

重構以自然為本的解決方案(NbS)框架：農村氣候變遷調適的系統性方法

Restructuring the Nature-based Solutions (NbS) Framework: A Systematic Approach to Climate Change Adaptation in Rural Areas

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摘要

氣候變遷對農村地區帶來了諸多挑戰，包括極端天氣事件增加、生態系統退化和農業生產力下降。以自然為本的解決方案(Nature-based Solutions, NbS)被視為應對這些挑戰的有效策略。本研究聚焦於國際自然保護聯盟(IUCN)提出的 NbS 評估框架，通過系統性文獻回顧，同時進行縱向細化和橫向整合，以重構和深化該框架，為農村地區的氣候變遷調適提供更全面的指導。

在縱向細化方面，研究基於 IUCN 框架的八大準則和 28 項指標，通過深入的文獻分析，識別出每個指標下 3-4 個關鍵實現要件，總計 94 個要件。這一過程不僅豐富了現有 NbS 框架的內涵，還為實踐者提供了更具操作性的評估工具。在橫向整合方面，本研究從新的視角重新審視和分類這 28 項指標，提出了六個核心主題：「利害關係人之參與式規劃與治理」、「識別挑戰、手段與效益的協同作用」、「NbS 手段的發展需跨域領與跨學科整合」、「全生命週期評估與監測」、「在不同目標、效益和影響之間謹慎權衡」、「強調生態系統的修復、利用與發展」。

這種雙向優化不僅突出了 NbS 在實施過程中的關鍵考量因素，也為決策者提供了更清晰的策略方向。通過將複雜的 NbS 概念簡化為這六個核心主題，同時深化每個指標的具體要件，本研究為農村地區制定氣候變遷調適策略提供了更為全面和實用的框架。

本研究的創新之處在於同時細化和擴展了 IUCN 的 NbS 框架，通過縱向細化和橫向整合，提供了更詳細且系統化的實施指南。這一重構的框架有助於政策制定者和實踐者更好地理解 and 應用 NbS 原則，從而制定更有效的氣候行動策略。研究結果預期將為農村地區的氣候智慧規劃提供重要參考，並為進一步整合 NbS 於氣候變遷調適政策中提供科學依據。

關鍵詞：以自然為本的解決方案(NbS)、氣候變遷、農村發展、框架重構、氣候韌性

Abstract

Climate change poses numerous challenges to rural areas, including increased extreme weather events, ecosystem degradation, and declining agricultural productivity. Nature-based Solutions (NbS) are seen as an effective strategy to address these challenges. This study focuses on the NbS assessment framework proposed by the International Union for Conservation of Nature (IUCN), aiming to reconstruct and deepen this framework through a systematic literature review, simultaneously conducting vertical refinement and horizontal integration to provide more comprehensive guidance for climate change adaptation in rural areas.

In terms of vertical refinement, based on IUCN's eight criteria and 28 indicators, this research identified 3-4 key implementation requirements for each indicator through in-depth literature analysis, totaling 94 requirements. This process not only enriches the existing NbS framework but also provides practitioners with a more operational assessment tool. For horizontal integration, this study re-examined and classified the 28 indicators from a new perspective, proposing six core themes: "participatory planning and governance of stakeholders", "identification of synergies among challenges, means, and benefits", "cross-domain and interdisciplinary development of NbS approaches", "life-cycle assessment and monitoring", "careful trade-offs between different objectives, benefits, and impacts", and "emphasis on ecosystem restoration, utilization, and development".

This bi-directional optimization not only highlights key considerations in the implementation of NbS but also provides clearer strategic directions for decision-makers. By simplifying complex NbS concepts into these six core themes while deepening the specific requirements for each indicator, this study offers a more comprehensive and practical framework for developing climate change adaptation strategies in rural areas.

The innovation of this research lies in simultaneously refining and expanding the IUCN's NbS framework, providing a more detailed and systematized implementation guide through vertical refinement and horizontal integration. This restructured framework helps policymakers and practitioners better understand and apply NbS principles, thereby formulating more effective climate action strategies. The research results are expected to provide important references for climate-smart planning in rural areas and scientific basis for further integration of NbS into climate change adaptation policies.

Keywords: Nature-based Solutions (NbS), Climate Change, Rural Development, Framework Restructuring, Climate Resilience