

採訪撰文 Interview & Text / 夏君佩 Jun-pei Xia 特別感謝 Special Thanks to / 國立東華大學自然資源管理研究所吳海音教授 Prof. Hai-yin Wu Institute of Natural Resources, National Tunghwa University 翻譯 Translator / 黃詠蘭 Teresa Huang

Observation Shows Care 從觀測中展現關懷

生態觀測的意義與價值

The Essence and Value of Ecological Observation

如果上網搜尋，會看到吳海音教授的名字跟臺灣獼猴緊緊的連結在一起，大量的文章發表與成果、訪談，展現了吳教授對於生態觀測的功力與累積；另一方面，吳教授除了野生動物的研究教學之外，她也教授資源管理方面的課程。在這次的訪談中，吳教授以資源管理的宏觀角度，為我們釋疑了台灣生態觀測的演進與轉化。

翻轉的主題，不一樣的印象

這場採訪，主題的反轉超過了筆者的想像。原本筆者心中想的是，我們談論的主題最有可能會圍繞著生態攝影的部分打轉，討論的也可能是攝影器材的進步對於生態觀測有什麼樣的影響，以及拍攝過程中的辛酸甘苦……畢竟這些部分是「非專業」的人們對於生態觀測，最直接的聯想。但是，電話那頭傳來的、吳教授直率而明快的聲音，卻讓這場訪問有了不一樣的定調。

吳教授告訴我，攝影是一門專業，也是藝術，這個部分她會讓真正的專家來執行，至於她自己動手拍攝的照片，純然就是用於研究記錄之用，而非讓人領略「哇！臺灣原來這麼美」的工具；如果要投注心力在這上面的話，因為人的時間跟資源有限，很有可能會偏離了自己原本的研究主題，而把精力花在器材與技術的追逐上面了。聽完之後我愣住了。聽出了我的遲疑，吳教授笑問：是不是跟之前想的很不一樣？真的，確實是不一樣！

生態觀測，到底是什麼？

Searching on the Internet, you will realize Show closely connected Prof. Hai-yin Wu is with Formosan Macaques (*Macaca cyclopis*). Huge piles of research papers and interviews demonstrate Wu's expertise and devotion to ecological observation. Besides wildlife zoology, Wu also lectures on resource management. With a macroscopic perspective, she talked to us about Taiwan's eco-observation.

Surprised and Impressed

The subject of our talk was unexpected and beyond my imagination.

I prepared myself for a discussion on wildlife photography: how advanced equipment changed eco-observation, or the ordeal as a wildlife photographer. This is how a layman perceives eco-observation. But as I spoke with Wu on the phone, her voice, crispy and straightforward, set a totally different tone for the upcoming interview.

Wu said photography is a profession and an art, and she leaves that to real photographers. The photos she takes are purely for research records and never meant to show “the beauty of Taiwan.” If that was the goal, she said, she would have invested time and resource into photography, on its equipment or techniques, and eventually departed from her research. I was speechless. She seemed to notice that and said, “Not like what you thought, right? But it is indeed different.”

Eco-observation: What is it?

生態觀測的意義

吳教授為此作了如下的說明：生態一詞本身是需要被定義的，而在生態觀測之中，生態、環境等都需要被界定。簡言之，生態觀測就是針對生態領域中你有興趣的部分，所進行的觀察、觀測、記錄以及探究。而在其中，你必須清楚你的主題，以及所觀測的對象，只要是在這個範圍內所進行的研究，都屬於生態觀測的範疇，這是一個專門的學問。而生態攝影在其中，只佔了很小的一個部分而已。

True Definition of Eco-observation

Wu's definition is as follows: “Ecology” requires a definition. In eco-observation, both “ecology” and “environment” need to be defined. To put it simply, eco-observation involves observing, monitoring, recording, and exploring the parts of an ecosystem that you are interested in. You must have a clear theme, though, and identify your target. Within this scope, everything is eco-observation. It is a specialized area. Eco-photography is only a fraction of it.



人們從自然中領會尊重生命的意義 / Chen Peng Guang 攝
We've comprehended the deeper significance of protecting the ecology, respecting the land and reusing our resources. / by Chen Peng Guang

釐清了這個觀念，生態觀測的縱橫時間變得寬闊起來：它可以是研究者基於個人的興趣而進行對於物種或環境的長期追蹤；也可能是跨越了多個研究領域，共同進行大規模的資料蒐集與解密！

秉持志向始終如一

在年少時期，吳教授就立定了生物學家的志向，一路走來橫互了20個以上的年頭，等於從臺灣生態意識開始萌芽的時候，吳教授就參與其中了。而這些年看下來，臺灣的生態觀測有著什麼樣的轉變呢？根據吳教授的看法，早期的生態觀測多為平面且單點的進行，觀測者與團隊選定一個觀測標的，就深入當地，然後憑著自身的生物知識以及手邊能使用的設備進行觀測；這樣呈現出來的成果通常是比較單一而平面的。而伴隨著科技進步：攝影器材的更新、衛星技術的成熟、數位資料庫的資源以及網路的興盛等等，現在研究者的觀測面向，也由平面轉化為立體，彷彿由2D轉換成3D一樣，有些時候可能還是4D的：這是因為搭配了完整的資料庫檢索，而使時間因素也可以一併考慮進去，讓成果的呈現更完整。

而嶄新的技術，對於觀測結果及相關推論也會有影響。早期吳教授在墾丁觀測猴群，總覺得猴子們的樹棲性特別強，總是在樹冠層來去，休息與覓食，要不就是在珊瑚礁上活動。可是，當紅外線自動攝影技術成熟之後，其他研究人員在不同的地方利用自動相機記錄到獼猴經常在地面上行進與移動。之後，吳教授的學生們對墾丁地區其它猴群的密集追蹤，發現獼猴也會在地面上覓食，翻檢落果。觀測的過程中，體認到了動物在不同時空會有不同展現，而不同技術與方法，各有其所長與限制，無絕對的優劣。

至於觀測技術轉化的過程，身為研究者的吳教授，在早期和現在又分別面臨了什麼樣的挑戰呢？教授說，早期當她還是新手的時候，所要面對的是一個城市孩子，如何在野生的環境中過下去，她有學院方面的知識，但是缺乏入山經驗與實際操作。而等她自己成為成熟的觀測者，有了足夠的經驗基礎，面對新的技術，思考的層次也轉換了；她需要的是連結技術與研究之間的想像力：如何讓技術幫助自己的研究主題更具開創性。

在技術普遍相對成熟的現在，吳教授也做出提醒，研究者要能兼顧自身的本業和技術方面，自己要做好資源方面的管理和整合，避免因為技術涉入而導致研究的主题偏移，如此，重要的研究主题很可能因此就陷入懸而未決的狀態，這是研究者必須時時檢視並確認的。

Puzzle resolved. The scope of eco-observation is wider than I thought. Clearly, it can be long-term observation of a species or environment by individuals, or multi-disciplinary data collection and analysis on a larger scale.

Single-minded Along the Way

Wu set to become a biologist at a young age. 20 years has passed. She was there as ecological concepts took shape in Taiwan. Over these decades, what changes has Taiwan's eco-observation gone through? As Wu pointed out, early observation was mostly ground-based and single-pointed. The observer selected a single target and began monitoring based on his/her knowledge of biology and available tools. As a result, what they presented was unilateral and limited. As technology advanced, upgraded equipment, GPS, digital database and Internet technologies became easily available. Today's researchers carry out 3-dimensional observation, and at times, 4-dimensional, as advanced databases enable diachronic analysis.

New technology may also affect observation results and inferences. In her early years as an observer, Wu once monitored a troop of macaques in Kenting. She found the macaques highly attached to trees, moving mostly between tree-crowns and trunks, or on coral reefs. As the techniques of camera trappers became mature, other researchers found that the macaques tend to move on the ground while Wu's students later discovered that they looked for food on the ground, too. So we realize different acts and habits of the same animals. And different ways used in observation are equally eligible.

As observation techniques change, what are the challenges for Wu back then and now? As a novice who grew up in the cities, she said she had to learn how to survive in the wild. She was trained and taught well but lacked hands-on experience. As she has matured professionally, she now has to deal with new techniques and elevate her thinking. She needs to connect techniques with research and use them to make her research ground-breaking.

Despite the advancement in techniques, researchers, as Wu reminds, should find a balance between research and techniques, and learn to manage and integrate resources efficiently. Never sacrifice research for fancy techniques, said Wu.

對於台灣生態觀測的觀察

一路走來，吳教授也對台灣的生態觀測進程做了觀察。

吳教授認為，當然在人力、資源、技術以及社會關注等方面，生態觀測這個區塊在台灣確實有進步，然而，臺灣的生態觀測在宏觀的角度來說，並不能算是領先。先以國科會的補助，或者是論文升等的機制而論，對於生態觀測這種需要長期累積追蹤的學門，取得補助或升等相對不易。研究者在學院的體制下，必須面對升等論文的壓力，而手邊的研究又很難在短時間內就獲致一個初步的結論，這可能導致研究者會將重點放在可以快速得出結論的觀測之上，這容易使國內整體的生態觀測產生偏頗；而有些堅持冷僻領域的研究者，可能受限於論文數量或研究期較長，不容易得到足夠的支持，兩者皆非好事。吳教授認為，不同的學門應該要有合適各自的評鑑方式，如此方能避免資源過度集中於某些明星科系，而使相對冷門的科系益發萎縮的狀況。

Taiwan's Eco-Observation

Wu also made her observations of the development of Taiwan's eco-observation.

Wu sees improvement in manpower, resource, technique and social recognition of Taiwan's eco-observation. However, from a broader perspective, Taiwan is not in the upper crust. Government subsidies and research merit systems, for example, do not fit the needs of eco-observation that often entails long-term projects. Researchers are pressured into presenting results. Many thus tend to take on projects that are productive in the short term. Such mindset has fundamentally changed the direction of Taiwan's eco-observation. Those who stick to highly specialized but unpopular projects, on the other hand, do not receive enough support. Wu thinks that all disciplines should have their separate evaluation systems to avoid overemphasizing some and ignoring others.



在自動照相機的探測下，可探測到各種動物的行蹤。圖1~5為山羌、山豬、臺灣獼猴、長鬚山羊、鼬獾 / 吳海音提供
Traces of various animals can be found through the detection of camera trappers. From Pic. 1 to 5 are Formosan barking deer (*Muntiacus reevesi micrurus*), Formosan Wild Boar (*Sus scrofa taiwanus*), Formosan macaque (*Macaca cyclopis (Swinhoe)*), Formosan serow (*Capricornis crispus swinhoei*), and Formosan ferret-badger (*Melogale moschata subaurantiaca*). / Photos provided by Hai-yin Wu



走入深山溪壑間，只為能取得野生動物的珍貴紀錄 / 吳海音提供
Treading deep into the mountains and creeks is only to obtain precious records of wildlife. / Photo provided by Hai-yin Wu



自動照相機亦須裝設於野生動物不易察覺之處 / 吳海音提供
Camera trappers must be installed where wild animals could not feel their existence. / Photo provided by Hai-yin Wu

而這樣的狀況也反映在政策之上。吳教授表示，研究者個別的研究興趣是一回事，資源管理單位針對本身的執掌，該有整體考量，提供經費、機會、甚或職缺於資源監測的工作及支援資源管理的研究案，如此對資源，對管理工作本身，對有志於生態與資源研究者，都有正面意義。

研究者就像溫度計一樣，吳教授說，當一百隻溫度計同時累積資訊，就可以整合出對整體有意義的參考資訊。在吳教授的想法裡，自己的計畫若能和整體嵌合，一起進行當然很好，如果和大方向不合，她就把自己當成那單一的溫度計，繼續追蹤、累積著她有興趣的領域、議題。

熱情與現實的抉擇

持續追蹤及地面資訊的收集，這應該需要大量的人力作後盾吧？吳教授說，她的工作確實很需要熱情的研究生一起進行。但是，生態研究始終不是台灣學界的顯學，畢業之後的出路也很有限，以她身為老師的立場，對於這樣的學生，是稱許、支持，但不敢吸引與招募。原因只是希望他們不是盲從跟風，而是真知道自己要的與將面對的。若想通後心意已決，吳教授就會從旁盡力的鼓勵與協助。就業市場的嚴峻無法迴避，如果一定要拉住有熱情的學生持續在這個領域，在畢業之後面對現實考驗，學生的熱情

Such problems are also reflected upon policy-making levels. Wu said, regardless of researcher's individual field of interest, those in charge of resource management should do their jobs in making full-scale considerations, providing funds, opportunities and jobs of resource observation, and supporting related projects, to create a win-win situation.

Wu said every researcher is like a thermometer. Statistics collected from 100 thermometers can be meaningful data. Coordinated projects are ideal, but if not, then see yourself as a single thermometer and continue to observe and accumulate data in your own fields and issues of interest.

Between Passion and Reality

Continued observation and data collection surely needs manpower. Wu said her projects need participation ecology is, after all, not a mainstream discipline in Taiwan, making careers in ecology a difficult path. As a teacher, Wu recognizes and supports eco-passionate students but does not lure or recruit them. She always wants them to think over the future of this path and make their own decision before she gives them her utmost push. We said, job outlook is bleak. Once faced with the reality, even

可能會轉為怨恨，或者是因為現實打擊而提早燃盡。

面對學生的轉行，吳教授抱持著坦然的態度。她寧可學生帶著熱情離開，心中深藏著對生態保育熱情的種子，也許有一天這些學生會變成股王，會變成國科會主委，會入閣……這之中有無限種可能，那時學生想到自己年少的熱情，或許台灣的生態領域就能有翻盤的機會了。這真的是一個非常「生物學家」式的說法！看待事物總是看見它的無限可能，但是又不強求結果！

吳教授笑說：「種子放著是不會壞的，能量會一直儲蓄在那邊，當我們在不合適的時候催芽，才會使能量提早釋放而無法持續！」

筆者請問了吳教授，對於後繼的生態觀測者，有沒有什麼樣的建議或提點？吳教授笑謎謎的說：「如果進行的是資料蒐集，記得不要對環境造成破壞，如果要進行實驗，也要考量復原的可能性。最重要的是，生為一個生物學家，要常常自我反省，不只是對自己道路的反省，也包括了處事以及資源運用方面是否合理等等。」

20多年來對於物種的觀察，讓吳教授的思考有著特有的冷靜與中性，事情沒有絕對的好壞，物種的滅絕或興起是自然界的必然；以強大的熱情伴隨著對自然界規律的通透理解，吳海音老師，持續著她生物學家的道路。

students with passion may lose their interest or even become averse to ecology.

Seeing students shift to other careers, Wu stays optimistic. She said she would rather see students walking out with passion for ecology. Perhaps some will become bankers, the head of the NSC, government officials, who knows? Maybe they'll find ways to contribute to ecology. What a biologist's way of thinking: seeing all possibilities while not presetting any results!

She smiled and said, "Those seeds won't go bad. Time hasn't come. If we force them to sprout prematurely, they'll use up all their energy!"

Any suggestions for the young generation of eco-observers? I asked. She smiled again and said, "When collecting data, never cause harm to the environment. When experimenting, prepare ways to undo it. Most importantly, a biologist needs to reflect, not just on yourself but the way you deal with people and how you use and manage resource."

20 years of observation on species has given Wu a clear head and objectivity. There is no absolute good or bad, she thinks. The rise and fall of species is natural. Passion, coupled with thorough appreciation of the law of nature, enables Wu to continue her journey as a biologist.

吳海音教授簡介 Profile of Prof. Hai-yin Wu

吳海音教授是臺灣最早進入生態觀測領域的學者之一；觀測的範圍由墾丁跨越到高雄柴山、新中橫公路以及宜蘭福山等等，為臺灣全島猴群的觀測奠定了完整的基礎，也幫助人們更瞭解並愛護臺灣獼猴。由於吳教授整個觀測的歷程，等同於臺灣生態觀測的起始與趨於成熟的過程，有著不可取代的特殊性，所以知名的生態攝影工作者劉燕明，曾以吳教授的故事拍攝了「吳海音的獼猴世界」，深刻討論了臺灣生態保育的進程，此片並入圍了37屆金馬獎最佳紀錄片。

吳海音是臺灣大學生物學系學士、碩士、博士。現任國立東華大學自然資源管理研究所教授。專長領域為保育生物學、野生動物生態學和資源管理。

Prof. Wu is one of the earliest eco-observation researchers in Taiwan. Her research covers areas stretching from Kenting, Chai-shan (in Kaohsiung), the New Central-Cross-Island Hwy, to Fu-shan (in Yilan). Laying the foundation for the observation of Taiwan's monkey species, Wu has also contributed to increased understanding of and care for Formosan Macaques. As a long-time eco-observer, Wu has witnessed the development of Taiwan's eco-observation. For all her irreplaceable unique qualities, Yen-ming Liu, an acclaimed eco-photographer, made *Hai-yin Wu's World of Macaques*. It features Taiwan's eco-conservation and was nominated for Best Documentary at the 37th Golden Horse Award.

Prof. Wu, Hai-yin – BA, MA, and Ph.D. in Biology at National Taiwan University; professor at Institute of Natural Resources, National Tungkwa University; specializing in conservation biology, wildlife ecology and resource management.

