



Ecological Corridors - A Vital Nature-based Solution to Climate Change -

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Ecological connectivity is the unimpeded movement of species and the flow of natural processes that sustain life on Earth.¹ An important strategy to maintain, enhance, or restore effective ecological connectivity in intact and fragmented landscapes are ecological corridors; clearly defined geographical spaces that are governed and managed over the long term and complement protected areas and other effective area-based conservation measures (OECMs) to form ecological networks for conservation.^{2,3} Conservation biologists agree that one of the most effective strategies for protecting biodiversity and ecosystem services in a changing climate is to ensure habitat is protected and connected at the landscape scale.⁴ The 5th session of the United Nations Environment Assembly reaffirmed to work across sectors promoting ecological connectivity as a focus for halting the loss, degradation, and fragmentation of ecosystems.⁵ Likewise, The United Nations General Assembly has encouraged increasing the establishment of ecological corridors to maintain and enhance connectivity of habitats for climate change adaptation and mitigation.⁶ Ecological corridors can serve as a vital nature-based solution (NbS) to climate change, contributing in two major ways:

1. Adaptation: Corridors accommodate range shifts

The Intergovernmental Panel on Climate Change's 6th Assessment Report states that increasing connectivity is the single most consistently cited climate change adaptation measure.⁷ Ecological corridors provide avenues for wildlife populations to shift their ranges as the climate changes and suitable habitats move, shrink, or grow.⁸ Movement is essential to wildlife survival – to meet daily and seasonal (i.e., migration) needs, dispersal of offspring to new home areas, and for species to shift their ranges in response to current and future rapid environmental shifts— driven not only by climate change but also changing land use patterns.⁹ Recent research demonstrates that protected areas alone are unlikely to serve as “stepping stones” for species undergoing range shifts due to climate change.¹⁰ Ecological corridors can therefore substantially increase the ability of species to adapt their ranges to fit preferred temperatures as the planet warms.¹¹

Corridors spanning environmental gradients (i.e., in latitude or elevation) are the most effective for accommodating future range shifts. Corridors ideally encompass climate “microrefugia”; unique places that remain relatively buffered from contemporary climate change over time.¹² Examples include places with thick canopy cover, valleys which harbor cold air pools, or areas near large bodies of water with a high heat capacity.¹³

Moreover, ecological connectivity is essential in freshwater and marine environments. Free-flowing rivers and streams are important in an era of climate change, as they maintain cooler water and air temperatures than human-modified waterways. They also connect many ecological zones, giving plants, migratory fish, and wildlife room to move.¹⁴ In marine and coastal systems, ecological connectivity among and between marine protected areas can allow for shifts in species distribution or ecosystem functions due to climate change.¹⁵

2. Mitigation: Corridors provide carbon sinks

Ecological corridors can also contribute to mitigating climate change. Carbon stock corridors are specifically designed to contain maximum amounts of carbon tied up in vegetation. Identified corridors can often have carbon densities equal to or greater than those of the protected areas they connect.¹⁶ In tropical landscapes with high rates of deforestation, corridors provide dual benefits of carbon storage and biodiversity conservation.¹⁷ Grasslands also sequester massive amounts of carbon in belowground

stocks and can serve as valuable corridors for many kinds of wildlife.¹⁸ The mitigation potential for connectivity extends beyond terrestrial corridors. Research also shows that free-flowing rivers can store more organic carbon in biota and sediments than human-modified rivers.¹⁹

Across all biomes and ecosystem types, climate change mitigation projects that seek to add biodiversity conservation benefits can apply the concept of carbon stock corridors to guide the spatial arrangement of the project. And vice versa, biodiversity conservation projects can use carbon stock corridors to take advantage of growing climate mitigation funding and political will.

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⁶ United Nations General Assembly. 2021. Resolution 75/271 *Nature knows no borders: transboundary cooperation – a key factor for biodiversity conservation* (16 April 2021). <https://undocs.org/en/A/RES/75/271>.

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<https://www.ipcc.ch/report/ar6/wg2/>.

⁸ Costanza, J.K. and Terando, A.J., 2019. Landscape Connectivity Planning for Adaptation to Future Climate and Land-Use Change.

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⁹ Tabor, G. (2019). 'Ecological connectivity: A bridge to preserving biodiversity'. In *Frontiers 2018/19 Emerging Issues of Environmental Concern*, pp. 24-37. Nairobi: United Nations Environment Programme. <https://wedocs.unep.org/handle/20.500.11822/27541>.

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