臺灣赤楊與赤楊金花蟲的生態之爭，帶給人們珍愛自然萬物的另一層省思。
The battle between Formosan Alders and Formosan Alder Leaf Beetles could serve as a lesson for humans to learn to cherish the Nature.

# 臺灣赤楊與赤楊金花蟲的生態之爭

## 玉山國家公園塔塔加地區臺灣赤楊的追蹤紀錄

## The Battle between Formosan Alder and Leaf Beetle

### Keeping Tabs on Formosan Alder in Tataka Area in Yushan National Park

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長年在玉山國家公園服務，雖對於園區中的生態景物已相當熟識，但大自然的轉變往往來得太快，氣候變遷、人類活動或動植物為適應環境的自行演化，許多自然異象的發生，常會因為輕忽而導致無法掌控的局面。2008年時，塔塔加地區曾上演一場臺灣赤楊與赤楊金花蟲的生態之戰，在追蹤調查的過程中，將可帶來哪些省思？

## 落葉異象　臺灣赤楊的危機

臺灣赤楊，別稱臺灣榿木，原產地是臺灣，主要分布在全島中海拔山區，形成臺灣最優勢的落葉純林。屬陽性植物，對環境的適應力強，在乾燥或土質貧瘠之處生長良好，喜歡在向陽坡面之崩塌地或河床生長，在新闢建之公路或開發地區生長茂盛。用途廣泛可為家庭植觀賞植物、作防風、造林和水土保持之用，木材可作紙漿，亦可栽培香菇或白木耳，也具備藥用功能，可治療外傷能清熱降火。

With years of service in Yushan National Park, I have been quite acquainted with the landscapes and life forms in the park. But in the Nature, changes could come up so fast that climate change, human activities, self-evolution of animals and plants, abnormalities in the Nature, when ignored or taken lightly, would lead to uncontrollable outcomes. The year 2008 has witnessed an ecological battle between the Formosan Alder and the Formosan Alder Leaf Beetle in Tataka area. What lesson can people learn from it through investigation?The Crisis of Formosan Alder

Formosan Alder *(Alnus formosana)* is a member of the Alnus genus of the Betulaceae family. Native to Taiwan, the alders form the most dominant deciduous pure forests throughout mid-altitude mountains on the island. With the characteristics of being light-demanding and highly adaptable to harsh environments, they especially like to grow on sun-facing slopes of riverbeds and along newly built highways. They could be grown as ornamental trees; be used for windbreak, afforestation, and papermaking; as well as be medicinal, treating bleeding in a trauma and clearing the body's internal heat.

臺灣赤楊葉片上所布滿的蠕動小蟲，即是赤楊金花蟲
The Formosan Alder Leaf Beetles on the Formosan Alder.

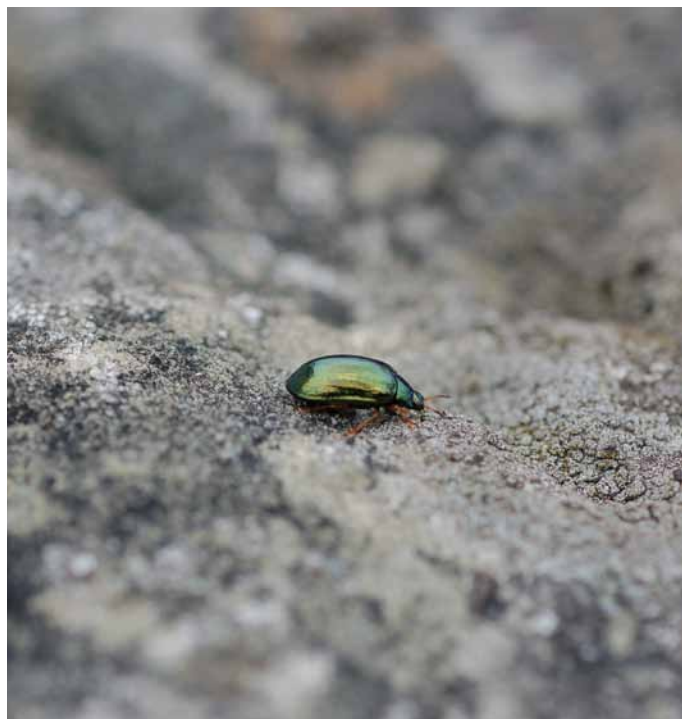
臺灣赤楊雖較少受人提起，但它總會默默地在貧瘠、崩落、毀壞之地穩定山林。八八風災肆虐後，可見及臺灣赤楊的身影悄悄地飄進崩塌區域，迅速布滿山林，協助大地復育。

臺灣赤楊高可達20公尺，樹幹筆直，樹皮呈灰褐色，老時常片狀剝落。根部有根瘤菌。葉互生，卵或長橢圓形，細鋸齒緣，長約10公分。花屬單性，雌雄同株；雄花為柔荑花序；雌花則成密穗狀花序，暗紅色。果呈毬果狀，由整個雌花序發育而成，長約2公分，小堅果扁平，有狹翅。在新中橫地區於公路112公里處開始到塔塔加沿線都有分布，目前是新中橫沿線坍方區或公路旁為主要優勢物種。

Formosan Alder is seldom regarded as a precious wood used in Taiwan, but it widely contributes to soil stabilization on barren and collapsed lands. Soon after Typhoon Morakot ravaged Taiwan, Formosan Alder silently covered up the devastated area and helped with land restoration.

The alders have upright trunks reaching a maximum of 20 m with fuscous tree barks, often exfoliating when they age, and have rhizobia in root nodules. Their leaves are alternate with serrated margin in ovate or oblong shapes, about ten cm long. Their flowers are unisexual and monoecious, with male catkins and dark-red female spikes. Their cone-shaped fruits are developed from the whole pistillate inflorescence, two cm in length, with compressed and winged nutlets. They are widely distributed along New Central Cross-Island Highway from 112k to Tataka area.

赤楊金花蟲成蟲，外觀豔亮
The adult Formosan Alder Leaf Beetle is elliptic in shape with a shiny color.



2008年5月初，筆者行車經過玉山國家公園塔塔加一帶，對於窗外的落葉景象感到有些疑惑，由於此區並無5月落葉的植物，而且葉子落得嚇人。根據樹幹以及生長位置來觀察，判定其產生大量落葉情形的是臺灣赤楊，但由於5月應是臺灣赤楊鬱鬱蔥蔥、萌芽長葉的季節，所以這樣反常的現象，讓人十分憂心。

## 監測　蟲蟲危機

仔細察看掉落路旁、護欄上的葉片，發現葉片上布滿蠕動的小蟲，數量多到只要風吹過，樹上的蟲子就會掉到衣服上。趕緊將被幾乎被蟲啃盡的葉脈拍下，進行相關的查證，查出了罪魁禍首是赤楊金花蟲。

確認後，除持續觀察園區臺灣赤楊的受害情形，每兩週系統性地收集森林凋落物 ( 含落葉 ) 的相關資料，也一邊詢問山友其他地區的危害情形，整理調查出臺灣可能遭受赤楊金花蟲的危害區域：塔塔加地區包含新中橫公路、楠梓仙溪區域、沙里仙溪區域、玉山西峰東側山麓及溪谷、陳有蘭溪區域、神木溪區域與阿里山公路；其他地區則有南湖大山區域、中橫公路與合歡山區域。

初步的探查資料與範圍擬訂後，追蹤計劃則可開始展開。

## 展開追蹤

赤楊金花蟲為臺灣赤楊重要害蟲之一，幼蟲及成蟲皆以赤楊之嫩葉及頂梢為食，尤其在苗圃及初植地區，幾乎所有葉片皆受其害。赤楊金花蟲的成蟲體型為橢圓形，背面呈美麗之金綠色，雄蟲平均體長為6.3公厘，雌蟲為7.7公厘，壽命約為一個月。每一雌蟲平均一生可產約170到 270粒卵，可見其強大的繁衍能力。

2008年5月中，臺灣赤楊的受害範圍，已由最初的新中橫台21線國家公園範圍內119公里到132公里界碑附近擴散至138公里，顯示災情由下而上發展，路面、石牆與赤楊下方植被皆為赤楊金花蟲所占據。觀察臺灣赤楊外觀情形則為：葉子逐漸轉變成褐色，之後整棵樹開始落葉，也發現樹幹疑似有枯萎情形，而蟲害區域多以坍方處為主。至5月底時，較低海拔的新中橫公路114公里處也有赤楊受危害情形，高處的危害區域則已接近公路140公里處，塔塔加地區也發現有赤楊金花蟲的成蟲出現。

2008年6月時，整個山區都遭受赤楊金花蟲肆虐，新中橫公路沿線、阿里山公路沿線、陳有蘭溪

In early May, 2008, I noticed abnormal leaf loss at Tataka area in Yushan National Park (YSNP). Plants around that area were not supposed to shed astonishingly many leaves in May. After observing the trunks and the location nearby, I reckoned the trees were Formosan Alder. Seeing their leaves wither in a season which they were supposed to be luxuriantly green, I was very concerned.

## Monitoring on the Threat

Leaves on the ground and on the fences were covered with countless wriggling bugs. Whenever the wind blew, numerous bugs on the trees fell onto me. I immediately took pictures of the leaf veins, the only leftover after the bugs' feast, reported to YSNP Headquarters, consulted academics in this field, and requested Forestry Research Institute for an evaluation of possible impacts.Keeping Tabs on Leaf Beetle

Soon it was confirmed that the culprit was Formosan Alder Leaf Beetle *(Linaeidea formosana)*. In response, we continued monitoring the damage caused on the Formosan Alder, and systematically collecting data on forest litterfall, including fallen leaves, every two weeks. We also checked with mountaineers to figure out the ranges and areas possibly inflicted by the Leaf Beetle: Tataka area (including New Central Cross-Island Highway), Nanzihsian River area, Shalisian River area, the east side and valley of Mt. Jade West Peak, Chenyoulan River area, Shenmu River area, Alishan Highway, Mt. Nanhu area, and Mt. Hehuan area.

## Keeping Tabs on Leaf Beetle

Formosan Alder Leaf Beetle is one of the major pests of Formosan Alder, with its larva and imago both feeding on new leaves and buds of the alders. Especially in nursery gardens, almost all leaves would suffer. The adult beetle comes in elliptic shape with beautiful shiny green color on the back. The beetle's body is averagely 6.3 mm long for the male and 7.7 mm for the female. In a lifespan of about one month, the beetles show strong proliferation capability that a single female may lay 170 to 270 eggs during her lifetime.

Around mid-May 2008, such havoc had spread from the original range of 119k to 132k of Provincial Highway No. 21 in YSNP to further north of 138k,, mostly in landslide areas. Even the roads, the walls, and the vegetation cover below the trees were occupied by the beetles. The alder's leaves had turned brown and were falling in large quantities. Some of the trunks had also begun to wither. By the end of May, the beetles' sphere of influence had expanded farther to 114k at lower altitude, 140k at higher altitude, and Tataka area.

In June 2008, the whole mountain areas were ravaged by the beetles, including all the way along New Central Cross-Island Highway, Alishan Highway, and the drainage

流域、楠梓仙溪流域、神木溪流域……原以為只有山稜東側會發生，然而山林「全軍覆沒」的情形令人耽憂。慶幸的是，臺灣赤楊的發芽情形後來有好轉的跡象，雖沒能發現赤楊金花蟲是否有天敵，還好亦無啃食其他樹種的跡象。

2008年7月，新中橫沿線119k開始至塔塔加遊憩區的臺灣赤楊已逐漸復甦並脫離落葉乾枯的形態，與赤楊金花蟲的生態之爭，幸好沒有落得慘敗的下場。

2008至2011年之間也不經意觀察沿線的臺灣赤楊植群狀況，有看到赤楊金花蟲活動，但是數量不多，沒有當年大發生的狀況，也沒有區域擴散的落葉現象。現今新中橫兩旁的臺灣赤楊依然茂密，其茂盛的生命力不僅抓住了土石，也抓住整片山林，讓飛禽走獸得以安然嬉戲覓食。

## 自然無原則　珍惜是準則

臺灣赤楊是一種強勢的植物(又稱為先驅物種)，易在新生地或坍塌及公路旁生長，在早期的山林生活中，是人類生活上常使用的植物種類；居家使用的薪材、築屋使用的樑柱與支架、增加土地肥力的氮肥、動物的食糧與懸崖的跳板等，用途甚多。

basins of Chenyoulan River, Nanzihsian River, and Shenmu River. The damage was much severer than my expectation. Fortunately, the number of sprouts of the alders seemed to be rising, and no other tree species were affected.

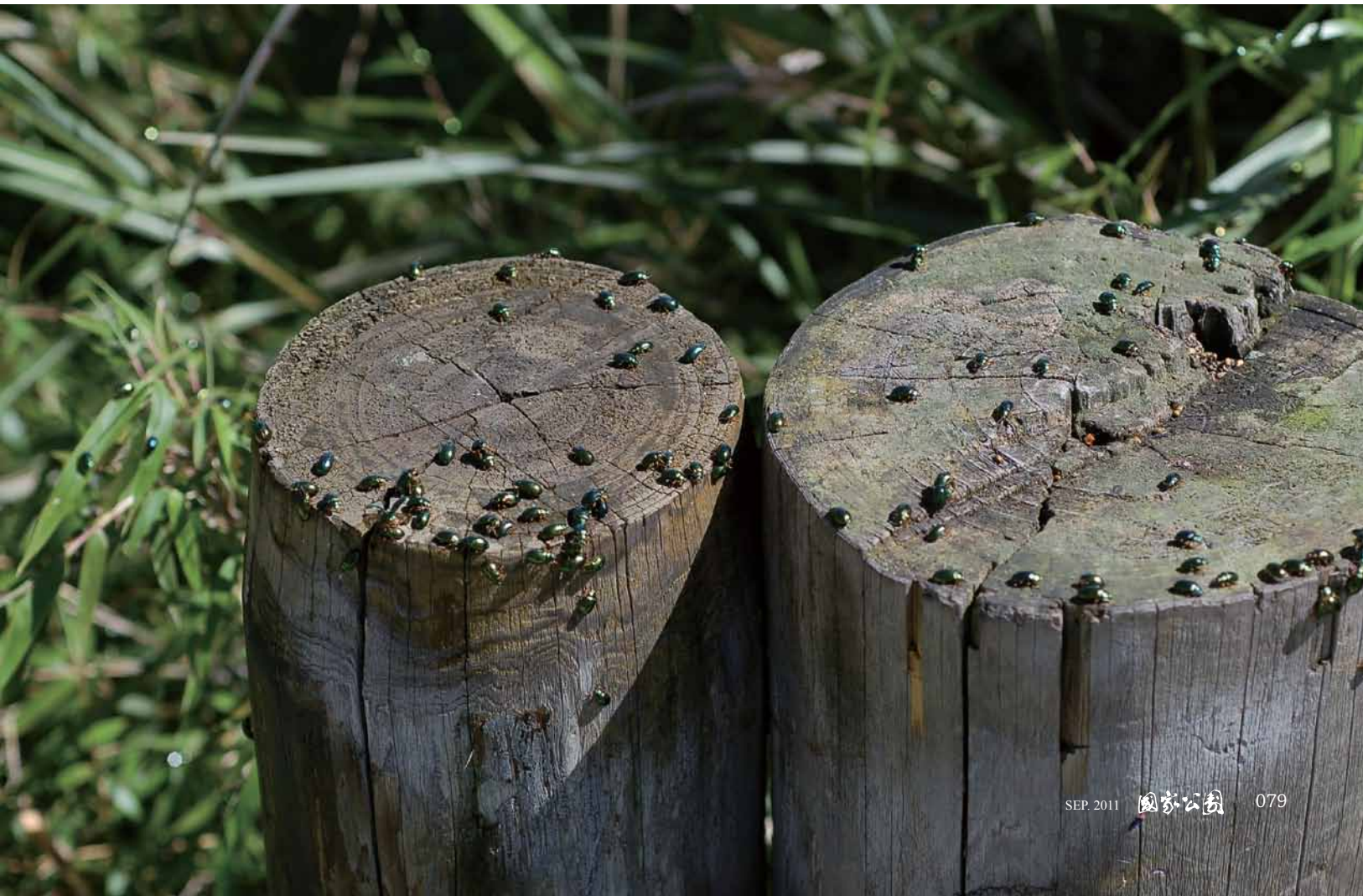
In July 2008, the Alder trees from 119k of New Central Cross-Island Highway to Tataka Recreation Area had been gradually recovering and were no longer withering or losing leaves. The trees eventually gained victory over the beetles in this battle.

I have been keeping observing the growth of the alders along the highway since 2008. The beetles are still present, but fortunately, beetle outbreak and abnormal leaf loss have never occurred again. Today, the alders along the highway are mostly dense and exuberant. Their vigorous vitality not only stabilizes the soil, but also preserves the whole forests and mountains, so the animals can live in peace.

## Rule of Thumb: Cherish the Nature

Formosan Alder is a pioneer species that can easily grow on reclaimed lands or collapsed lands, and along highways. In primitive age, the alders were commonly used by men in their daily lives to make fire, construct houses, fertilize soil, feed animals, and build bridges.

赤楊金花蟲的啃食，造成臺灣赤楊的生存危機
Formosan Alder Leaf Beetles had turned into a threat to the survival of Formosan Alders.



臺灣山區的中海拔是赤楊分布的區域，生長從未遭受威脅，因此臺灣赤楊總能給人生生不息的意象。經此可感受到凡事無定數，許多自然現象並沒有絕對的生存依據或準則。

從最初發現枯枝落葉的異象，再找出是赤楊金花蟲作祟，接著從新中橫散布成全面性的蔓延，甚至臺灣島有赤楊的地方都遭啃食。人們常忽略周遭出現的景物，認為這些狀況應該都可以在掌握之中，常常只顧著放眼未來，也養成捨近求遠的思考模式，疏忽了平日與自己最親近的生態，因此當事實發生時，往往束手無策。

一個看似平常的「落葉」景象，若就這樣忽視而過，也許就會錯失追查真相的良機，而無法即時為管理處在生態的經營管理上提供最佳的需求參考。珍愛地球的真意，不應只是在環境遭受破壞或物種面臨瀕絕才開始去珍惜，微觀生活，將可發現更多值得重視的生態「真相」。

The survival of the alders has never been threatened; hence people always deem them as symbols of eternality and perseverance. This threat posed by the beetles indicates that things constantly change, and phenomena in the Nature do not follow absolute principles or rules.

A small observation of abnormal leaf loss in the beginning led to the unveiling of a leaf beetle outbreak from one highway to wherever the alders grew. Men usually assume that whatever happens, everything could be under control. As a result, men focus on looking toward the future, but overlooking the significance of small things that are taken for granted in everyday life.

If this simple phenomenon of fallen leaves had been ignored, the threat posed by the bugs might not have been identified in a timely manner and nor could the best solution have been provided to the park headquarters in effective ecological management.Once the most unexpected things happen, men could only surrender. The real meaning of cherishing the Nature does not begin when the environment is being destroyed or the species are endangered. By paying attention to every detail in life, we'll discover how treasurable the Earth truly is.

簡介 *Profile*


## 邦卡兒．海放南
## Bagkall Haivangang

漢名全鴻德，擔任玉山國家公園管理處遊憩服務課課長，為國家公園首位原住民課長。靜宜大學生態所碩士畢業。曾執行2007年玉山國家公園塔塔加遊憩區植物相調查計畫、參加第三屆國際原住民文化及生態多樣性學術研討會、主持林務局布農族民族植物研究計畫。所曾發表《臺灣原住民教育問題》之檢討文章，被臺灣原住民媒體引用於2007年聯合國原住民會議，並進行相關討論。

With a Chinese name Hong-de Cyuan, he is currently the Chief of Tourism and Recreation Section in YSNP Headquarters, the very first aborigine serving this position in Taiwan’s national parks. He earned his Master’s degree from the Institute of Ecology of Providence University. He had conducted research in 2007 on the vegetation of Tataka Recreation Area, participated in the 3rd Conference of International Aboriginal Culture and Biodiversity, and directed the research project of Bunun ethnobotany of the Forestry Bureau. In 2007, his review paper on “Education of Taiwanese Aborigines” drew wide attention in the media and in the UN.