Photo: Dionne Gill/NatureScot - (Photo courtesy of EcoCo LIFE Scotland LIFE13 BIO/UK/000428)

Connecting the dots

LIFE lessons on ecological connectivity

The tree lined River Tilt, Glen Tilt, Tayside and Clackmannanshire Area.

Ecological connectivity is defined as the 'unimpeded movement of species and the flow of natural processes that sustain life on Earth'[1]. This connectivity is negatively impacted by landscape fragmentation, which happens when large habitat patches or lineal features like rivers, are divided into smaller, more isolated fragments. It is primarily caused by urbanisation, intensive agricultural practices and barriers like roads, railways, dams, weirs and locks. These pressures disrupt habitats, threaten biodiversity and hamper climate change adaptation measures. Creating a network of ecological corridors that are properly governed, managed and funded, as well as eliminating or lessening these barriers, could help solve the EU's landscape fragmentation problem. Several LIFE projects have practical experience in this area. They are important for building a truly coherent Trans-European Nature Network and are helping to restore at least 25 000 km of rivers to be free-flowing – two main goals of the EU's Biodiversity Strategy for 2030.

Fast facts

- As the world's human population rises and demand for food, housing and roads continues to grow, so does the intensity of land use. This sees natural habitat patches becoming smaller and more isolated, impeding biodiversity and climate change adaptation.
- Fragmentation is widespread across Europe and has a devastating impact on ecological connectivity. It isolates habitats and prevents wildlife from moving back and forth between patches of land, causing inbreeding, lack of food and even death.
- In 2015, around 28% of the EU was strongly fragmented[2] with Belgium, Luxembourg, Malta, and the Netherlands having the highest levels.
- At least half a million barriers are blocking Europe's rivers, of which many are obsolete and abandoned[3]. These barriers make Europe's rivers the most fragmented in the world.
- The **Natura 2000** network aims to ensure the long-term survival of Europe's most valuable and threatened species and habitats, listed under both the **Birds Directive** and the **Habitats Directive**. The network has done a lot to help improve ecological connectivity between and within protected areas.
- But the protection of natural areas is incomplete, and more ambitious and large-scale action is needed to improve Natura 2000's ecological coherence. It is therefore important to connect Natura 2000 areas by maintaining and restoring more ecological corridors.
- Ecological connectivity can progress by introducing different landscape elements and habitats. For example, a hedgerow might act as an ecological corridor for dormice, while a corridor can also be a much larger area that maintains or restores connectivity.
- So-called **'other effective area-based conservation measures' (OECMs)** have an important role to play in filling in the gaps between Natura 2000 sites. Although not recognised as protected areas, OECMs are managed with conservation as a primary or secondary objective. In addition, long-term conservation may be the ancillary result of management activities.
- Green infrastructure can be used as a tool to increase connectivity both within and outside the Natura 2000 network. Constructing wildlife passes over roads and railways, building ponds and developing biodiversity-friendly landscapes across rural and peri-urban landscapes are a few examples.

Environment

[1] This definition has been endorsed by the Convention on Migratory Species in 2020: https://www.cms.int/en/document/improving-ways-addressing-connectivity-conservation-migratory-species-4

[2] https://www.eea.europa.eu/data-and-maps/indicators/mobility-and-urbanisation-pressure-on-ecosystems-2/assessment/#_ftn1

[3] Information compiled thanks to the Amber Barrier Atlas: https://amber.international/european-barrier-atlas/

- Working with and advising landowners like farmers and foresters is key to help them manage their land in a way that benefits connectivity.
- Exploring different governance models, including a transboundary governance approach and ensuring a high level of participation from landowners, authorities and other stakeholders is vital. This would enhance the long-term management and conservation of ecological corridors.
- Land-planning, mapping and decision-making are important tools to assess, measure and boost connectivity conservation.
- Taking advantage of existing EU funding programmes and developing new and innovative funding mechanisms can also enhance ecological connectivity.

How the EU is helping

- In May 2020, the European Commission adopted the **EU's Biodiversity Strategy for 2030** – a core component of the **European Green Deal**. The Strategy is an ambitious and long-term plan for protecting nature and reversing the degradation of ecosystems.
- It aims to expand legally protected areas in Europe to at least 30% of land area and 30% of sea area – with at least 10% of these under strict protection.
- It also aims to integrate ecological corridors as part of a coherent, functional and resilient Trans-European Nature Network and to restore at least 25 000 km of rivers to be free-flowing, while delivering multiple benefits for nature, climate and people.
- Also, the Strategy contains a European Restoration Plan, which includes 14 specific actions and targets aimed at restoring degraded land and sea ecosystems across Europe.
- **Investments in green and blue infrastructure** are also encouraged, as they can boost connectivity, curb biodiversity loss and enable ecosystems to deliver their many services to people and nature.

What has LIFE done?

- LIFE projects have helped improve connectivity and their valuable know-how contributes to the goals of EU Biodiversity Strategy for 2030.
- Some LIFE projects are helping to identify 'high nature value' areas that are not yet protected, as well the ecological corridors needed to ensure connectivity between Natura 2000 sites.
- Other projects are creating, enhancing and restoring corridors, buffers and stepping stones (patches of habitat) to help wildlife move around more freely and to maintain ecological processes. In some cases, this is done by developing green and blue infrastructure.
- LIFE has demonstrated legal and alternative protection schemes to manage ecological corridors and green infrastructure. It has also explored the use of different funding sources.
- LIFE also encourages dialogue between policymakers, researchers, and other international organisations. A good example is LIFE's platform meeting on connectivity in March 2021.

A snapshot of LIFE's work on connectivity

Encouraging free movement of species in Italy

An underpass used by amphibian species

Photo: LIFE10 NAT/IT/000241

Photo: LIFE10 NAT/IT/000241

For many plants and animals, a large part of Europe is not a good place to live as their habitats are not well-connected. To move from one area to the other, species are forced to cross farmland, cities, roads and railway lines.

The **Trans Insubria Bionet (TIB)** project aimed to increase the connectivity between the Campo dei Fiori and the Ticino Valley regional parks in Northern Italy. This is the most suitable corridor for preserving a functional link between the Alps and the Apennines through the Po Plain.

By helping animal and plant species move more easily, the project team improved biodiversity and this helped enhance the area's climate resilience. Their work covered some 15 000 hectares, including 14 Natura 2000 sites.

The team constructed five underpasses used by amphibian species and eight pools used by amphibians for reproduction. An additional eight underpasses were installed to help small and medium-sized animals move around, while three existing underpasses were improved. They also restored two existing wetlands in the Campo dei Fiori regional park.

The team went on to adapt culverts (tunnels) to help wildlife travel along waterways. They also restored a total of 400 metres of dry-stone walls, and 295 metres of existing walls, providing shelter for amphibians, reptiles and small mammals. Their approach can be replicated across Europe.

So-called 'network contracts' involving 43 municipalities, the Varese Province, the Campo dei Fiori and Ticino Valley regional parks, as well as the Lombardy region, were signed under the project. Also, 279 landowners committed to indefinite agreements, which improved conservation on their land.

Uniting wolf populations in Portugal

An Iberian wolf

Carnivores need to interbreed with other connected populations. They also require space to expand and grow. Unfortunately, this is not always the case as is evident in Portugal's Iberian wolf populations. Around 14 animals live in the Greater Côa Valley, but the Douro River currently separates wolves in the Malcata mountain range in the south from those in the larger Douro valley to the north. To improve genetic diversity and boost population numbers, the wolves need a protected corridor to connect the two isolated subpopulations. There are also threats to the wolves like conflicts with the livestock sector, negative attitudes from farmers and the public, poaching, as well as a lack of wild prey to feed on.

The five-year **LIFE WolFlux** project is enhancing the ecological and socio-economic conditions needed to support a viable wolf sub-population south of Douro river so that it can play its functional role as a top predator. The team is reducing conflicts with farm animals, eliminating poaching and stopping fires caused by humans. They are also restoring roe deer habitat and introducing around 100 of these deer to the project area for the wolves to feed on.

With more connectivity between wolf packs, a 10% expansion in wolf range, and a 20% rise in breeding success is foreseen. A management plan for the wolves will also be put in place. Other actions include promoting better human-wolf coexistence and developing wolf-related value-added products.

Unlocking the UK's longest river

Innovative fish passes installed on the River Severn

The Twaite shad is a fish species that normally lives in estuaries and inshore waters, but it returns to freshwater rivers to spawn. In the United Kingdom, its numbers fell dramatically during the 19th century, mainly due to the construction of migration barriers like weirs. There are six such barriers on the River Severn and its River Teme tributary, greatly limiting the shad's spawning range.

The **Unlocking the Severn LIFE** project team is helping the fish to access quality spawning habitat. To do this, they are installing several different fish passage solutions to remove these barriers. These include deep vertical slot fish passes, which allow fish to swim upstream without having to leap over any obstacles. The team wants to ultimately restore 253 km of river habitat for the fish.

With its motto of 'Our river for people and wildlife,' the team is reconnecting millions of people with the UK's longest river. To this end, it is working with community groups, as well as hundreds of volunteers. And 200 people have been trained as citizen scientists to help count the number of fish passing through the former barriers.

View of the biologically diverse forests

In southwestern Lapland, areas located outside Natura 2000 sites tend to be made up of commercial forests used for the mining, peat and construction sectors. These forests are however highly valuable due to their unique biodiversity.

The **NATNET LIFE+** project team aimed to boost the vitality and coherence of the Natura 2000 network and to increase biodiversity in these forests.

The team first developed a special tool to survey and identify habitats like bog woodland that had the potential to increase the ecological connectivity between the existing Natura 2000 sites. They then set up voluntary permanent protection agreements with willing landowners. These landowners received a tax-free compensation for any losses they incurred when undertaking nature conservation measures on their land.

The approach was a resounding success – the team managed to increase ecological connectivity and establish green infrastructure across 37 sites, covering 542 000 hectares.

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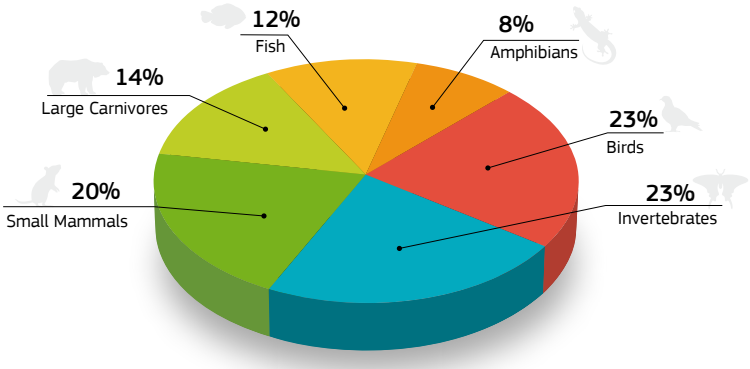
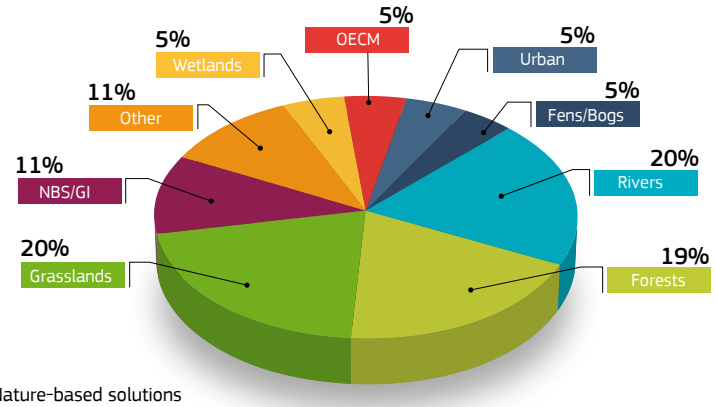
Facts & figures

LIFE connectivity projects by species



LIFE connectivity projects by habitat



NBS - Nature-based solutions
GI - Green infrastructure
OECMs - Other effective area-based conservation measures

It is difficult to get a complete picture of how many LIFE projects deal with connectivity.

This is because it is not always obvious that project actions are directed towards improving ecological networks for species or habitats.

We therefore analysed a large cross-section of projects between 2007 and 2019 for elements of connectivity. This analysis is not fully inclusive but can be considered as indicative of general patterns and the most common themes targeted by the LIFE programme.

From our sample size of 148 projects, 121 focus on habitat restoration by either restoring natural habitats or installing green infrastructure.

The most common habitats are rivers, forests and grasslands. Fewer projects deal directly with connectivity for targeted species.

Of the 49 projects where groups of species are mentioned, nearly half focus on birds and invertebrates. Small mammals follow on 20%, then large carnivores (14%), fish (12%) and amphibians (8%).

Learn more

ec.europa.eu/life LIFE programme
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How to apply for LIFE funding

The European Commission organises annual calls for proposals.
Full details are available at ec.europa.eu/life

Contact

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European Commission – Directorate-General for Climate Action – B-1049 Brussels (clima-life@ec.europa.eu).
European Commission – Executive Agency for Small and Medium-sized Enterprises (EASME) – B-1049 Brussels (EASME-LIFE-ENQUIRIES@ec.europa.eu).

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