

Wildlife Corridors and Climate Change Adaptation

The fragmentation of habitat into small patches is a major threat for terrestrial biodiversity. Fragmentation can inhibit dispersal, reduce gene flow, decrease food availability, and increase the amount of edge habitat where predation and edge effects are more likely. Small fragments are highly vulnerable to invasive pest species. As the climate changes, many species will need to move to new habitats in the landscape and fragmentation will impede range shifts in those that have trouble crossing gaps between patches. Wildlife, or biodiversity, corridors aim to connect fragmented patches of habitat to aid species dispersal and persistence, and this information sheet provides information on corridors for terrestrial species, and how corridors can best be implemented to aid management plans to promote climate change adaptation.

What are Biodiversity Corridors?

Biodiversity corridors are commonly strips or blocks of land, supporting native vegetation, that connect two or more areas of remnant wildlife habitat. They can differ greatly in size and shape, depending upon the habitat and the species they are aimed to assist, but should, at a minimum, serve as avenues that promote movement of target species, providing cover, food and shelter.

Improving landscape connectivity is high on the political agenda, with the federal government recently releasing the extensive draft [National Wildlife Corridors Plan](#), a strategy to restore and manage ecological connectivity of Australian landscapes.

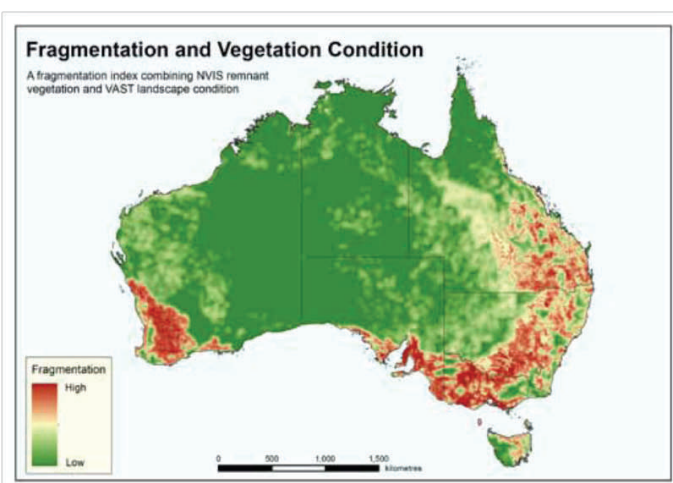
A number of corridors, at continental and regional scales, are also being established in Australia, including [The Great Eastern Ranges Initiative](#), [Gondwana Link](#), [Habitat 141](#)^o, and the [Trans-Australia Eco-Link](#), as well as other smaller scale corridor and buffer projects (e.g. [Naturelinks](#)).



Wildlife corridors provide avenues for movement, and at a larger scale, food and nest sites in strips of native habitat within a matrix of unfavourable habitat, such as agricultural and cleared land.

Corridors and Climate Change:

A key objective of corridors is to increase the area, and by extension, the population size of threatened species. An added benefit is their role in climate change adaptation; large-scale corridors that span climatic gradients can enhance the capacity of species to shift to new, more climatically favourable areas, allowing species to respond to shifting climates through natural dispersal rather than requiring active intervention. In particular, regional scale corridors that connect [habitat refugia](#) (cooler areas in the landscape) may be critical.



Much of Australia's vegetation is fragmented and in poor condition, particularly in highly populated regions. Large-scale corridors will help to revegetate these regions and mitigate against climate change (map from National Wildlife Corridors Plan).

Corridors can also promote the movement of individuals between different populations, increasing gene flow and reducing genetic bottlenecks and drift associated with isolated populations, thereby increasing the evolutionary resilience of species to rapidly adapt to environmental change.

Australia's flat topography means that even small changes in climate may mean that species need to travel considerable distances over land to stay within their preferred climatic "envelope". **In essence we need corridors that are large enough to support entire populations as they move – landscape corridors with high quality core habitat that span large areas.**

In fact the dispersal rates of some species may not prove fast enough to keep up with predicted climate changes. In such cases, corridors are places into which laggard populations can be introduced to help them keep up with species that are more mobile. This process, known as [assisted migration](#) in animals, and predictive provenancing in plants, is controversial due to the inherent risks and expense of actively relocating species.

Corridor Types, Design and Size:

Depending on management goals, corridors can be developed via natural revegetation, active planting of tree, shrub, and/or herbaceous cover, or buffers along streams or roadsides.

Corridor design and implementation are critical. Poor placement and design can result in negative impacts, including promoting pests and fire and can even act as a sink into which animals disperse but then die. Corridors can be constructed at different size categories, including local (~ 50 km wide), sub-regional (>300 km wide), and regional (>500 km wide).

Types of corridor include:

- **Linear** - these corridors generally link remnant patches of vegetation (Figure 1a), surround protected areas or follow rivers or streams (**buffers**)
- **Stepping Stones**- these are often a number of smaller corridors linking smaller areas of vegetation across the landscape (Figure 1b)
- **Landscape** - these are distinct from linear corridors in that they are intended to provide a larger habitat that can be lived in, not just moved through.

Corridors at smaller scales are generally aimed at linking populations and increasing population size, while large-scale corridors are will be useful for climate change adaptation and promoting movement/dispersal of species.

Other general guidelines and recommendations exist to maximize the potential of corridors for use in climate change adaptation strategies, including:

- Locating corridors along climatic, latitudinal or elevational gradients, and where at least 10%, preferably 30%, of native vegetation remains.
- At larger scales, connecting enough stepping stones to support viable populations of target native species.
- Designing buffers to reduce edge effects - threatening processes created by the surrounding matrix such as wind-blown nutrient and weed incursions, increased solar radiation and higher predation rates.

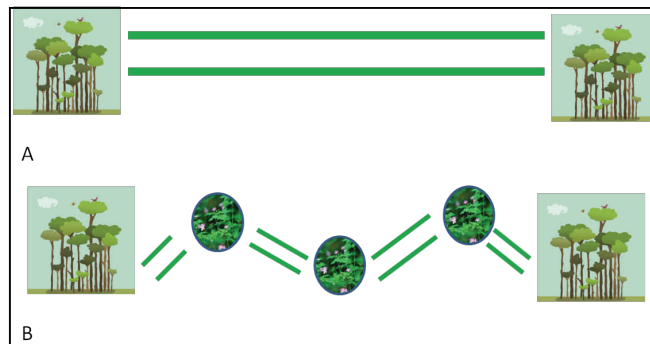
Implications for managers and decision-makers:

In terms of climate change adaptation, corridors should be planned at the regional or continental level to ensure that they provide evolutionary connectivity - the ability to provide enough habitat for gene exchange and range expansions and shifts. They should also reinforce conservation principles, with their design and focus being on areas with valuable biodiversity such as hotspots or areas with high levels of endemism.

The draft Corridors Plan envisages that a variety of land types will be used to contribute to corridors, including private land and National Reserves. Planning for such large scale landscape interventions involves multiple jurisdictions from the local, to state and continental levels, and requires collaborations across multiple forms of tenure including public, private and Indigenous groups. However, ongoing landscape corridors such as the Great Eastern Range Initiative, which strives to link habitats from Victoria to the Atherton tablelands in Queensland, are showing that such collaborations between multiple stakeholders are possible.

The recently announced federal government [Biodiversity Fund](#) is also supporting a range of restoration and revegetation projects directly aimed at increasing connectivity, and restoring, managing and better protecting biodiversity on public and private land.

Furthermore, while some corridors require restoration of links between patches, many are being assembled through the inclusion of existing habitat, particularly in remote and regional Australia where much vegetation remains intact.



Schematic of two corridor types, A) Linear corridor linking remnant habitat patches, B) Stepping Stone corridors linking a series of small habitat patches.

About the Adaptation Research Network for Terrestrial Biodiversity

The Adaptation Research Network for Terrestrial Biodiversity is one of eight research networks administered by the National Climate Change Adaptation Research Facility. It is hosted by James Cook University in Townsville, north Queensland.

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For more information on the Climate Change Adaptation Research Facility and other Research Networks, please visit www.nccarf.edu.au

