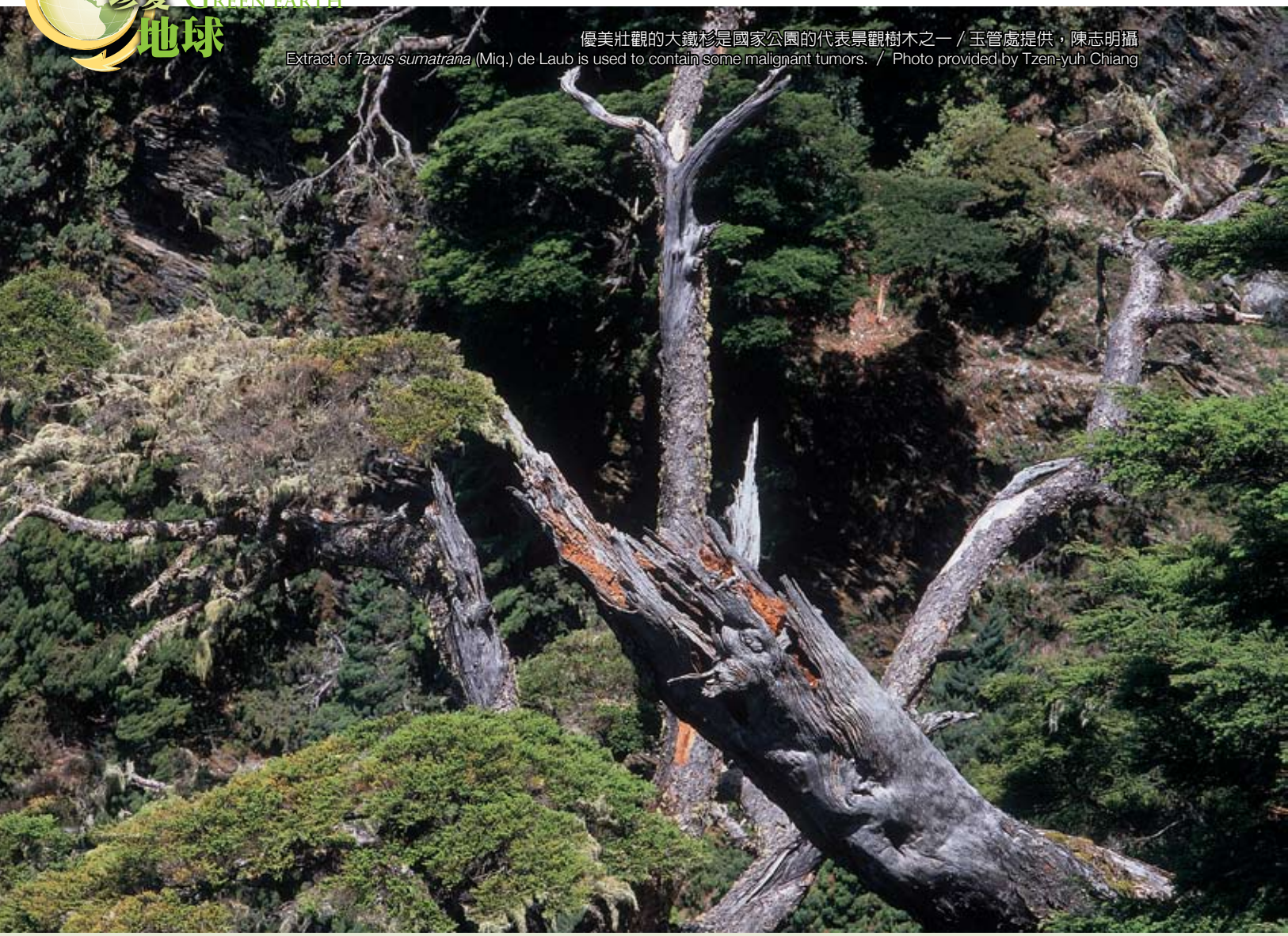

優美壯觀的大鐵杉是國家公園的代表景觀樹木之一／玉管處提供，陳志明攝
Extract of *Taxus sumatrana* (Miq.) de Laub is used to contain some malignant tumors. / Photo provided by Tzen-yuh Chiang

談棲地保育的重要性

棲息與共的自然使命

The Great Mission of Protecting Habitats

On the Importance of Habitat Conservation

採訪撰文 Interview & Text / 連一周 Yi-zhou Lian、連欣華 Hsin-hua Lian
特別感謝 Special thanks to ／成功大學生命科學系蔣鎮宇教授 Professor Tzen-yuh Chiang of the Department of Life Sciences of NCKU，玉山國家公園蘇志峰課長、陳貞妤技士 Mr. Zhi-feng Su and Ms. Zhen-yu Chen of Yushan National Park，墾丁國家公園陳玄武技士 Mr. Xuan-wu Chen of Kenting Naitonal Park，行政院農委會農業試驗所劉大江所長、黃勝忠組長 Director-general Dah-jiang Liu and Division Chief Sheng-zhong Huang of the Agricultural Research Institute (ARI), Council of Agriculture
翻譯 Translator / 黃詠蘭 Teresa Huang

圖右為每平方公尺的美洲含羞木，一年可產生9,000顆種子。圖左為現已在台東縣、屏東縣與高雄市等地的河床、路邊、港口淤積地以及林道發現蹤跡 / 蔣鎮宇提供
Right: *Mimosa pigra L* grows at 9,000 seeds per square meter. Left: It has been spotted in riverbeds, roadsides and costal silted land in Taitung County, Pingtung County and Kaohsiung City. / Photo provided by Tzen-yuh Chiang

當莫拉克颱風重創南台灣，七股、四草的潟湖濕地發揮了防洪作用，減緩鄰近鄉鎮的水患危機。如此看來，以濕地為重要保育棲地的台江國家公園，自然有著責無旁貸的使命，進行棲地的保育與維護。

國家公園擁有豐富多樣的天然景觀、原生物種與特殊生態系，為了延續這些珍貴的生態資源，種源的保存與護育，自然是國家公園責無旁貸的責任。

但天災與人禍總是在不可預期的情況下，衝擊著人類的文明與生命。於是，存種保根的觀念，在二千年前「諾亞方舟」的神話故事中便可見一斑。時至今日，全球各地都在進行物種的保存與相關研究，由此可知人們已逐漸在與大自然的相處中，學著尊重、珍惜與保存。

大家所較常理解使生物多樣性喪失的原因，大多是氣候變遷、外來物種的入侵與污染等因素，不過世界保育聯盟分別在1994與2004年時，已將「棲地喪失」視為影響生物多樣性降低的最大原因。在其所發表的瀕危物種紅皮書中，表示有將近86% 的鳥類與哺乳類、 90% 的淡水魚以及30% 以上的海洋生物都因為棲地遭受破壞，而陷於滅絕危機。因此，要想保護好生態環境，就必須先做好棲地保育。

外來種入侵惡夢

在了解棲地守護的重要性之前，我們先來聽聽一個故事。

刺軸含羞木又稱美洲含羞木，是一種南美洲的原生含羞科植物。此物種全株生有毛茸和銳刺，其所分泌的含羞草素能壓抑其他植物生長，剝奪其他原生植物生長空間，每平方公尺可產生9,000顆種子，在蘇門答臘、爪哇及新機內亞等亞洲熱帶地區皆可見其迅速散布的蹤影。

When Typhoon Morakot ravaged through Southern Taiwan, the lagoons and wetlands in Cigu and Sihcao contributed to effective flood prevention and lowered the risks of flood in the neighboring regions. It appears that Taijiang National Park, which consists predominantly of wetlands, bears unshirkable responsibility of habitat conservation and maintenance.

National parks retain rich and varied natural landscapes, native species and distinctive ecosystems, making them duty-bound to preserve these precious natural resources and species.

However, natural disasters and man-made calamities always strike against human civilizations in an unexpected way. That is why the idea of "retaining one's roots" has been implied in the story of Noah's Ark. And now the whole world is engaging in research on species preservation, indicating that humans have been learning to respect, treasure and conserve Nature as they interact with it.

It is generally accepted that biodiversity is lost due to climate change, the invasion of alien species and pollutions. However, in 1994 and 2004 the World Conservation Union, a.k.a. IUCN, singled out "the loss of habitats" as the major factor resulting in the diminishing biodiversity. In its red list of threatened species, the IUCN stated that nearly 86% of birds and mammals, 90% of freshwater fish and over 30% of marine life are facing extinction due to the loss of their habitats. Thus habitat conservation is a prerequisite of ecological conservation.

The Invasion of Alien Species: A Disaster

The story below shows the importance of habitat protection.

Mimosa pigra L. is a species native to South America. It has hairs and spikes and secrets growth-suppressing mimosine to obstruct the growth of other native plants. The plant grows at a whopping 9,000 seeds per square meter and is rapidly spreading in the tropical Asia of Sumatra, Java and Papua New Guinea.

▲ 紅豆杉屬 (如南洋紅豆杉) 其萃取物具有抑制部分惡性腫瘤的療效 / 蔣鎮宇提供
Extract of *Taxus sumatrana* (Miq.) de Laub is used to contain some malignant tumors. / Photo provided by Tzen-yuh Chiang

◀ 被視為高級建材的紅檜木材質地堅硬耐用，為盜伐者所覬覦的珍貴林木。/ 賴宛靖攝
Highly durable, *Chamaecyparis formosensis Matsumura* is regarded as high quality building materials and thus is coveted by illegal loggers. / by Wan-ching Lai

曾有一年，泰國沼澤地也因為刺軸含羞木的侵入而將近乾涸，於是泰國人民全體上下一起進行刺軸含羞木的清除行動。當辛苦的清除行動結束，全國人民以為「大功告成」而集體慶賀時，卻沒發現有極少株「躲過」了這次的消滅行動。隔年，泰國人民無不面面相覷地，看著眼前大蓬勃的刺軸含羞木又在眼前搖曳著……。

「現在，已可在台東縣、屏東縣與高雄市等地區的河床、路邊、港口淤積地以及林道兩邊發現刺軸含羞木的蔓延，若讓它不小心侵入了以保育濕地為主的台江國家公園，後果，該如何想像？」成功大學生命科學系蔣鎮宇教授語重心長的說。

棲地護育 從瞭解開始

國家公園裡的生態棲地保存完整，但也由於生物種類繁多，管理不易，種源生物的研究與資料庫的建立就相對來得重要。

分子指紋技術是一種能在物種保育及遺傳多樣性的利用上提供準確而快速的技術分析方法。蔣教授將其應用在生物保育的實踐上發揮的淋漓盡致，不僅可進行種源基因的採集研究，透過此技術應用，「甚至連你家的愛玉籽是不是偷採來的都能知道呢！」蔣教授笑著說。

「棲地護育，並不只是口號，而是要去瞭解維護的目標到底是什麼？該怎麼去執行？」蔣教授緩緩的說。像是紅檜因有其木材質地良好、不易腐壞的優良條件，可適用於高級建材之一；南洋紅豆杉其紅豆杉屬的某萃取物具有抑制部分惡性腫瘤的療效；位於玉山國家公園中塔塔加的大鐵杉，其優美壯觀的樹形，以及處於交通要道的地理位置，使其成為國家公園的代表景觀樹

The plant once nearly caused the swamps in Thailand to dry up, thus galvanizing the whole nation into eradicating it. After some painstaking efforts, the people falsely assumed that the species had been eliminated. They celebrated the triumph, only to find in the next year that the plant flourished again ..

"Now Mimosa pigra L. has been spotted in riverbeds, roadsides and costal silted land in Taitung County, Pingtung County and Kaohsiung City. If it makes its way into Taijiang National Park, the results can be disastrous." said Professor Tzen-yuh Chiang of the Department of Life Sciences of NCKU.

Habitat Protection Starts With Better Understanding

Habitats in Taiwan's national parks are well preserved, but numerous species within them make management rather difficult. Hence the research on species and the establishment of a databank are crucial.

Providing accurate and fast technical analyses of species conservation and genetic diversity, the fingerprinting technique has been employed by Chiang for species conservation. The technique enables one to research on the DNA of the species and it can "identify whether the plants in one's house are homegrown or stolen," joked Chiang.

Habitat protection should not just end up a slogan. We need to fully understand its ultimate goal as well as how to do it. Chamaecyparis formosensis Matsumura, for instance, is of good quality and is enduring, making it a perfect building material; extract of Taxus sumatrana (Miq.) de Laub is used to contain some malignant tumors; the grandeur of Tsuga chinensis (Franchet) Pritz. ex Diels var.formosana (Hayata) Li & Keng makes it one of the iconic trees representing national parks. These species bear economic, medical and recreational significance, and habitat conservation can be effective only when the purpose of species protection is well

木之一。上述物種在經濟、醫療使用與觀光上皆具有極大的重要性。先瞭解種源的維護目的，棲地保育的執行方向才能更確實完善。

而保存物種棲地，不僅僅是指將某物種生育、棲息的那塊地保存好就行，還要考量到該物種的整個生物族群、生態史，以及不同時期所需不同的棲地環境與生態條件。以候鳥來說，所要保護的絕不單單只有所佔據的那個池塘，還有所遷徙路上的所有濕地、北方的生育地等整片有所相關的濕地系統，才是真正完整的棲地保護。因此，要做到棲地保育，絕非想像中容易。除了環境政策的執行推展，專業的學術研究與人的配合都是缺一不可的規劃範圍。

保育觀念 因時制宜

有了專業的研究建立、棲地保育的正確維護，最重要的，還是「人」與「棲地環境」的維持。

其實在許多地方，當地居民已與所處環境發展出一種共生關係，國際間逐漸發展「保護區」的圈地保護方式，即是兼顧著生態、社會和經濟各層面，對棲地採取永續的管理方式，而這種概念，也已納入國家公園經營管理的規劃範疇之一。

若要保育一個原始棲地，不去干擾是不是就是最好？

蔣教授笑著說，就像一些傳統文化的淘汰，保育的觀念應該也要有所更新，生物資源並不是讓它放著不動，就叫「珍惜」。如美國中西部的高草地，亦是一塊美國極欲保護的原始棲地，然而放任生長禁止干擾的結果，卻讓這些原生種在自然演替的結果下差點被淘汰，其後經由人為的介入處理，才能讓這原生種得以保護下來。

蔣教授表示，我們都知道人命值錢，那是否也應以相等的態度去保育每一個原始生態環境？一直以來，國家公園在原始棲地的復育成果都是國內保育界的良好典範，為使生態族群皆能得到更好的生長環境，保育物種棲地，也是你我都應共同守護的責任。

appreciated.

Habitat conservation is more than preserving places where certain species reproduce and inhabit. The entire population and the ecological history of the species, and the different requirements and conditions during each stage of the species' growth must be considered. Take migratory birds, a thorough protection of their habitats includes the ponds they occupy, the wetlands along their migratory path and their breeding place in the north. Habitat protection is an uphill fight requiring the implementation of environmental policies, academic research and cooperation from the public.

Conservation Should Reflect Changes in Time

The key to successful habitat conservation lies in "humans" and "the environment of the habitat."

In fact, the idea of "protection area" which takes account of ecological, social and economic aspects and manages habitats in a sustainable manner has come to the forefront. Such an idea has also been adopted by the management of the National Park.

But is no disturbance at all the best way of protecting a primitive habitat?

Judging from the downfalls of some traditional cultures, the idea of conservation should be kept abreast of the times. Cherishing ecological resources doesn't mean leaving them intact. The high grass in the Midwest, for instance, is also a habitat that the U.S. is keen to protect, and yet the country's no disturbance policy resulted in the near-extinction of the native species there. It was the later human intervention that helped the native species survive.

Chiang said that we are well aware that life is precious, and we should treat habitats with the very same attitude. National Parks have always been an exceptional model for the conservation of habitats, and now is the time for everyone to share his/her responsibility to conserve habitats and provide all the species on earth a better living environment.

蔣鎮宇教授簡介 Profile of Prof. Tzen-Yu Chiang

目前為成功大學生命科學系教授，專長興趣是植物分類學、物種演化、族群遺傳。曾獲國科會2007年度傑出研究獎、2005年榮獲日本植物研究期刊年度獎、2004年榮獲美國AAAS科學促進學會會士等。

Professor at Department of Life Sciences, National Cheng Kung University; specialized in plant classification, species evolution, and population genetics; winner of 2007 Outstanding Research Award from National Science Council, 2007 Annual Plant Research Periodical Award in Japan, and 2004 membership of U.S. AAAS.

觀點延伸
Extended Viewpoints

全球貿易的自由化，讓農作物等栽培的經濟作物擁有廣大的市場，市場的需求增多，需使用的土地面積自然也增大。當欲開發使用的農地因棲地維護而受到限制環境，抗議行動便焉然而生，無法遏止的壓力與衝擊將一直是棲地保育所要面對的最大課題。

本期，國家公園季刊特地走訪農業試驗所，讓行政院農委會農業試驗所的劉大江所長告訴我們，農業作物的種原保存意義，其實與國家公園的保育重責相去不遠，農試所「國家種原庫」的建立，目的就是在保存大量的本土作物遺傳基因，延續作物遺傳之歧異性，用於品種改良、栽培技術改進等學術研究。經更新的品種與技術，或許更能適應自然環境之生長，而減少對原始棲地的破壞。

一億年的台灣原生種作物

農業試驗所內培育許多臺灣原生種植物，舉其一例有「臺灣野生稻」。在農試所劉大江所長與作物種原組黃勝忠組長的解說下，首先見識到臺灣原生稻種。倘不經特

The liberalization of the international trade expanded the market for cash crops. As the market demands rise, more land is required to grow crops. As lands intended for plowing get restrained because of habitat conservation, protests will inevitably break out. Therefore, mounting pressure and clashes have always remained the greatest challenge facing habitat conservationists.

In this issue, the NPQ interviewed Mr. Dah-jiang Liu, Director-general of the ARI, who drew the analogy between seeds conservation and the conservation effort undertaken by national parks. The ARI's "National Seed Bank" aims to preserve the DNA of many local crops and extend the differences in crop breeding for improvement in crops and cultivation techniques. Improved species and techniques may better adapt to the natural environment and lessen the damage to habitats.

The 100-Million-Year-Old Native Crop of Taiwan

The ARI cultivated many plants native to Taiwan, with "Taiwan Wild Rice" being one of them. Liu and Sheng-zhong Huang, Chief of Plant Germplasm Division, ARI,

1. 台灣參加聯合國全球種子庫計畫，為農業之國際合作與發展再創新頁。圖為種子庫內部景況 / 黃志浩攝
The ARI's joining SGSV signifies a new page for Taiwan's agricultural collaboration with the international community./by Chih-hao Huang
2. 農業試驗所魏趨開技佐手指處，即是全國僅存一塊一億年的台灣野生稻田 / 黃志浩攝
Mr. Chiu-kai Wey of the Agricultural Research Institute (ARI) pointed at the only wild rice field in Taiwan that has been existing for over 100 million years. / by Chih-hao Huang
3. 黃勝忠組長表示，期望未來農試所在基因保存的相關技術上，能為棲地保育更多盡一份守護的心力 / 黃志浩攝
Director Sheng-chung Huang hoped that through techniques related to gene conservation, the ARI can make more contributions to habitat conservation. / by Chih-hao Huang

別的指引，一般人會誤以為那是一片「雜草」。靠近一看，此原生稻穗只有現今常見的稻穀的三分之一。但別小看這不起眼的物種，其稻穀外殼細長，具有抗病蟲害力強的特性，以及強韌的生命耐力，已在地球上已繁衍超過一億年之久。

漂洋過海的國際合作

2008年2月，由挪威政府出資在挪威斯費巴島的冰山上興建全球種子庫，負責單位則是挪威北歐遺傳資源中心。2009年2月，農試所已與挪威農糧部北歐遺傳資源中心，簽署全球種子庫備份保存計畫協定，臺灣將提供台灣特有育成作物種原約 1萬2千份種子，作為世界作物種原備份保存之用。透過參加聯合國全球種子庫計畫的機會，俾作為世界作物種原備份保存之用，並為我國農業之國際合作與發展再創新頁。

保存物種 共同目標

黃組長表示，「在地保存」是國家公園成立的目的之一；農試所則擔任「移地保存」，彼此間有著「相輔相乘」的交集，都是為人間保存一塊森林環境而努力。若當國家公園內的原始物種，因自然力與人為因素而遭受破壞，農試所皆可提供國家公園相關的種原應用與保存技術，使其加以積極的復育，維持自然界裡的生物多樣性。

劉大江所長沉重的說，自「八八水災」過後，臺灣5萬多項的物種，真不知有多少消失殆盡？雖然存在大自然的環境中，無奈的眼見它遭到自然淘汰，但從一名農業復育的小兵立場而言，雖不是萬能，在尊重植物自然生長法則之下，我們想盡辦法要保存這些物種，避免從野外消失。這正是國家公園保育單位，與農業試驗所集思廣義，攜手合作努力的目標。

introduced the rice to us. At first glance, it would normally be mistaken for weeds, but a closer look reveals that the size of this rice is only 1/3 that of normal rice. Small as it may seem, its thin and long chaff is highly resistant to diseases and pests and its high vitality has enabled it to propagate for over 100 million years.

Cross-Continental Cooperation

In Feb. 2008, funded by the Norwegian government and under the auspices of the Nordic Genetic Resource Center (NordGen), the Svalbard Global Seed Vault (SGSV) was established. In Feb. 2009, the ARI signed the SGSV agreement with the NordGen and would abide by the agreement to provide about 12,000 seed samples to the SGSV for preservation in the future. The ARI's joining SGSV signifies a new page for Taiwan's agricultural collaboration with the international community.

Seed Preservation: A Common Goal

Huang said that “in situ preservation” is one of the objectives behind the establishment of national parks, while the ARI plays the complementary role of “ex situ preservation.” If species in national parks were damaged due to natural and artificial forces, the ARI could bring its species preservation technique into play and contribute to the restoration and maintenance of the biodiversity in Nature.

Liu solemnly wondered how many out of Taiwan's 50,000 species were wiped out following the August 8 Flood. But no matter how helpless we feel, we should respect the natural growth of the plants and try our best to preserve them so that they will not be lost for good. This is actually what national park conservation groups and ARI have been striving to achieve.