

Supporting implementation of Convention on Migratory Species and the Global Biodiversity Framework

Selected Solutions on Connectivity Conservation for CMS COP14

[PANORAMA Species Conservation Community](#) provides a platform for documenting species conservation success from all over the world. These case studies can be replicated, applied to inspire the best solutions for each species' challenges, providing resources for the implementation of the [Global Species Action Plan](#) (GSAP).

Maintaining, enhancing, and restoring ecological connectivity is crucial at local, national, transboundary, regional, and global levels. The Convention on Migratory Species (CMS) defines ecological connectivity as “the unimpeded movement of species and the flow of natural processes that sustain life on Earth”. This includes the flow of nutrients and minerals, pollination, seed dispersal, free flowing rivers, transmission of genetic material, movement of animals, species adaptation to environmental change, and many others. These interconnections often span national boundaries and there is a growing toolkit of science, policy, and practice for undertaking concrete measures and approaches for integrating connectivity into broader conservation efforts. Applied across landscapes and seascapes, ecological connectivity plays a major role in addressing effective biodiversity conservation, land restoration, and climate change mitigation and adaptation across terrestrial, freshwater, and marine ecosystems.

The ecological connectivity of species refers to the ability of species to move freely from place to place, on land, in water and in the air. This allows species to access resources such as food, water, and shelter, as well as mates for reproduction. Connectivity plays a key role in species resilience and adaptation to climate change, as it enables plant and animal species movements to follow shifts in the range of climatically favourable environments. These movements can in turn be facilitated and maintained to take place across spatial and temporal scales including daily movements, dispersal movements, seasonal migrations, and long-term geographic shifts in population range. Species migration can only be accomplished when animals are able to access the different sites, habitats, food resources and breeding conditions they require at the different stages of their annual cycles and throughout their migratory journeys.

Therefore, CMS reaffirmed its commitment to ecological connectivity as a top priority in its 2020 '[Ghandinagar Declaration](#)' and related policy resolution 'Improving Ways of Addressing Connectivity in the Conservation of Migratory Species'. Together, CMS and its Family of Agreements provide a specialized framework for cooperative efforts on ecological connectivity in relation to the special conservation needs of migratory species. Indeed, ecological connectivity is essential for migratory species throughout their lifecycles at wide scales. It is the expression of whole migration systems, as it enables the functioning of the migration process and the conditions that maintain the cyclical and predictable movements of animals. Adoption of the 2022 Kunming-Montreal Global Biodiversity Framework (KMGBF) reinforces this fundamental importance for healthy ecosystems and species, including in Target 2 on restoration, Target 3 on area-based measures, and Target 12 on urban landscapes. This emphasis on ecological connectivity is an innovative way for CMS, CBD, and many multilateral environmental agreements to achieve their individual and joint objectives joint objectives in a more comprehensive, efficient, and effective manner to stop fragmentation, reverse biodiversity loss, and increase resilience to climate change.

Yellowstone to Yukon (Y2Y): Connecting and protecting one of the most intact mountain ecosystems

Summary

Since 1993, a joint Canada–US not-for-profit organisation, the Yellowstone to Yukon Conservation Initiative, has brought partners together to achieve a vision of connecting and protecting the region so that people and nature can thrive. More than 400 different entities have been or currently are engaged in collaborative conservation that advances the vision across this ecological network. These include conservation groups, local landowners, Indigenous entities, businesses, government agencies, funders and donors, and scientists.

Conservation progress across the Y2Y region is due to the collective work of these different groups. Conservation priorities range from protecting areas important for biodiversity and restoring and maintaining areas between protected areas for ecological connectivity, to directing development away from areas of biological importance and promoting policies and practices for people and wildlife to live in harmony across the region.



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Grizzly Bear Climbing Over a Guardrail

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Connectivity, ecosystem services and Nature-based Solutions in Land-use planning in Costa Rica

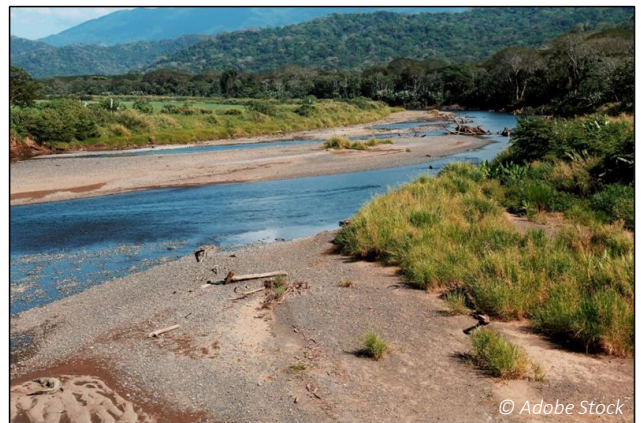
Summary

In Costa Rica, land management plans are a tool that local governments can use to generate regulations that complement protected areas and ecological corridors. These three elements are complementary and must be developed in an integrated fashion to achieve a systematic approach to planning. Management plans implement ecological corridors through tools such as the establishment of specific areas for focal species; the preservation of agricultural areas that function as biological, conservation and sustainable tourism corridors; the creation of buffer zones; and the zoning of aquifer recharge zones for the protection of water resources.

Through the University of Costa Rica's Sustainable Urban Development Research Program (UCR-ProDUS in Spanish), land management plans for more than a dozen municipalities have been developed, including the protected areas Corcovado National Park, Piedras Blancas National Park, Ballena Marine National Park, Juan Castro Blanco Water National Park and Carara National Park.



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Carara National Park, Costa Rica

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A Phased Approach to Increase Human Tolerance in Elephant Corridors to promote ecosystem connectivity

Summary

Pathfinding elephants are moving through human-dominated landscapes, often across international boundaries. By doing so, they play a vital role in connecting Protected Areas (PAs) but also encounter Human-Elephant Conflict (HEC) that threatens lives and livelihoods. Our solution proposes a long-term strategy to conserve elephant corridors whilst incorporating the socio-economic needs of the people that share the landscape with them.

GPS tracking of elephants across two transfrontier conservation areas flags where linking corridors exist and thus where to focus resources. We use innovative cafeteria-style experiments to understand which elephant-unpalatable plants would offer lucrative alternative income streams to farmers living in those HEC hotspots. Lastly, we combine food security and people's safety by deploying Rapid Response Units and soft barriers to protect subsistence crops. This phased strategy enables the protection of bioregions to achieve biodiversity objectives at landscape scale.



[Elephants Alive](#)



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Tracking collared elephants showing us where they want to go

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Connectivity Across the Great Barrier Reef

Summary

The world's largest coral reef system, the Great Barrier Reef, is an extremely biodiverse habitat. The corals that comprise the reef are the backbone of the ecosystem that many marine animals depend on. Ocean currents drive the population dynamics of coral and the entire reef system. Connection of fishing zones to no-take zones and connection between inshore and offshore habitats along with zones of high larvae dispersal would be the most effective way to conserve the delicate reef habitat. Without data on larvae dispersal, it was critical to determine the best spots for connectivity.

The Great Barrier Reef Marine Park (GBRMP) was substantially rezoned and expanded in 2003, based on systematic planning principles. Eleven biophysical operating principles (BOPs) were devised to protect representative examples of each of the GBR's 70 bioregions. The maintenance of connectivity was also an explicit goal of the marine park – both the total size of the no-take marine reserves and their individual locations were considered.



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Great Barrier Reef in Australia

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Using camera traps to restore connectivity for wild cats in Central Asia

Summary

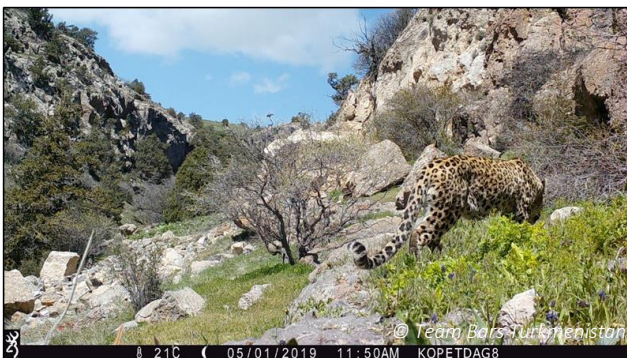
Located in the central part of the Kopetdag Range in the Ahal Province of Turkmenistan and spanning an area of 497 km², Central Kopet Dag Reserve incorporates two sanctuaries and two natural monuments.

This Reserve is the most important stronghold in Turkmenistan for the conservation of the Persian leopard (*Panthera pardus saxicolor*) and recently the presence of the Pallas cat (*Otocolubus manul*), a relatively rare small wild cat, rediscovered. The Reserve is the gateway between Iran and areas to the north and west into Kazakhstan for the Persian leopard. Since 2018, thanks to the collaboration between protected area staff and international partners, an effort is underway to establish baseline information on all cat species, the status of their important prey (the Urial and Bezoar goat), and to identify threats, including the impacts of the border fence with Iran. Twenty camera traps have been deployed that to date have enabled to identify several Persian leopards as well as record the Pallas cat.



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Persian Leopard in Central Kopetdag Reserve

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Improving Livelihoods and Connecting Forest in Brazil

Summary

In Brazil, the largest Atlantic Forest remnants lie in the Pontal do Paranapanema area of western São Paulo state. During the 1960-90s largescale ranching and sugarcane farming threatened the connectivity of the forest. Promoting income generation for settlers is urgently needed, as is protecting the remaining fragmented forests within this productive landscape before further pressures ensue.

The Corridors for Life project focuses on encouraging the adoption of biodiversity-friendly land-use options, enhancing the adoption of sustainable agriculture and agroforestry, improving farmers' livelihoods, and providing investors a return in the form of high-quality carbon offsets. Selecting areas for agroforestry and restoration will increase habitat viability by means of ecological corridors to increase connectivity between 'core' forest fragments, ensuring genetic exchange.



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Some 2.4 million trees make up the 1,200-ha ecological corridor connecting two main Atlantic Forest fragments, the largest in Brazil.

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Pacific salmon watersheds: Restoring lost connections

Summary

Over the last several decades, increased dam removal and mitigation to benefit salmon and other species of fish has become more widespread. Across the USA, more than 2,000 dams have been removed since 1912, with the vast majority having occurred in the past couple of decades. The dam removal process occurs through a decentralized decision-making process that involves numerous stakeholder groups, including federal agencies, state agencies and private dam owners. Although some dam removals have been voluntary, many have been the result of legal proceedings set in place by the Federal Energy Regulatory Commission (FERC).

Initial removal efforts focused on older dam structures, which cost too much to maintain and no longer complied with modern safety standards. In recent years the focus for dam removal leans towards environmental protection and habitat restoration. In the USA, the Wild and Scenic River Act (1968) is a legal mandate to preserve rivers having natural, cultural and recreational values in a free-flowing state.



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Chinook salmon (*Oncorhynchus tshawytscha*)

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Grassroots reserves have strong benefit for river ecosystems in the Salween River Basin

Summary

Throughout Southeast Asia, in response to perceived declines in fish populations, concerns for continued resource security, and encroachment from outsiders using illegal fishing gear (e.g. electric shocking), small no-take reserves on rivers have been created by local communities, established by non-governmental organisations or imposed by national governments.

These small reserves are effectively the only management action for these intensive-harvest fisheries. In tributaries of the Salween River in north-western Thailand, ecological networks of small riverine reserves continue to grow, particularly among fishery-dependent communities where overharvest is common.



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In no-take reserves, large schools of fish can be seen from the riverbank

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The Jaguar Corridor Initiative: A range-wide species conservation strategy

Summary

There are roughly 173,000 jaguar (*Panthera onca*) individuals left in the world today, with almost 90 per cent confined to Amazonia, especially in Brazil. Based on connectivity models, the species' corridor range measures 2.6 million km² for a total conservation network of 4.5 million km². In order to focus research and conservation efforts across this vast network, jaguar populations and ecological corridors are prioritized using three criteria: ecological importance, network importance and corridor vulnerability. Through coarse-scaled GIS data and expert-derived resistance values, corridors were validated before conducting site-based conservation activities and strategies conducted by the federal to the individual landowner level. Activities include:

- Developing a local corridor council
- Working with hydroelectric companies to direct environmental mitigation and restoration projects toward areas of importance
- Providing science-based recommendations to development projects for maintaining connectivity across the corridor



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Jaguar in Amazon Rain Forest

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Ecological Corridor for the Reunion of Giant Pandas

Summary

The Qinling landscape supports a large population of Giant pandas (*Ailuropoda melanoleuca*). In the 1970s National Road 108 was constructed through the previously intact forest, splitting the panda populations apart into distinct groups in the east and west. The eastern subgroup of pandas is at high risk of extinction. Habitat fragmentation like this limits resources and genetic movement for both groups of pandas. In 2000 a tunnel was built by the government to accommodate the new road and the opportunity to reconnect the panda population. The old roads, above ground, were closed so that habitat could be re-established.

In 2003 the Shaanxi Guanyinshan Nature Reserve was legally established, and in 2005 the World Wildlife Fund together with the reserve launched the G108 Qinling vehicle tunnel corridor restoration project. The main activities of the project included baseline surveys of the panda population, bamboo plantings to improve habitat quality, local community engagement and wildlife monitoring.



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Giant Panda

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Conserving Long Distance Migration for Mule Deer

Summary

Mule deer are an iconic migratory species of the western United States. Wyoming has some of the longest, most intact mule deer migrations in the lower 48 states. As anthropogenic influences increase and migrating ungulates continue to decline worldwide, a focus on protecting migration paths must be emphasized.

Mule deer travel across Wyoming to merge with 5,000 more mule deer for the winter where they continue their migration north. A pinch point known as the Fremont Lake 'bottleneck' was a serious threat to the migration path; the deer squeeze through a 400m wide area twice a year. The migration path through the bottleneck was blocked by a 2.5m tall woven wire fence. The area was identified as an important area for migration and was purchased by a national non-profit the Conservation Fund. The land was transferred to the Wyoming Game and Fish Department and designated as the Luke Lynch Wildlife Habitat Management Area preventing the obstruction of the migration corridor.



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Mule Deer (*Odocoileus hemionus*)

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COREHABS to BearConnect: Securing Wilderness in Eastern Europe

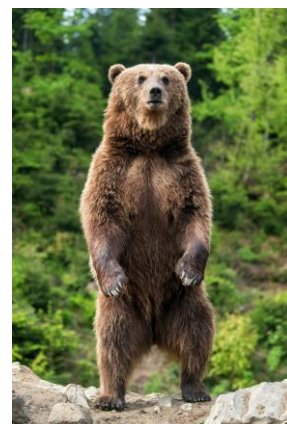
Summary

The Romanian portion of the Carpathian Mountains holds the largest continuous forest ecosystems in Europe, harbors many well-preserved natural habitats, and is home to large herbivores and carnivores, including brown bear. A total of 30.2% of the national territory is covered by forest, including virgin forests and ancient beech forests. However, these sites are disconnected.

The COREHABS initiative (Ecological corridors for habitats and species in Romania) is providing corridor modelling as a decision support tool for stakeholders, giving them the opportunity to develop infrastructure while considering the ecological measures necessary to ensure the long-term viability of species and habitats. COREHABS and other research projects are investigating the degree to which existing ecological networks ensure landscape connectivity, and are providing practical recommendations for integrating connectivity conservation into national, regional, local, rural and urban planning.



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Brown Bear (*Ursus arctos arctos*)

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