

GLOBAL LAND OUTLOOK

Thematic Report on Ecological Connectivity and Land Restoration

EXECUTIVE SUMMARY



United Nations
Convention to Combat
Desertification



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Connectivity is a critical yet frequently overlooked attribute of well-functioning ecological processes, which are essential for the survival of species, human well-being and the health of landscapes. All natural processes that support life on Earth take place within complex social-ecological systems in which humans and nature interact and influence each other. This multi-dimensional connectivity provides a framework for understanding the complex and dynamic interactions between society and the environment.

Ecological connectivity is far more than the movements of animals between different habitats. It is a broad concept that considers the biotic and abiotic structures and functions that support healthy populations and the delivery of ecosystem services that underpin our societies and economies. For instance, clean air and water, pollination, pest control, soil erosion and flood control and climate regulation are all dependent on ecological connectivity.

Connectivity allows for the flow of resources, information and species, enhancing the resilience of both social and ecological systems in the face of climate change, land degradation and biodiversity loss. This includes ecological processes that connect communities, ecosystems and landscapes, such as:

- water-mediated transfers of matter, energy and organisms within the hydrological cycle,
- regulation of energy fluxes, such as solar, wind and water;
- unimpeded movement of species on land, in water and in the air, including the exchange of genetic material and dispersal of individuals among populations;
- spatial and temporal linkages associated with migratory patterns and climate change-induced range shifts;
- communication, collaboration and knowledge exchange, which for humans can lead to restorative measures that enhance ecological connectivity.



Human activities have significantly altered most landscapes, resulting in the loss of biodiversity and ecosystem services and, in some cases, the creation of novel ecosystems. Consequently, landscapes are becoming increasingly fragmented, thereby eroding the natural structures and processes that support ecological connectivity. The most prominent drivers of fragmentation are changes in land use and the overexploitation of natural resources to meet the ever-increasing demand for food, water, energy and raw materials. These pressures are exacerbated by the expansion of infrastructure to deliver these goods and services, as well as climate change, invasive species and pollution which also contribute to the loss of ecological connectivity.



When ecosystems and landscapes are degraded and fragmented, they lose their ability to support wildlife, regulate nutrient and water cycles and withstand environmental stressors. This makes them more vulnerable to drought, desertification and further land degradation which has significant costs to society. However, sustainable land management and ecosystem restoration have the potential to restore biodiversity habitat and enhance ecological connectivity, thereby strengthening the resilience of people and nature. Greater investment and incentives for regenerative land management practices that re-establish connectivity are critical to mitigating and adapting to the impacts of multiple, interconnected crises.

'Connect to restore, restore to connect' serves as a guiding principle for the design, implementation and monitoring of large-scale landscape conservation, recognising that connectivity and restoration are mutually reinforcing. It emphasises that maintaining or enhancing connectivity is crucial for effective restoration, and conversely, that restoring the health and productivity of the land can improve ecological connectivity. This could involve removing barriers that impede the movement of species or water flows, conserving wildlife corridors, restoring habitats and managing soils to support nutrient cycling and vegetation recovery.

Addressing the current extent of land degradation and fragmentation requires the strategic, systematic and holistic combination of nature-based solutions adapted to local social-ecological contexts. This involves radical changes to the way we use and manage land resources, such as soil, water and biodiversity, to create more connected and resilient ecosystems and landscapes. A first step is to integrate sustainable land and water management and ecological connectivity considerations into key policy areas and economic sectors, such as agriculture, forestry, water management, extractive industries, ecotourism, nature conservation and urban planning. Implementation and monitoring must consider any new challenges that may arise from restored connectivity, such as the spread of fire, invasive species and diseases.

Ecosystems and landscapes that are well-connected, such as networks of protected areas, are considerably more resilient to disasters, stresses and shocks. For instance, unimpeded water and nutrient cycling can enhance drought resilience, while connected vegetation cover can regulate the local climate by maintaining moisture levels and reducing heat stress. Reconnecting natural and agricultural landscapes, such as through agroforestry and regenerative agriculture, can improve soil health, farm productivity and food security. Restoring wetland and riparian ecosystems – reconnecting 'blue lifelines' – improves hydrologic and aquatic connectivity, enabling fish and amphibians to migrate between their breeding and feeding grounds.

Technical measures to restore degraded land and enhance ecological connectivity cannot be implemented in isolation. Without due consideration of local conditions and knowledge, as well as incentives, supportive policies and inclusive decision-making, ecological connectivity and land restoration initiatives are likely to encounter significant challenges. Increased attention to data collection, participatory governance, gender equality, land rights and the participation of Indigenous peoples and local communities can help to ensure that these initiatives contribute to broader goals, such as reducing poverty and promoting more equitable and sustainable development.

