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Editorial

Solutions and Practical Applications for Protecting, Restoring and Using Ecosystems as Climate Change Tools

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EDITORIAL

The potential and problems associated with actual ecosystem management, restoration, and protection to support climate change mitigation and adaptation actions are the subject of our concluding section. Under the broad/overarching framework of NbS, or 'Natural Climate Solutions' (NCS), when the context is climate change mitigation, the ability to protect, restore, and employ ecosystems as tools to combat climate change has gained significant popularity. If 'maladaptive' NbS, such as non-native monoculture plantings, are avoided, NbS can contribute to reducing and limiting global warming while also potentially maintaining biodiversity and ecosystem services. Give an outline of the concept of NbS and how it is gaining traction in international politics. They propose a novel conceptual framework that clarifies the function of NbS in integrating the ecosystem with the socioeconomic system, as well as examples of how NbS can lessen the overall vulnerability of the social–ecological system with careful and equitable application. They highlight crucial evidence for nature's role in reducing social–ecological vulnerability and sensitivity to climate change impacts, as well as examples of how NbS improves ecosystem and societal adaptive capacity. Ecosystems' capacity to facilitate human adaptation (i.e., to supply so-called "adaptation services") changes as a result of climate change. They use an innovative method by examining the co-benefits, trade-offs, and synergies among different adaptation services as they go through an ecosystem cascade that includes ecosystem management, mobilisation, appropriation, social access, and appreciation. They show how broad mechanisms might promote co-benefits and minimise trade-offs amongst adaptation services using five case studies from a variety of socio-ecological systems. They end by proposing that understanding these co-production mechanisms will enable proactive management and governance for collective adaptation to ecosystem change.

While carbon value is fundamentally unidimensional, biodiversity value is multidimensional and geographically contingent, making it more difficult to map. A tropical forest, for example, has significantly higher species diversity than an Arctic habitat, although the latter has a higher biodiversity value. They create maps of both proactive biodiversity conservation potential (areas of high biodiversity intactness that are not under immediate threat but could benefit from proactive protection) and reactive biodiversity conservation priorities (areas of high biodiversity intactness that are under immediate threat but could benefit from proactive protection) using multiple indices. The study shows where biodiversity and carbon priorities converge (e.g. tropical and boreal forest regions) versus where they diverge (e.g. grasslands), indicating that a focus on carbon and climate mitigation may not deliver biodiversity benefits and, in many cases, may be detrimental to local biodiversity (e.g. through carbon-focused afforestation of natural grasslands).

The majority of tropical NCS potential is held by a small number of countries, all of which have above-average governance indicators, showing the possibility and capacity to execute NCS utilising protect-manage-restore tactics.

Low vegetated cover, high impervious cover, pollution generation, heat island effects, high demand for fresh water resources, and concentration of population and infrastructure in vulnerable areas such as coastal zones, river floodplains, and deforested hillsides make cityscapes particularly vulnerable to climate change hazards. Climate change dangers, as well as the amplifying effects of urban areas on those hazards, can be mitigated using nature-based techniques. Improved vegetation cover and green space, as well as the development of structures that restore natural hydrologic function, such as storm water ponds, bios wales, green roofs, and riparian zones, as well as the restoration of natural protective habitats along coasts, are among these initiatives. However, a complete evaluation of these nature-based solutions must consider the costs (including negative consequences) of these strategies in comparison to technical approaches

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