分析台灣濕地對東亞澳遷徙線瀕危候鳥之棲地貢獻

Analysis of the Contribution of Taiwan's Wetlands to the Habitat of Endangered Migratory Birds along the East Asian-Australasian Flyway

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摘要

東亞澳遷徙線(East Asian-Australasian Flyway, EAAF) 是全球最大遷徙水鳥受威脅的遷徙線，也是最迫切需要保育的遷徙線。EAAF 從阿拉斯加經過東亞、中南半至遷徙水鳥的數量正在快速減少。目前許多研究認為，這些水鳥受威脅的原因，主要是東亞的潮間帶泥灘地因為海岸線開發流失，其他可能的生存威脅還包括過度 獵捕、外來植物入侵、以及氣候變遷。

本研究發展一般性的跨國棲地貢獻模型，應用空間補貼方法評估臺灣溼地環境對於瀕危遷徙候鳥的跨國生態系服務潛力。本研究改進美國地理學會 (USGS) Semmens et al. 於 2011 年所發表的跨境生態系統服務計量模型，過去的空間生態系統服務補貼模型並未精確地考量物種的棲地，而是以政治上的國界或各州的邊界進行估算，本研究使用 MaxEnt 模型模擬棲息地的適宜性。研究中以多種環境變數為基礎擬透過棲地模擬更精準地衡量不同水鳥濕地的重要性 ，作為生物多樣性保育資源配置的重要依據。 本研究以 Worldclim2 的生物地理環境變量，包含了每月最低溫度 ，每月最高溫度，每月平均溫度，每月降雨，每月日照輻射，每月 風速，水蒸氣。並優先模擬黑面琵鷺和大杓鷸的潛在分佈。

根據模型結果顯示，台灣西南部濕地為高適宜性的區域，對候鳥提供關鍵的覓食與中繼停棲場所，這些濕地應成為重點的關注對象。在候鳥過冬時期，對於黑面琵鷺，台灣的棲地貢獻度達黑面琵鷺 29%。對於大杓鷸，台灣的貢獻度達 9%。後續研究將會詢 問台灣社會民眾對

於棲地貢獻度和保育願付價格之關聯性。 本研究結果可作為主管機關及權益關係人有效配置保育資源，以及規劃生態系服務給付方案的依據。同時藉此彰顯台灣濕地在東亞澳遷徙線上的重要性，促進國際保育合作，透過高效益的資源運用，達成永續發展目標。

關鍵字: 東亞澳遷徙線，受脅候鳥，物種分佈模擬，棲地貢獻，濕地生態系服務

ABSTRACT

The East Asian-Australasian Flyway (EAAF) is the migratory route with the highest number of threatened migratory waterbirds in the world and is the most urgently in need of conservation. The EAAF stretches from Alaska through East Asia and Southeast Asia to Australia. Many studies suggest that the primary threat to these birds is the loss of intertidal mudflats in East Asia due to coastal development. Other potential threats include overhunting, invasive plant species, and climate change.

This study aims to develop a generalized transboundary habitat contribution model, applying a spatial subsidy approach to assess the potential of Taiwan's wetlands to provide transnational ecosystem services for endangered migratory birds. The study improves upon the transboundary ecosystem service valuation model published by Semmens et al. (2011) of the U.S. Geological Survey (USGS). Previous spatial ecosystem service subsidy models did not accurately account for species-specific habitats, instead estimating values based on political or state boundaries. This study seeks to more precisely evaluate the importance of

different wetlands for various waterbird species through habitat simulations, thereby providing a critical basis for biodiversity conservation resource allocation.

The study utilizes biogeographical environmental variables from WorldClim2, including monthly minimum temperature, maximum temperature, average temperature, precipitation,

prioritizes modeling the potential distribution of the Black-faced Spoonbill and the Eurasian Curlew. Preliminary results indicate that during the wintering period, Taiwan contributes to 29% of the habitat for the Black-faced Spoonbill and 9% for the Eurasian Curlew. Future

research will explore the relationship between public willingness to pay for conservation and habitat contribution levels in Taiwanese society.

The results of this study can serve as a basis for government agencies and stakeholders to effectively allocate conservation resources and design ecosystem service payment schemes. At the same time, the findings highlight the importance of Taiwan's wetlands within the EAAFP, promote international conservation cooperation, and support the achievement of sustainable development goals through efficient resource use.

Keywords: East Asian-Australasian Flyway, threatened migratory birds, species distribution modeling, habitat contribution