



李光中 Kuang-Chung Lee

英國倫敦大學地理學博士

Ph.D. University College London

現任花蓮教育大學生態與環境
教育研究所副教授

Associate professor of Education
Department of Graduate Institute
of Ecology and Environmental
Education, National Hualien
University

氣候變遷與保護區

The Challenge of Climate Change

從2004年賣座的環境災難片《明天過後》，到美國前副總統高爾的《不願面對的真相》拿下今年奧斯卡最佳紀錄片，全球暖化現象和可能造成的災難已逐漸受到大眾關切。早在1988年，聯合國環境規劃小組（UNEP）與世界氣象組織（WMO）成立了跨政府的氣候變遷專家小組（IPCC），負責評估氣候變遷對於環境及社會經濟的衝擊。今年2月初，IPCC集結2,500多位科學家的努力，於巴黎發表第四次的評估報告《氣候變遷2007》後，現今，氣溫上升的科學證據已不是新聞，氣候變遷的爭論已成了討論未來人類該如何面對這可怕效應的因應之道。

目前有關減緩全球暖化現象的作法，多著眼於減少溫室氣體的排放，如制定《京都議定書》限制二氧化碳的排放，而鮮少討論如何幫助那些因全球暖化，而遭受衝擊的野生動植物。生物多樣性是人類生存的重要資源，因人類對全球暖化的成因恐怕難辭其咎，為此對自然生態盡份心力，也是為解決人類存續問題。世界保育聯盟（IUCN）的世界保護區委員會（WCPA）主席Nik Lopoukhine日前針對氣候變遷議題，提出以下3項對策：

An environmental disaster movie called “The Day After Tomorrow” had box office success in 2004. Just this year, Al Gore, the former U.S.A. vice president, won an Oscar for his global warming documentary feature “An Inconvenient Truth”. The possibly disastrous consequences of global warming becomes one of the most pressing concerns of this new century. The scientific community had already begun investigating in 1988, when two UN organizations, the United Nations Environment Programme and the World Meteorological Organization, established an intergovernmental body called Intergovernmental Panel on Climate Change which had the aim of assessing the available scientific, technical and socio-economic information relevant to developing an understanding of the risks of human-induced climate change. In February 2007, the most recent report “Climate Change 2007” conducted by IPCC included the findings of more than 2,500 experts and scientists. Now, with reality setting in, many more eyes are opening to global warming and seeking for a solution.

Present approaches that have been adopted for slowing future climate change are mostly focused on reducing greenhouse gas emissions. The “Kyoto Protocol to the United Nations Framework Convention on Climate Change” is the best example of this, as its primary focus is on reducing emissions of carbon dioxide and five other greenhouse gases. In comparison, there are not as many plans that focus on the impact of climate change on ecology and biodiversity and any possible solutions to this side of the crisis. Nik Lopoukhine, Chair of the IUCN World Commission on Protected Areas, addressed three strategies regarding the issue of ecologic conservation and global climate changes:

● 設置國家公園等相關保護區：

未來必須區分出重要的棲地，如哪些區域是野生物受氣候變化影響而移遷的地方，這些地方安全嗎？如果不是，就必須設置保護區讓野生物有安全的新棲地。

● 強化保護區的聯結：

設置孤立的保護區是不夠的，必須盡可能的建立所有陸地和海洋保護區之間的聯結，來幫助物種適應氣候變遷。另外，亦須辨識出物種可能使用的廊道，以確保其安全。對於生存在山頂和海島的物種，未來可能因氣溫上升而無處可逃，移地保育等救援計畫則可能是未來必須施行的措施。

● 推行生態復育：

生態復育係針對已經劣化或損壞的生態系統，以刻意的人為措施幫助其恢復永續能力的過程。

目前國內對於氣候變遷與保護區的討論和研究都不多，上述訊息和對策頗值得我們深思和採取進一步行動。以知名的國寶魚「台灣櫻花鉤吻鮭」為例，即是歷經數十萬年來氣候和地理變遷的陸封型鮭魚，目前僅見於大甲溪上游的雪霸國家公園，稱為「冰河孑遺生物」，水溫變化關乎其生存。以目前全球氣溫上升趨勢，國寶魚能否逃過這一劫？我們應當採取何種就地和移地保育措施？這些問題都指向氣候變遷與保護區的關聯性。

● Establishing Conservation Areas or National Parks:

Distributions of species are likely to change with climate changes, so there is more need than ever to distinguish important habitats, and develop a better understanding of movement patterns of organisms influenced by climate changes. Identifying which habitat is safe for which species, and determining any need for translocation if the original habitats becomes unsafe, provides an important purpose and guidance to the establishment of conservation areas and national parks.

● Connectivity:

An isolated preservation area is not doing enough for conservation. Both land-use and marine-use planners have to discover and develop the concept of connectivity to give organisms the best chance of adapting to climate changes. In addition, planners also need to distinguish corridors that species might use to reach the conservation area, and put these under some form of protection as well. For species whose natural habitats are mountain tops or islands, natural escape and self-relocation to new habitats is unlikely, so programs of ex situ conservation may become necessary.

● Ecological Restoration:

Direct action of restoration is a necessary approach to be aimed at endangered or damaged ecosystems, to help organisms in these most threatened areas be resilient to climate change impacts and enhance their natural abilities to adapt.

As a matter of fact, there are not many discussions in Taiwan regarding the relationship of climate change and the establishment of conservation areas. International strategies regarding this issue are valuable resources upon which to base our own future plans. For instance, *Oncorhynchus masou formosanus*, considered to be a national treasure of Taiwan, is a land-locked salmon, a descendent of ancient glaciers, surviving in the cool, higher elevations of Taiwan's mountain streams. Due to environmental damage, its habitat has been reduced to just a single upper mountain stream of the Tachia River in Shepa National Park. Since it only survives in cool water, water temperature change plays a crucial role to this glacial relic. Will it be able to survive the crisis of global warming? This endangered organism showcases the best example of the relationship between climate changes and development of conservation areas, lending great urgency to our need to find workable solutions.