econnect

Restoring the web of life

Alpine SPACE
EUROPEAN TERRITORIAL COOPERATION
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WEBS OF LIFE

Alpine biodiversity needs ecological connectivity

Results from the ECONNECT project

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Contents

Acronyms and terminology

Anthropogenic
Caused or influenced by humans. The term is used to define any human impact on the environment (e.g. air pollution).

Barrier

- **Legal**: a barrier caused by national/regional legal frameworks, preventing the establishment of ecological networks.
- **Physical**: a barrier caused by a tangible obstacle increasing habitat fragmentation. It can be natural (e.g. a mountain range) or artificial (e.g. a motorway).

Biodiversity
The variety of all forms of life at any level, from genes to species, to ecosystems.

Climate change
A long-term shift in weather patterns (e.g. temperatures). Although climate change is part of the Earth's natural variability, today it usually refers to the anthropogenic global warming caused by the rising concentrations of heat-trapping greenhouse gases in the atmosphere caused by human activities. Climate change is expected to increase the vulnerability of many species, especially those that will not be able to cope with the adverse effects of climate change or to adapt their distribution ranges to the new conditions. Over the next century, climate change is expected to become the first or second greatest driver of global biodiversity loss.

Cultural landscape
The result of the interaction between humans and nature. A cultural landscape is a combination of natural and human features resulting from a long and intimate relationship between people and the natural environment.

Distribution
Geographic distribution of a species. It is represented by the areas where the species occurs.

Ecological

- **Connectivity**: degree of connection between natural areas in a given landscape matrix (see below).
- **Network**: a cluster of physically connected natural habitats hosting populations of different species and diverse ecosystems. An ecological network is traditionally composed of core areas (e.g. major protected areas) connected with each other by ecological corridors and stepping stones.

EGTC (European Grouping for Territorial Cooperation)
European legal instrument aiming at facilitating and promoting cross-border cooperation. The EGTC enables the grouping of authorities of different member states under a single legal entity. EGTC can be an effective tool for overcoming legal barriers and easing the establishment of transnational ecological networks.

Gene flow
The natural transfer of genetic material from one population to another, thereby changing the composition of the gene pool of the receiving population. This process increases genetic variability within the receiving population and enables new combinations of traits, including those reinforcing populations against natural and anthropogenic stresses. A genetically diverse population is more viable and less exposed to the risk of extinction.

Green bridge
A man-made infrastructure planned in order to enhance ecological connectivity within a fragmented landscape. The construction of a green bridge should normally have as little impact as possible on the natural environment where it is built. Usually green bridges enable species to move over motorways safely.

JECAMI (Joint Ecological Continuum Analysing and Mapping Initiative)
Online mapping tool developed by the **ECONNECT** project for supporting decision making processes concerning ecological connectivity on local, regional or Alpine level.

Landscape
- **Fragmentation**: the breaking up of a large intact area into smaller units by anthropogenic activities/infrastructures. This may lead to the isolation of populations and the interruption of gene flow (see above).
- **Matrix**: the entire surface of a territory as characterised by a varying degree of wilderness, natural connectivity and anthropogenic structures (see above). Infrastructures occurring within the matrix will influence species' movements and gene flow.
- **Permeability**: is an indicator for the movement potential of species, populations and genes to move through the landscape matrix.

Measure in the field
Concrete actions implemented in the field aiming at improving landscape permeability.

Pilot region in ECONNECT
Regions where the activities of the **ECONNECT** project take place. Ideally, the concrete measures successfully implemented in the Pilot Regions will be exported elsewhere, contributing to enhance the Alpine ecological network.

Resistance
The ability of an ecosystem to absorb external disturbances without changing its processes and structure.

Resilience
The ability of an ecosystem to return to the original state following a perturbation.

Spatial planning
Planning techniques relying on a holistic vision of the territory and integrating different goals and land uses.

Species dispersal
Ability of the individuals of a given species to move. In vertebrates, dispersal is typically implemented by young males. Such activity is crucial for maintaining the genetic diversity and for increasing the distribution ranges (see "Distribution").


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Preface

ECONNECT has enhanced ecological connectivity in the Alpine Space. Protection of biodiversity and natural heritage - a central necessity to cope with the challenges of climate change - required an integrated approach which beyond protected areas considers high biodiversity areas and corridors as linking elements of an Alpine ecological network. International umbrella organisations linked to the Alpine Convention, scientific institutions and local implementation partners joined forces to demonstrate needs and options for action and to develop and implement innovative tools and instruments to further ecological connectivity. Pilot applications involving a multitude of stakeholders result in long-term implementation. To overcome legal and administrative constraints policy recommendations have been generated ensuring effective cross-border cooperation and procedural harmonisation. Knowledge transfer and dissemination are guaranteed by the widely ramified structure of partners and the strategic use of networks. Ultimately, however, **ECONNECT** has clearly shown that the essential prerequisite to future life in the Alps is defining, accepting and implementing trade-offs between boundless development and the setting aside of large tracts of interconnected and permeable lands to maintain a higher biodiversity for regeneration and renewal to occur in the face of ecological disruption. Social acceptance, future co-opportunities and political buy-in are as important as building a green bridge to cross motorways.

Connectivity in the Alps

Connectivity can be visually perceived as the possibility of individuals of any given species to utilize their entire range, to move through suitable habitats, to allow for individual dispersal and to maintain a regular genetic flow. The Alps, and mountain environments in general are characterised by cliffs and steep slopes, which act as ecological barriers for some species, while other species can benefit from the long and regular mountain chain allowing longitudinal and altitudinal movements.

Despite the natural barrier-effects in the Alps the major concerns for ecological connectivity are still largely those created by human-induced landscape fragmentation.

There is generally a strong correlation between human settlements and altitude or slope steepness. In heavily urbanized countries biodiversity distribution is limited to or concentrated in the mountainous areas: the obvious explanation of such a phenomenon is that human communities have always preferred to settle in the plain regions rather than on steep slopes, thus relegating biodiversity to inaccessible areas.

On an alpine scale, urbanization of almost all the valley floors led to the fragmentation of the ecological continuum, with serious consequences for many species.

In addition, in an era of rapid global changes ecological fragmentation can exacerbate the effects of climate changes.

Finally, it is acknowledged that a site-approach to conservation through protected areas, Priority Conservation Areas etc. is not sufficient to achieve long-term conservation goals for the Alpine ecosystems.

Through a multilevel and transnational approach the **ECONNECT** project has assessed the key issues strictly related to connectivity (legal frameworks,, scientific knowledge, communication etc…) and identified major problems and potential solutions. Furthermore, the **ECONNECT** project provided the opportunity to enhance collaboration and coordination at a transnational level between the different national actors.

THE ECONNI PROJEC IN A NUT SHELL

The ECONNECT project in a nut shell

Project vision

ECONNECT envisions an enduringly restored and maintained ecological continuum, consisting of interconnected landscapes, across the Alpine Arc region, where biodiversity will be conserved for future generations and the resilience of ecological processes will be enhanced.

Geographic scope

Project actions were implemented within the whole Alpine region as defined by the Alpine Convention. It encompasses an area of approximately 190,000 square km:

- one of the largest European natural spaces;
- one of the European biodiversity hotspots, with over 30,000 animal species and 13,000 plant species;
- home and workplace for 14 million people;
- holiday destination for more than 100 million tourists each year.

Project rationale

Conservation of the Alpine biodiversity during the past 100 years has been driven by a "protected areas" approach, aiming at establishing a number of isolated reserves, separated from the rest of the Alpine space. However, in today's increasingly human-dominated Alpine landscapes and in the face of global climate change this approach must be revised: new and innovative solutions need to be identified and implemented to preserve the overall dynamic potential of the Alps. To this purpose, conservation efforts must aim at preserving and restoring a permeable landscape matrix (spaces where the movement of flora and fauna is not hampered by barriers) through the implementation of ecological networks across the entire Alpine region.

Fig. I.1. *Satellite Image Map Alps*

Legal framework for Biodiversity

Numerous conventions, such as the Convention on Biological Diversity and the Alpine Convention, and European directives, such as the "Habitat directive" (92/43/EEC), the "Water Framework Directive" (2000/60/EC), emphasize the importance of the ecological networks as a tool for achieving the conservation of biodiversity. Almost all Alpine countries have ratified the Convention on Biological Diversity and all Alpine Countries have ratified the framework convention of the Alpine Convention. As biodiversity is threatened by human-dominated land use, urbanization, fragmentation of habitats and man-made barriers, ecological networks linking the entire Alpine mountain range represent a key contribution towards fulfilling international obligations.

Pilot Region approach

The 'Methodology' for the **ECONNECT** Pilot Regions can be considered the backbone of the implementation process. The theoretical framework is provided by the document 'Creating Ecological Networks in the Pilot Regions - Strategic Implementation Guidelines' (Scheurer & Kohler, 2008) issued by the Continuum Project. The process foresees three concise implementation steps based upon the expertise of scientists and the experience of four different organizations ALPARC, CIPRA, ISCAR and WWF.

Project goal

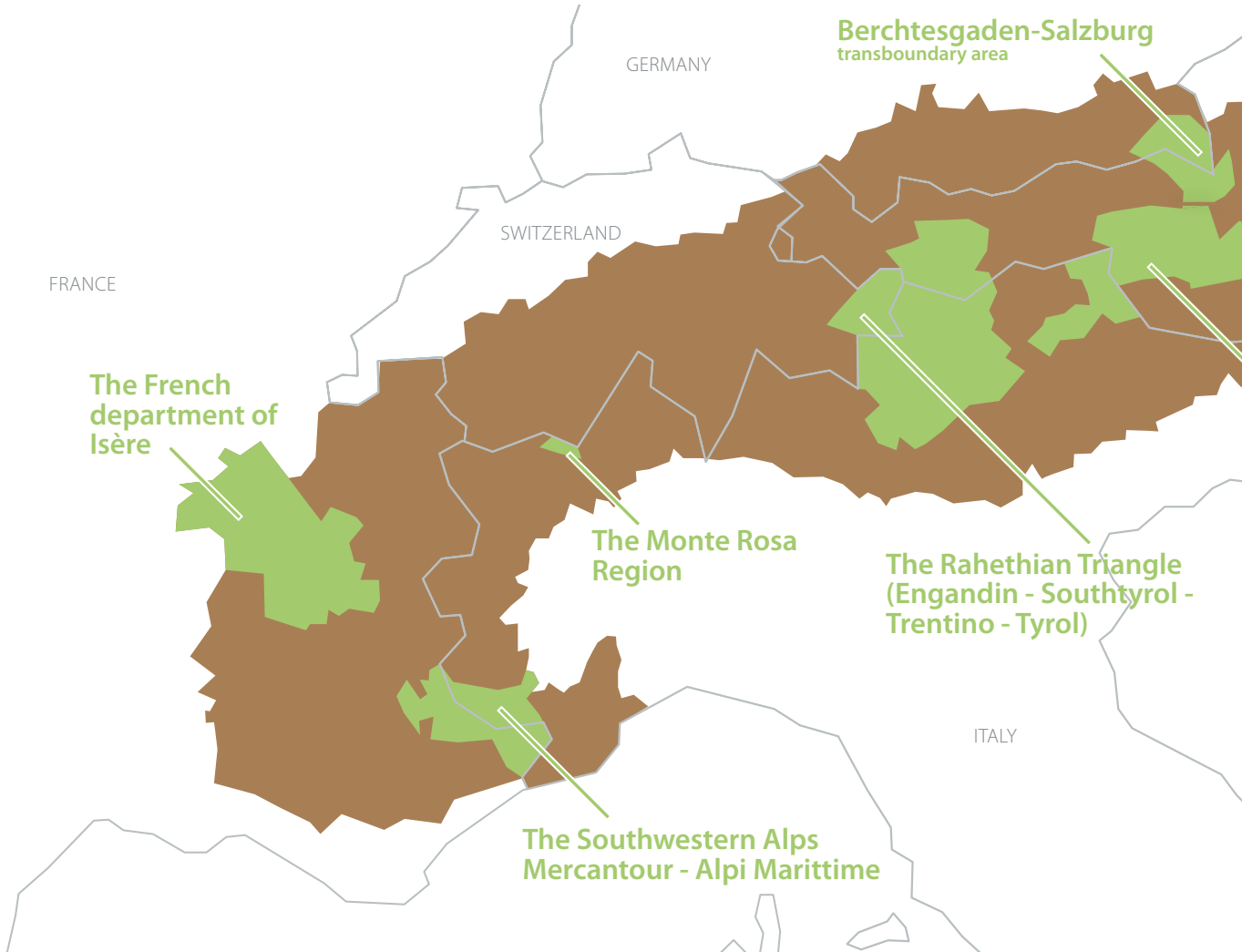
The main goal of the **ECONNECT** project was to contribute to identify solutions and measures to alleviate landscape fragmentation by establishing ecological networks across the Alps, with the aim of enabling species to move without restrictions across the entire mountain range. In fact, dynamic and unrestricted species movements are crucial for the adaptations made necessary by the rapid on-going environmental transformations. In other words, no more frontiers, be they physical, legal or political.

Project approach

The **ECONNECT** project tackled this complex and multi faceted issue through a multi-disciplinary approach, by addressing not only the environment, but also the economic, legal, social and political components which play a primary role in the establishment of all ecological networks and the implementation of conservation measures.

This resulted in a three step process:

- selection of the important areas for ecological connectivity at the Alpine level,
- identification of the legal, social and economic barriers preventing the preservation and restoration of ecological networks and proposals on how to overcome them;
- assessment of how policies affect the establishment of ecological connectivity and how ecological networks in turn, influence spatial/infrastructure development and economic activities.



Project activities

Project activities can be grouped into three main broad categories: information gathering, actions in the field, and communication.

Information gathering

The Alps encompass eight countries, 28 regions, 98 provinces and the communities living in the region speak 5 diverse languages. This results in a wide diversity, amongst many others, in the legal frameworks for nature protection, spatial planning, as well as land-use practices. Also, availability, quality and consistency of data differs significantly from country to country and among different administrative units. Therefore, aiming for connectivity on the Alpine scale while taking into account social and economic differences is certainly very challenging. **ECONNECT** balanced these differences by harmonising geographical data from the different provinces, regions and countries.

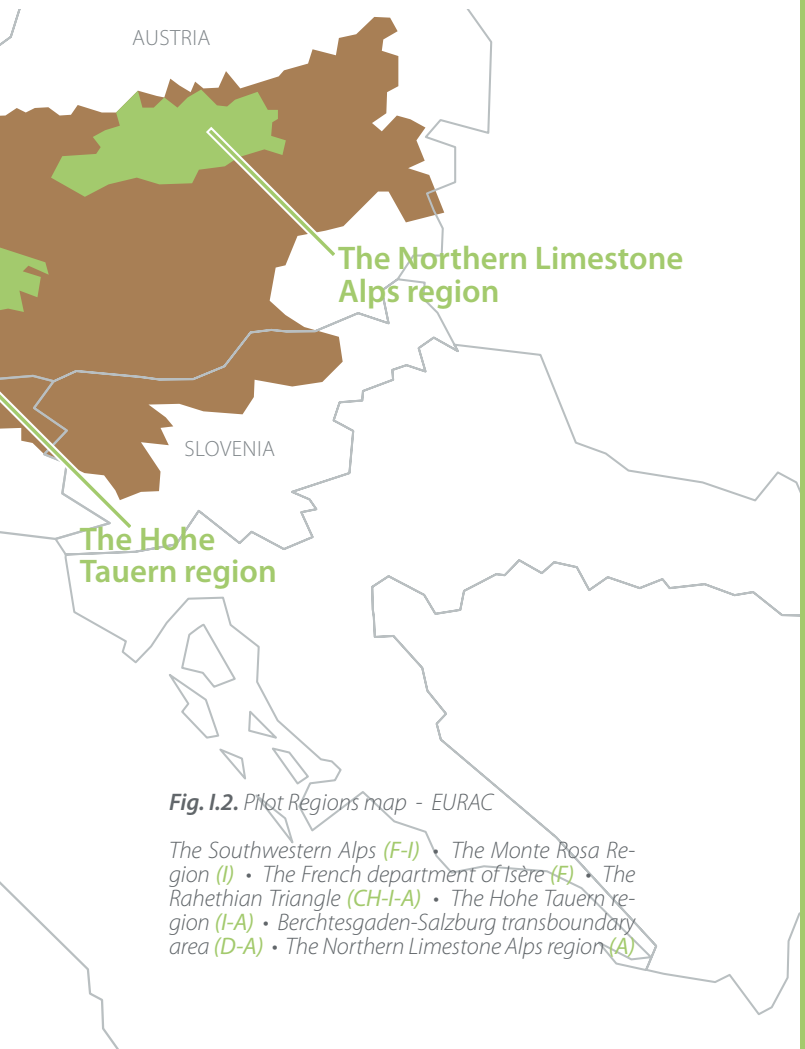


Fig. I.2. *Pilot Regions map - EURAC*

The Southwestern Alps (F-I) • The Monte Rosa Region (I) • The French department of Isère (F) • The Rahethian Triangle (CH-I-A) • The Hohe Tauern region (I-A) • Berchtesgaden-Salzburg transboundary area (D-A) • The Northern Limestone Alps region (A)

The Path That Led To ECONNECT

The path leading to **ECONNECT** started in 1995, when the Alpine Convention entered into force. While the Convention underlines the particular characteristics of the Alps it goes beyond national boundaries by seeking common international action. From that point, numerous projects were established to fulfil the Convention's aim. One of these was the Ecological Continuum Initiative (funded by the Swiss MAVA Foundation), which started in June 2007. The aim of this project was to lay the foundations for a long-term implementation of an Alpine ecological network. It developed a set of methodologies for connecting important areas and a catalogue of possible measures to enhance connectivity. This consortium introduced a completely new approach to Alpine nature conservation by looking at biodiversity from an Alps-wide perspective.

The Ecological Continuum consortium was composed of:

ALPARC - Alpine Network of Protected Areas: its approach is focused on the conservation of biodiversity by the creation of a genuine ecological continuum through a connection (corridors) between protected areas; the Protected Areas Task Force, enabled by the Alpine Convention, represents ALPARC in various Institutions/projects.

CIPRA - International Commission for the Protection of the Alps: it mainly operates in the sectors of initiation, promotion and mentoring of activities, the provision of know-how and awareness-building.

ISCAR - International Scientific Committee Alpine Research: it participates in many international research programmes and it promotes international cooperation in Alpine research. ISCAR carries out research and scientific projects, especially interdisciplinary research on the Alps, and transfers scientific knowledge to policy-makers and the general public.

WWF European Alpine Programme - It was set up to protect Alpine biodiversity, to preserve large-enough populations to make them self-sustainable and to protect large connected habitats through an eco-regional approach.

The four project partners provided the foundation for the work of the Platform "Ecological Network" of the Alpine Convention and initiated the **ECONNECT** Project to advance the initial work of the Ecological Continuum Initiative.

© Hohe Tauern National Park

Actions in the field

Although backed by robust and scientifically sound theoretical work, by definition ecological connectivity implies interventions on the ground. For this reason, **ECONNECT** selected and implemented actions in seven Pilot Regions ***(Fig. I.2)***, four of which were transnational.

A specific working group was set up with the aims to:

- develop and test a "Methodology for the Pilot Regions" for the preservation and restoration of ecological connectivity and promote it across the Alpine region.
- implement specific measures within the Pilot Regions aiming at reducing the level of ecological fragmentation and strengthening the cooperation between stakeholders and the relevant institutions.

Communication

ECONNECT carried out a number of communication activities aimed at raising awareness on the topic of ecological connectivity, creating compelling cases, disseminating best practices and the relevant project outcomes to stakeholders and decision makers.

To fulfil this goal:

- a comprehensive communication strategy was developed, which included classic and innovative means to communicate connectivity;
- a number of workshops were organized at the local level;
- a final conference was held to disseminate the results of **ECONNECT** on an Alpine level and to identify the next steps forwards.

Project results

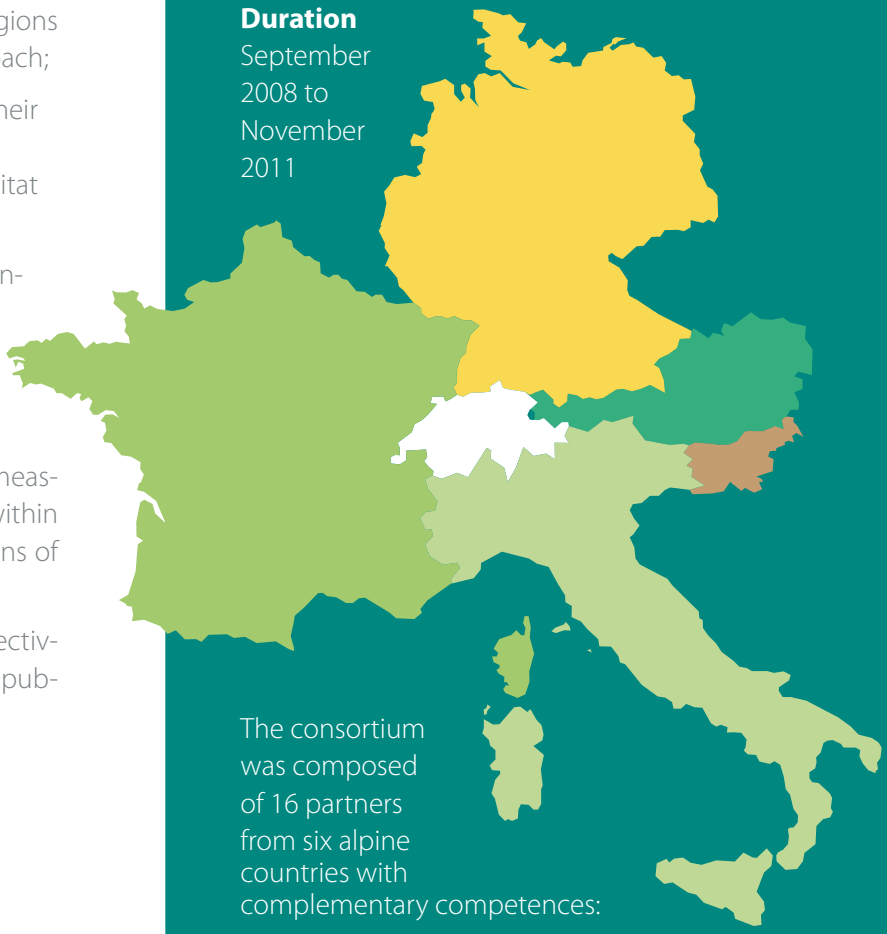
Major project results can be summarised as follows:

- geographic data across the Alps were collected and harmonised with a novel and innovative tool; the ecological connectivity in the Alpine range and within the seven Pilot Regions was assessed based on a common approach;
- six umbrella-species were selected and their potential movements in the alpine landscape were modelled based on their habitat requirements;
- the first study ever on legal barriers to connectivity in the Alps was carried out and solutions were identified;
- the most relevant barriers and corridors at the Alpine and the regional level were identified; a number of concrete measures aiming to enhance connectivity within and beyond the cross-border Pilot Regions of the project were implemented;
- knowledge concerning ecological connectivity, the key stakeholders and the general public was improved.

ECONNECT Facts and figures

Funded by
The EU Alpine Space program and co-funded by the European Regional Development Fund with € 3,198,240.

Duration
September 2008 to November 2011



The consortium was composed of 16 partners from six alpine countries with complementary competences:

AUSTRIA / University of Veterinary Medicine of Vienna - Research Institute of Wildlife Ecology (lead Partner); Hohe Tauern National Park; Environment Agency Austria; Gesäuse National Park; University of Innsbruck - Institute of Ecology.

GERMANY / National Park Berchtesgaden.

FRANCE / CEMAGREF; Council of the Department of Isère.

ITALY / Alpi Marittime Natural Park; Regione Autonoma Valle d'Aosta; European Academy of Bolzano; Ministry for the Environment; WWF Italy.

LIECHTENSTEIN / CIPRA International.

SWITZERLAND / Swiss National Park.

INTERNATIONAL / Task Force for Protected Areas - Permanent Secretariat of the Alpine Convention.

OBSERVERS / Federal Agency for Nature Conservation BfN (DE), International Scientific Committee for Alpine Research ISCAR (CH), Nature Park Logarska Dolina (SLO) and Biosfera Val Müstair (CH).

MAJOR ACHIEVEMENTS

Major achievements

ECONNECT contributed significantly to increasing the knowledge about existing ecological barriers and corridors in the Alps and their inherent complexity. By looking at the landscape from a functional, rather than a structural perspective, and evaluating how suitable or unsuitable an area is for the ecological continuum, **ECONNECT** delivered technical support to those who are improving landscape permeability on the ground. Moreover, this was the very first project to investigate how national and regional legislations affect the Alpine web of life. Finally, **ECONNECT** explored and put into effect new ways of communicating such complex topics. A detailed description of the most significant project results is provided in the following lines.

RESULT 1

Setting up a structured and well-managed data repository and on-line mapping tool to assess and visualise landscape attributes, barriers and corridors for selected key species

ECONNECT researchers set up and managed a systematic repository of geographic data necessary for the analysis of ecological networks on an Alpine scale, and to detect barriers for selected species. Most of the work consisted in collecting, adapting, integrating and harmonizing already existing data, in order to provide the basic information for identifying anthropogenic barriers that may impact species' movements, and trigger actions in the field within the Pilot Regions. Data were collected at two levels of detail to meet both the needs of the alpine-wide and the regional analysis in Pilot Regions. Harmonization methods developed in other EU and national projects were evaluated.

A number of maps were produced for each **ECONNECT** Pilot Region (see for example ***Fig. II.1***).

Maps aimed at:

- providing an overview of the location of Pilot Regions in the Alps;
- visualising the connections between Protected Areas within each Pilot Region;
- visualising outcomes such as the modelling results for the selected key species;
- visualising priority areas within each Pilot Region;
- visualising the alpine-wide results of the continuum suitability analysis.

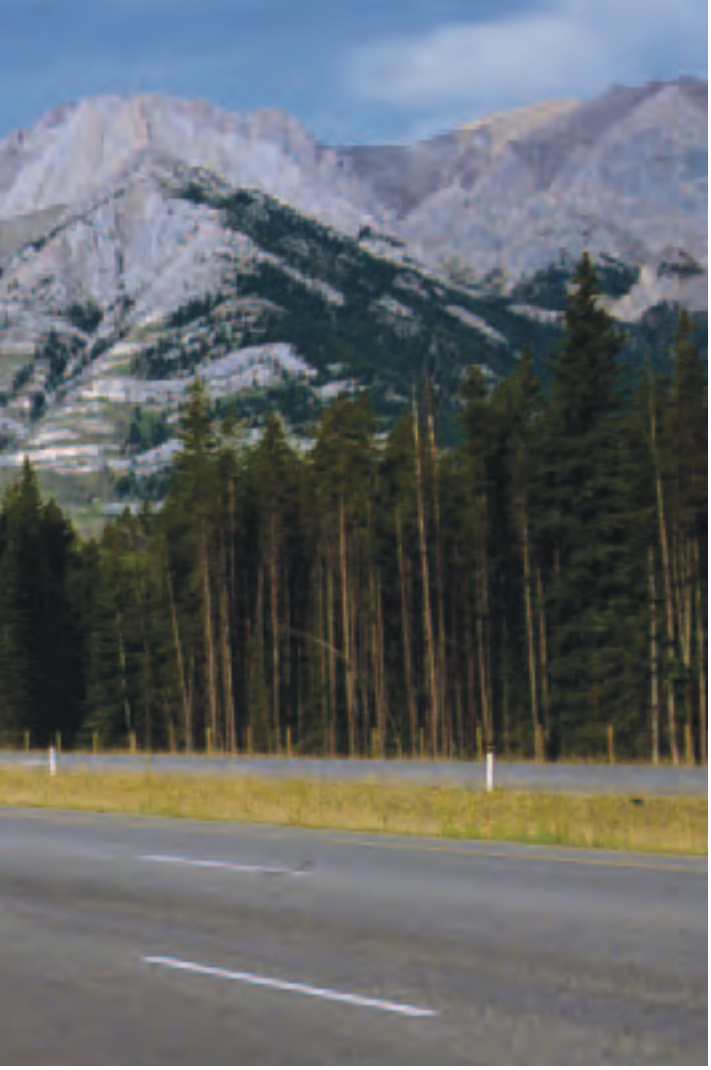
Collected data and maps were uploaded into an online geodata archive to facilitate data sharing between project partners and the interested public.

Real connectivity depends on a comprehensive planning process. The complex system of interactions and mechanisms in human societies calls for an analytic and comprehensive approach. In order to analyze and visualize ecological connectivity in the seven Pilot Regions, the Swiss National Park developed, in collaboration with the Arinas Company, a web application called **JECAMI - "Joint Ecological Continuum Analyzing and Mapping Initiative"**.

JECAMI combines three different approaches: the analysis of the landscape as a whole in a Continuum Suitability Index (**CSI**), the distribution and movements of specific key species with the Species Map Application (**SMA**) and the Connectivity Analysis of Riverine Landscapes (**CARL**).

The **CSI** service defines a continuum suitability index from the interaction of ten different indices and allows for the measurement of connectivity suitability over a matrix of different areas. Today these indices include land use, population density, topography, protected areas, small-scale ecological measures and future land use planning. Further indices are edge density, the length of borders between different land use types and patch cohesion, which is an indicator for the different land use types within a defined area. The indicator results range from 0 to 100 where 100 implies the best possible conditions for connectivity.

Through the **SMA**-Service it is possible to detect barriers and corridors for a specific animal species.



CARL was applied in two of the Pilot regions: the Northern Limestone Alps region and the Hohe Tauern and Dolomite region. Further details are provided on the website: http://gis.nationalpark.ch/arcgisserver_app/secure/econ_jecami.htm.

The CARL module was used to study and quantify the fragmentation level of riverine landscapes in the Alps and to identify the barriers effective in the longitudinal, lateral, vertical and temporal dimension. Habitat suitability models were calculated for the focal species bullhead (Cottus gobioL.) and fish otter (Lutra lutra) based on habitat preferences. In riverine landscapes species-specific barriers were identified and their effects on the permeability evaluated. The CARL tool showed that streams and the riparian zones are strongly fragmented by artificial structures, associated with human settlements and activities in the valleys, while this effect is less relevant at higher altitude and within protected areas.

RESULT 2

Alpine barriers and the way they affect species

ECONNECT researchers found out that altitude and forest availability are the major factors influencing species distribution. Hence, in the Eastern Alps, species seem to benefit from more favourable conditions, probably due in part to the lower altitudes of the mountains. Analysis also shows that physical barriers are nearly never total barriers and animals still manage to move in many cases. Although man-made barriers may delay movements and make genetic exchange more difficult, currently they do not yet completely stop natural processes. Nevertheless, it is vital to provide species with green bridges to overcome barriers like the ones occurring in human-dominated alpine valleys, with their transport infrastructures and urban settlements. Furthermore, it is imperative to take into account species needs in the various future planning processes. Ultimately, however, **ECONNECT** clearly shows that the essential prerequisite to life in the Alps is defining, accepting and implementing the trade-off between boundless development and the setting aside of large tracts of interconnected and permeable lands to maintain a higher biodiversity for regeneration and renewal to occur in the face of ecological disruption. Social acceptance and political buy-in are as important as building a green bridge to cross motorways.

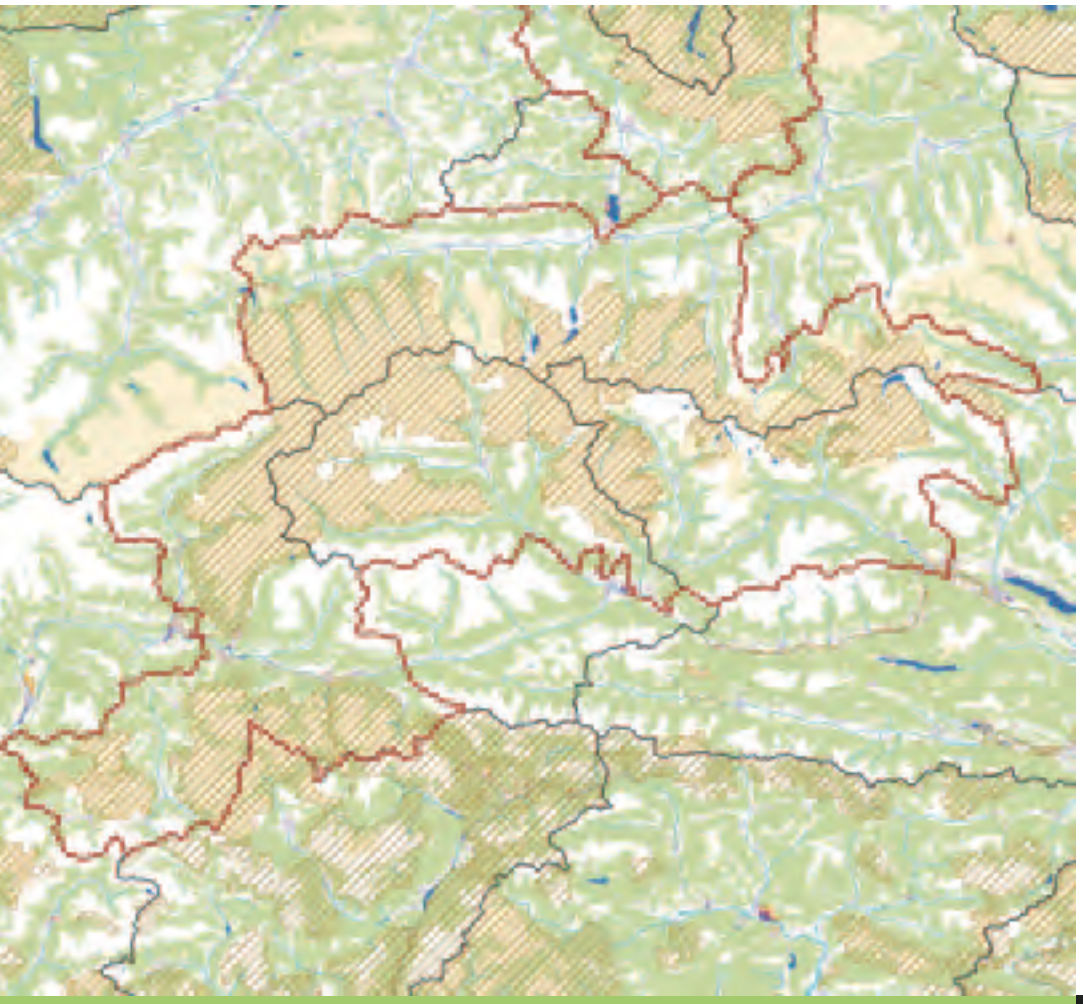
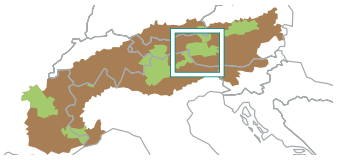


Fig. II.1. Priority Area Types that Ecological Connectivity Measures should focus on (example Pilot Region NP Hohe Tauern) © EURAC



The continuum project priority area type of regions

Areas with high biodiversity values
- Natura 2000 / Emerald site
- Nationally designated area

Riverine systems as connectivity elements of the wider landscape
- River 100m buffer
- Water course
- Water body
- Inland marsh
- Peat bog

Densely populated areas
- Urban continuous
- Urban discontinuous
- Commercial / Industrial

Areas with higher pressure through intensive agricolture
- Permanently irrigated land
- Non irrigated land
- Vineyard
- Fruit and berry plantation

Large scale forests areas (> 500 km2)
- Forest

Data collection

The main data sets collected in the alpine-wide analysis were used to define species habitats and barriers to species movements:

- **TERRESTRIAL SPECIES**: the suitable areas, i.e. areas where animals can live according to their needs, were derived from the following data sets: land use/ land cover, forest cover and tree types, elevation model, types of protected areas. Barrier data included linear barriers, such as roads, railways and river networks, as well as ski slopes and power lines.
- **AMPHIBIAN AND AQUATIC SPECIES**: for the analysis of habitats and barriers of species living in riverine habitats, data were collected referred to river network, lakes, small catchment areas, inflow, outflow, river surroundings, hydro morphological state and quality of rivers, i.e. river bank dynamics, water temperature, soil dynamics and substrate. Data on barriers included: location of hydropower stations, dams, weirs, sewage plants and river bank constructions.

For the purpose of the specific continuum suitability analysis, the methodology required the following additional data sets from the Pilot Region: municipal boundaries, inhabitants, tourist overnight stays per municipality, vegetation plans, forest development plans, forest types, biotopes, settlement areas, land use plans, power lines, ski runs, cable cars, embankments and avalanche protection.

RESULT 3

The promotion of a common Legal Framework

The Alps consist of eight different countries, each of which has its own legal framework. A specific working group provided an overview of the different legislations in force at various governance levels that potentially affect ecological connectivity. The group identified strategies and tools to deal with such diversity and complexity. The analysis identified possible options to improve the consistency of regulations and protection strategies for protected areas and buffer zones across the Alpine range, as well as the implementation of "safe" ecological corridors from one administrative area to another.

The process consisted of two stages. Initially, the legal status of six countries was assessed (Austria, France, Italy, Germany, Slovenia and Switzerland) with regard to protected areas. The analysis addressed the national legislative framework with specific reference to wildlife protection and spatial planning. Existing legislation - both at the national and regional level - and ongoing experiences in the field of transboundary cooperation were discussed.

During the second stage four comparative outlooks (Italy/France, Switzerland/Italy, Austria/Germany and Italy/Austria) were produced. The legal situation of protected areas in each pair of neighbouring Alpine states was analysed with the goal of identifying the obstacles to ecological connectivity and the best tools to establish and/or maintain ecological corridors and networks.

In order to overcome the difficulties represented by the different legal statuses of neighbouring protected areas, legal tools such as the European Grouping of Territorial Cooperation (EGTC) were analysed and their feasibility assessed in relation to actual cases.

The following **ECONNECT** pilot Regions served as case studies for comparison:

- "Berchtesgaden - Salzburg" (Austria-Germany)
- "Hohe Tauern and Dolomite Region" (Austria, Italy);
- "Monte Rosa" (Italy, Switzerland);
- "The south-western Alps" (NPs Mercantour/ Alpi Marittime) (France, Italy);
- "The Rhaethian Triangle" (Austria-Italy-Switzerland).

Two Transnational Workshops were held:

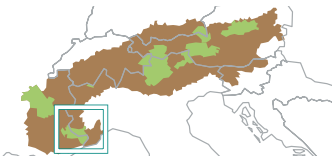
- in Domodossola (I) on April 17, 2009: "The legal framework of protected areas in each Alpine State", with an emphasis on transboundary issues such as Natura 2000 and the creation of an Alpine ecological network.;
- in Grenoble (FR) on May 6, 2010: "Legal barriers and possibilities for the implementation of ecological corridors in the Alps".

The Final Conference entitled "Ecological connectivity and mountain agriculture: existing instruments and a vision for the future" was held in Aosta (I) on December 9, 2010.

This action made stakeholders aware that:

- in relation to the institutional framework of nature protection and protection of habitats, legal barriers are mainly a result of the constitutional traditions of Alpine countries. In the region, federal states such as Austria, Germany, and Switzerland, co-exist with unitary states (such as France, Slovenia and Italy). In federal states, the regional (Länder in Austria and Germany; Cantons in Switzerland) competences in the field of nature protection may vary, and the same applies to the regions of Italy and France, which have different competences in the environmental field.
- Cooperation is required not only between the managers of protected areas but also between policy makers. A higher level of collaboration will facilitate the understanding of the objectives pursued in the different protected areas and will result in a harmonization of the statutes of protected areas across the Alps;
- the adoption of specific provisions outside protected areas is required; activities, projects, plans or programs outside or close to the core area can have a significant influence and impacts on the core area itself;
- landscape protection is an important tool because landscape features are often seen as part of the ecological network. It contributes to prevent landscape fragmentation and fulfils the objectives of the EU Habitats and Birds Directives. Furthermore, the concept of "cultural landscape" is becoming more and more important; this concept is integrated in the Alpine Convention system but not in individual national/regional legislation;
- transborder cooperation is vital as it came out in the Pilot Region of "The southwestern Alps Mercantour/Alpi Marittime" in France - Italy.
- The analysis outcomes pointed out that priority measures should involve the protected areas and should aim at enhancing their capacity to collaborate with each other.
- Current existing cooperation tools in the form of agreements and twinning have to be institutionalized; moreover, other legal frameworks are necessary to establish a common structure and develop joint management strategies among protected areas. In this perspective, the EGTC (European Grouping for Territorial Cooperation) regulation may be a good opportunity to institutionalize transborder cooperation between protected areas (details about EGCT are provided in ***box "EGCT - European Grouping for Territorial Cooperation"***).

Fig. II.2. *ECONNECT Pilot Region Mercantour-PN Alpi Marittime (Institute for Regional Development and Location Management 2010) © EURAC*



ECONNECT Pilot Area
The southwestern Alps
Marcantour/Alpi Marittime

- Major town
- Town (>3000 inhabitants)
- Country boundary
- Region boundary
- Province boundary
- Major river
- Lake
- Natura 2000 site
- Protected area
- National park

EGCT - European Grouping for Territorial Cooperation

The EGTC ((European Grouping for Territorial Cooperation) is a new European legal instrument designed to facilitate and promote cross-border, transnational and interregional cooperation. Unlike the structures that ruled this kind of co-operation before 2007, the EGTC is a legal entity and as such, will enable regional and local authorities and other public bodies from different member states, to set up cooperation groupings with a legal entity. EGTC members may include:

- member states;
- regional or local authorities;
- associations;
- any other public body.

The EGTC is unique in the sense that it enables public authorities of various Member States to team up and deliver joint services, without requiring a prior international agreement to be signed and ratified by national parliaments. Member States must however agree to the participation of potential members in their respective countries.

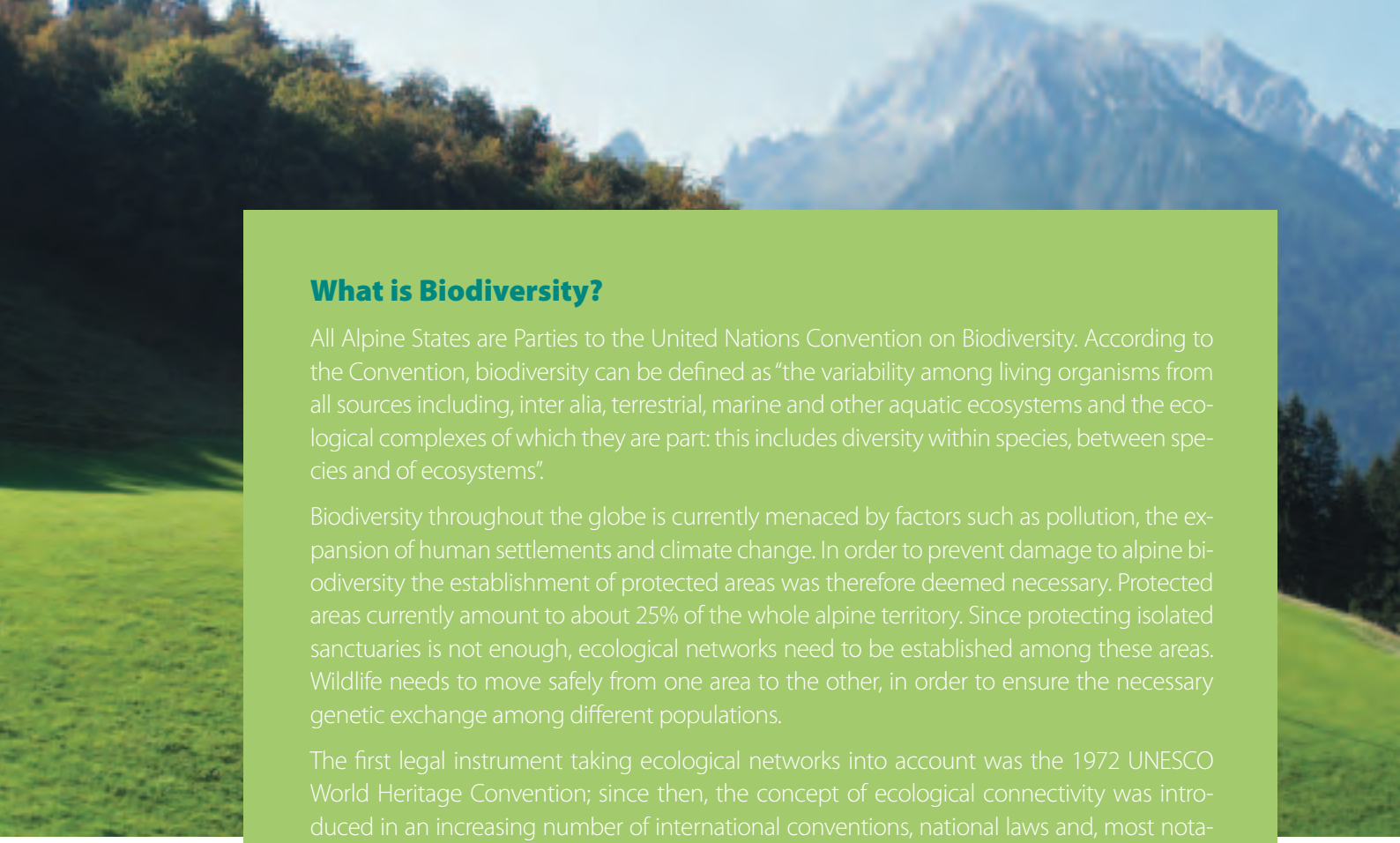
The law applicable for the interpretation and application of the convention is that of the Member State in which the official EGTC headquarters are located.

An EGTC convention sets out in particular:

- the name of the EGTC and its headquarters;
- the list of members;
- the area it covers;
- its objective;
- its mission;
- its duration.

For more information see:

- the rules of the European Grouping of Territorial Co-operation;
- Committee of the Regions;
- INTERACT EGTC.



What is Biodiversity?

All Alpine States are Parties to the United Nations Convention on Biodiversity. According to the Convention, biodiversity can be defined as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems".

Biodiversity throughout the globe is currently menaced by factors such as pollution, the expansion of human settlements and climate change. In order to prevent damage to alpine biodiversity the establishment of protected areas was therefore deemed necessary. Protected areas currently amount to about 25% of the whole alpine territory. Since protecting isolated sanctuaries is not enough, ecological networks need to be established among these areas. Wildlife needs to move safely from one area to the other, in order to ensure the necessary genetic exchange among different populations.

The first legal instrument taking ecological networks into account was the 1972 UNESCO World Heritage Convention; since then, the concept of ecological connectivity was introduced in an increasing number of international conventions, national laws and, most notably, in the well known European Birds and Habitats Directives. The Birds Directive in 1979 set up the Emerald Network of protected areas, whereas the 1992 Habitats directive established the Natura 2000 network. Some of the Pilot Regions established under the **ECONNECT** Project are actually Natura 2000 sites.

RESULT 4

Concrete actions in the field for the establishment of ecological networks

The project developed and delivered a comprehensive methodology. This provided **ECONNECT** partners with a framework to harmonize data collection and analysis, and the implementation of concrete measures on the ground. As a result of the joint planning process, priority measures to enhance ecological connectivity in each pilot region were selected. The results derived from this analysis process will serve as a basis for future spatial planning processes so that the spaces not yet fragmented and essential for species movements can be preserved. In Pilot Regions a number of actions such as improving water and aerial connectivity, setting up agreements with local stakeholders and decision makers and raising public awareness, were implemented. More details about the specific actions in the field are provided in the chapter dealing with the Pilot Regions and on the **ECONNECT** website (www.econnectproject.eu).

RESULT 5

Raising awareness about ecological networks

ECONNECT pursued a two-pronged strategy in order to make ecological connectivity known among decision makers, the general public and the stakeholders: classic communication tools, such as newsletters and press releases, along with other innovative means targeted the general media. Non-professional photographers were invited to take pictures showing barriers and corridors in the Alps and to share their images through an on line service (Flickr). A class of photograph students was invited to use their creativity to explore ecological connectivity: images taken at the Alpi Marittime Natural Park (one of the **ECONNECT** pilot regions) were used to set up an exhibition that was displayed at the Econnect Final Conference.

Moreover, local key stakeholders and communities were targeted by specific information/communication events in many pilot regions:

- stakeholder involvement for road management in Département Isere (F);
- stakeholder involvement for grassland management in Berchtesgaden (D);
- stakeholder involvement for the Rombach river in the Raethian Triangle (CH).

Finally, specific knowledge-transfer activities reached key actors at all levels of governance (stakeholders, managers, NGOs, GOs, scientists) and territorial coverage (local, alpine, European).

CONNECTIVITY AND SELECTED KEY SPECIES

Connectivity and selected key species

The main objective of this activity was to identify the anthropogenic barriers that influence the movements of different Alpine species, based on their ecological requirements.

The terrestrial indicator species were: brown bear (Ursus arctos), wolf (Canis lupus), Eurasian lynx (Lynx lynx), red deer (Cervus elaphus); the aerial species - black grouse (Tetrao tetrix) and griffon vulture (Gyps fulvus) and the aquatic species - fish otter (Lutra lutra) and bullhead (Cottus gobio). The study identified areas of actual and potential distribution of selected species and then defined barriers that limit ecological connectivity.

Fig. III.1. *Bear habitat and its legal status © EURAC.*

The figure shows the potential bear habitat in green (core habitat) and yellow (classified area: ECONNECT pilot regions, Natura 2000 sites and designated areas). The resolution of the map is 1 km²

Brown bear facts

The brown bear (Ursus arctos) belongs to the family of the Ursidae. The natural habitats of brown bears are open and forested areas. Currently in Europe brown bears occur predominantly in forests. This is probably due to the low density of human population in these areas rather than a natural habitat preference. The occurrence of brown bears is governed by the availability of food, land cover and undisturbed caves for denning. Brown bears are omnivorous and their principal diet in the Alps consists primarily of gramoids and forbs in spring, berries and fruits in autumn. Main food sources are acorns (Quercus spp.), beeches (Fagus sp.) and chestnuts (Castanea sp.). Meat is eaten occasionally by brown bears, either as prey or carcasses. Female bears reach a weight from 75 to 160 kg while male bears reach weights ranging from 120 up to 350 kg. Despite their body mass, bears are able to move fast, climb and swim.

Densities of brown bears are thought to vary with food availability and human acceptance.

The current distribution of U. arctos is limited mainly to the Eastern Alps, in particular: in Trentino - about 30-35 (males and females), in Veneto - 1-2 (only males), in Lombardy - 2-3 (only males), in Switzerland - 0-1 (only males). In Austria - 2-4 (only males), in Slovenia (Alpine part - more then 50 (very few or no females).


© Fritz Pfiking / WWF

Main threats for bears in Europe have been evaluated by the Action Plan for Conservation of the Brown Bear in Europe (http://www.lcie.org/Docs/COE/COE NE 114 Action plans for brown bear 2000.pdf). These include:

1. demographic and genetic viability. Small population sizes as such are a problem, at least 6-8 females are required to reduce the risk of extinction through random stochastic effects within 100 years below 10%;

2. fragmentation. Infrastructures that fragment bear habitat can be more detrimental to bears in some cases than the loss of habitat;

3. habitat loss attributed to the expansion of human activities such as agriculture, forestry, resource extraction, road construction and recreation;

4. low acceptance. Coexistence between man and Bear is made more difficult by the actual damages caused by bears, the slow and insufficient compensation, and the cultural barriers.

Brown Bear *(Ursus arctos)*

As a result of human persecution in the past, the current distribution of Ursus arctos in the Alps is restricted and limited mainly to the Eastern Alps. However, the distribution model shows that there are potentially suitable habitats for bears even in the Western Alps. For what concerns the legal status of the potential bear habitat, the spatial pattern analysis revealed that more than 60% of these areas are not protected.

Conclusion

Motorways represent the most relevant physical anthropogenic barrier for bears in the Alps. The main problem for Alpine bears however is the acceptance by local communities and managing authorities. In fact, intolerance is one of the drivers triggering the poaching of bears. Alpine-wide political decisions, such as compensating predated livestock will increase the acceptance of bears by farmers and the local population. Furthermore, the implementation of damage prevention measures and policies are urgently required (electric fences, dogs, etc.).

Finally, it should be considered that in increasing human-dominated landscapes habitats become less suitable for bears and conflicts between bears and humans will increase.

Fig. III.2. *Classification of potential wolf habitat - 2009 © EURAC*

It is worth reminding that the first wolf occurrence in the Alps was recorded in the Pilot Region "The South-Western Alps" (NPs Mercantour/Alpi Marittime).

Wolf pack core habitat areas and corridors

Based on wolf habitat suitability map, Guidos model and Morphological Spatial Pattern Analysis

Resolution: 1km^2

- Suitable habitat
- Corridors connecting habitats
- Corridor loop
- Unsuitable
- No data

Wolf facts

Wolf populations, similar to other highly mobile and territorial animals, can easily move across many unfavourable areas. However, wolves establish themselves successfully only in high-quality habitats. Regional landscape analysis and prediction of favourable wolf habitats were conducted in North America and in Europe. These researches emphasized the importance of long-term monitoring data and large-scale analysis to resolve complex spatial questions concerning wolf resource management and conservation. In particular in Europe, where intense anthropogenic habitat modification has occurred over hundreds of years, a large-scale occupancy analysis and the development of dynamic habitat models is important to understand and manage fragmentation and connectivity issues.

To study wolf connectivity, movement, and wolf potential habitat needs, it is fundamental to distinguish between wolf pack requirements and wolf dispersal patterns. For wolves, a highly social and territorial species structured in packs with a single breeding pair, this behavioural aspect affects density, home-range configurations, and movements.

Wolf *(Canis lupus)*

Wolf distribution in the Western Alps is shown in the figure below (***Fig. III.2***). During the last 20 years the wolf re-colonised the Western Alps in Italy and France through dispersal from the Apennines after becoming extinct throughout most of Western Europe and the Alps during the 20th century. Wolves are now also regularly found in Austria and Switzerland. An ecological corridor provided by the Ligurian Apennine Mountains ensures the connection with the Apennine population. Gene flow between the Apennines and the Alps is moderate (corresponding to 1,25-2,50 wolves per generation). Unlike the situation with bears, this movement was entirely spontaneous, and not triggered by reintroduction efforts. This does not imply that there are no barriers or extinction risks, it simply means that this species has peculiar adaptation mechanisms more effective than others.

It is worth reminding that the first wolf occurrence in the Alps was recorded in the Pilot Region "The South-Western Alps" (NPs Mercantour/ Alpi Marittime), probably the Pilot Region that contains the highest percentage of core and bridge areas in the Western Alps.

Conclusion

Wolves can easily cross roads and motorways; a single road is not usually identified as a barrier for wolf dispersion. However, in Italy wolves are often killed by car accidents, especially if they settle in a region with high road density. Therefore, road density is a major limitation to pack establishment rather than to wolf dispersal. Human settlements, small forest areas and high altitudes seem to be other negative variables related to wolf presence. The analysis pointed out that the lowest levels of connectivity are found between the source areas in the Pennine and Lepontine Alps and between Switzerland and Italy. Another factor that can affect connectivity for this species is the high level of legal fragmentation, given that the Alpine landscape encompasses several countries, each with its own administrative and legislation implementation framework. A shared management program for the Alpine countries is a necessary step to maintaining wolf connectivity and ensuring its long-term conservation in the region.

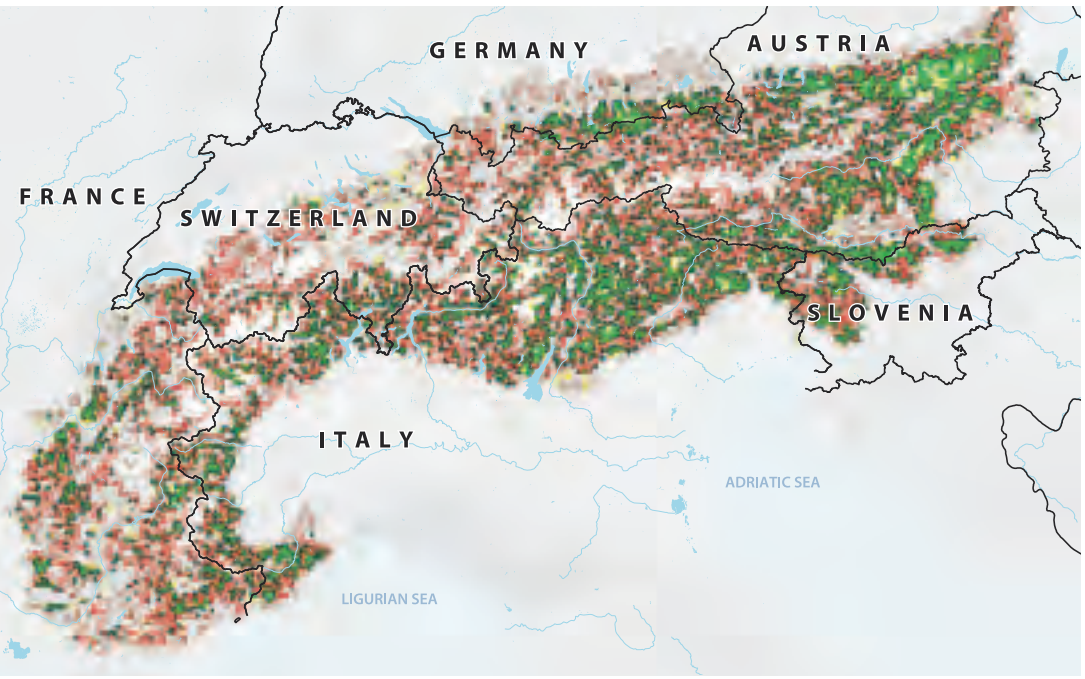


Fig. III.3. *Classification of potential lynx habitat © EURAC*

Source: Pan-Alpine Conservation Strategy for the Lynx, Technical report, 2003

Lynx core habitat areas and corridors

Based on potential lynx distribution, Guidos model and Morphological Spatial Pattern Analysis

Resolution: 1km^2

- Suitable habitat
- Corridors connecting habitats
- Corridor loop
- Unsuitable
- No data

Lynx facts

The Eurasian Lynx is one of four lynx species that occur worldwide. Its distribution is restricted to Europe and Eurasia, with exception of the Iberian Peninsula. In comparison to the other species, the Eurasian lynx is larger, with a mean body mass measured in Switzerland for adult females of 17 - 20 kg and adult males of 20 - 26 kg. L. lynx has an average home range of 60 - 480 km^2 for females and 90 to 760 km^2 for males. The maximum known dispersal distance (year 2009) of a lynx in the Alps is from the Tössstock (Switzerland) via the Swiss National Park to the Italian Trentino. This distance of approximately 200 km linear distance was taken as a reference for dispersal distance. The potential distribution areas of the lynx are the forests in central Europe and the Alps.


© Roger Leguen / WWF-Canon

Studies from Switzerland showed that while a lynx's diet consists of up to 20 different species of prey, the major part (88%) consists of chamois and roe deer. The presence of lynx usually leads to conflicts, especially with farmers and hunters.

The Pan-Alpine Conservation Strategy concluded that the lynx as species is not threatened in Europe as a whole; however, each population deserves to be preserved as an integral part of the ecosystem. Main threats identified are:

- Habitat loss through habitat conversion (i.e. deforestation).
- Loss of prey through the decline of ungulates.
- Direct persecution as results of a predator prey conflict.

Lynx *(Lynx lynx)*

Lynx is distributed substantially in Switzerland (as a result of reintroduction projects) and Slovenia, although scattered individuals occur over the Western Alps, in Trentino (I), Friuli (I) and Austria. Within the **ECONNECT** Pilot Regions lynxes occur in the French Department Isere, the Rhaethian Triangle, the Hohern Tauern, the Northern Limestone Alps. With regards to potential distribution, the probability of occurrence is much higher in the Eastern Alps. Approximately, 41% of all green bridges connecting core habitats fall within an **ECONNECT** Pilot Region or within protected areas.

Conclusion

Chamois and red deer are the main prey of lynx so its distribution is influenced by their presence. Predation on other animals is occasional. Unlike wolf and bear, the lynx is not seen, as a threat by farmers, but it is perceived as a competitor by hunters. It seems that motorways are a major barrier to the movements of individuals because they may interrupt potential dispersal routes, and possibly deplete the established lynx populations. However, data on road kills are limited and there is still uncertainty about the threats those infrastructures really pose to the species.

Fig. III.4. *Potential habitat distribution for Cervus elaphus in the Alps © EURAC*

Red deer core habitat areas and corridors

Based on potential red deer distribution, Guidos model and Morphological Spatial Pattern Analysis

Resolution: 1km^2

- Suitable habitat
- Corridors connecting habitats
- Corridor loop
- Unsuitable
- No data

Red deer facts

The Red deer has a bright red-brown summer coat, longer, thicker & browner in winter, a buff-colored rump. The male (stag) has antlers. Height at withers is up to 122cm. Length from 175cm to 285cm. The female (hind) is slightly smaller than the stag with a weight from 100 to 120 kg. Red Deers can live up to over 20 years in captivity and in the wild they average 10 to 13 years, though some subspecies with less predation pressure average 15 years.

Stags and hinds live in separate herds for most of the year, each keeping to a well-defined territory. Females use areas with young replanted and pre-thicket crops and older stands with checked trees more in proportion to availability than old closed-canopy stands, open-hill ground and high-elevation newly established forest. They use open areas more at night, dusk and dawn, and the more secluded thickets during the day.

Compared to females, young males were found more in older stands, high-altitude young plantations and on open-hill ground. Home range size (406-1008 ha for females and 1062-3059 ha for males) is smaller for animals with a high proportion of favourable habitats in their range. Individual ranges do overlap.

Summer and winter territories are different. Red Deer in Europe generally spend their winters at lower altitudes in more wooded terrain where there is more shelter. During the summer, they migrate to higher elevations where food supplies are greater for the calving season.

Woodland red deer hinds (females) can breed at 16 months. Smaller hill deer may not reach sexual maturity until they are 2-3 years old. The mating season, known as the rut, begins in mid September and continues to late October. Hinds normally give birth to single calves from late May to June.

In early summer red deer leave the valleys and migrate to their summer home ranges up in the mountains. The deer are browsers by nature, pulling off leaves from deciduous trees. They will also eat twigs, ivy and lichen from trees. In open habitats, the deer become mainly grazers, cropping grass and browsing from small shrubs like heather.

Aside from humans and domestic dogs, the Wolf is probably the most dangerous predator for most European Red Deer.

Red Deer *(Cervus elaphus)*

Red deer is a very adaptive species. Originally in the Alps deer were a woodland-dwelling species. However, following the large-scale reduction in tree cover that took place over the past centuries, red deer were forced to adapt to open land. This adaptive characteristic also affected their migratory behaviour. Red deer inhabit most of Europe, the Caucasusian Mountains region, Asia Minor, parts of western Asia, and central Asia. The species also occurs in the Atlas Mountains, between Morocco and Tunisia in northwestern Africa.

Red deer is a major trophy hunting species in Europe. This economic interest results in the high densities and the specific management conflicts. Also, legislation related to damage compensation clearly aggravates the issue in Germany and Austria. Additionally, legislation aiming to establish no-deer-areas certainly is a concern for species movements and gene flow.

Conclusion

Management conflicts and high deer densities in forests are the main issues for this species. Therefore, there is a need for a more conscious and active integration of wildlife species into the cultivated landscapes to provide adequate proper biotopes for plants and animals thereby reducing damages by correct management strategies. It should be stressed though, that silvicultural measures alone cannot solve the problems of wildlife management: complementary inputs are required from all stakeholders - foresters, hunters, farmers, tourist authorities, conservationists, regional planning authorities and local communities.

Fig. III.5. *Potential black grouse habitat © EURAC*

The figure shows the suitable black grouse core habitats (green) and corridors (red) connecting the habitat patches.

Black grouse core habitat areas and corridors
Based on potential black grouse distribution, Guidos model and Morphological Spatial Pattern Analysis
Resolution: 1km^2

- Suitable black grouse core habitat
- Corridors connecting the habitat patches
- Corridor loop
- Unsuitable
- No data

Black grouse facts

Alpine populations rarely migrate to valleys, whereas migrating populations were observed in northern flat land, in a range up to 20 km. However, the mean migration distance was only 4.4 km. The preferred habitat is the transition zone of forests, moors and heaths or the subalpine tree line in the Alps. Black grouse requires an area of approximately 20 ha of continuous habitat for breeding.

Males are black to dark blue and shiny and females are auburn with white bands. The diet of black grouse consists of buds, leaves and needles of Larix decidua in spring and berries in autumn. During winter the main food is found on trees.

The main factor for decreasing black grouse numbers in the lowlands is habitat loss and fragmentation; in the Alps habitat loss becomes an issue only where tree line shifts due to the abandonment of graze areas. Hunting can be locally a relevant threat.

Black Grouse *(Tetrao tetrix)*

Tetrao tetrix occurs in the shrublands and moors within the altitudinal range of forests and alpine meadows. Lowland populations have disappeared in central Europe and can only be found in Northern Europe and Scandinavia.

Until the year 2000 the number of black grouses in the Alps remained almost stable, since then they have started to decline.

Conclusion

Main obstacles for large distance dispersal of black grouse are:

- natural barriers (i.e. mountain ranges above 2500m);
- anthropogenic pressure: on the local level the black grouse relies on several habitat types (see ***box "Black grouse facts"***) during its annual cycle. Hence, guaranteeing the access to these habitat types is crucial.

Fragmentation of breeding habitats driven by local disturbances (e.g. leisure activities and infrastructures) is considered as the main issue, while in winter the species suffers from the disturbance caused by ski-lifts.

Finally, the expected changes driven by climate change in those habitat where the species occurs are another major concern.

Griffon Vulture *(Gyps fulvus)*

Gyps fulvus was not able to breed in the Alps for almost a century. Thanks to a few reintroduction projects today griffons fly again from Croatia to Austria and Autonomous Region of Friuli Venezia Giulia as well as in central France.

The griffon vulture is not a typical alpine species. In fact it occurs in several mountainous Mediterranean areas such as Spain, Dalmatia, Balkans, Crete, Greece, Turkey, Sardinia, Balearic Islands and North Africa. Nevertheless, the species was included in the **ECONNECT** set to evaluate the impact of the legal restrictions related to the provision of carcasses and to aerial barriers like power lines and wind farms.

The analysis aimed at assessing a number of factors: breeding locations, potential food availability and anthropogenic disturbances caused by high voltage power lines in the Alps.

Conclusion

Connectivity in the Alps does not appear to be a key issue for the griffon vulture. The species is able to cover large distances by flying at high altitudes.

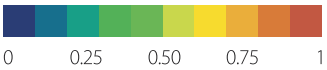
Known limiting factors are: availability of carcasses (as food source), poaching rate and availability of rock cliffs.

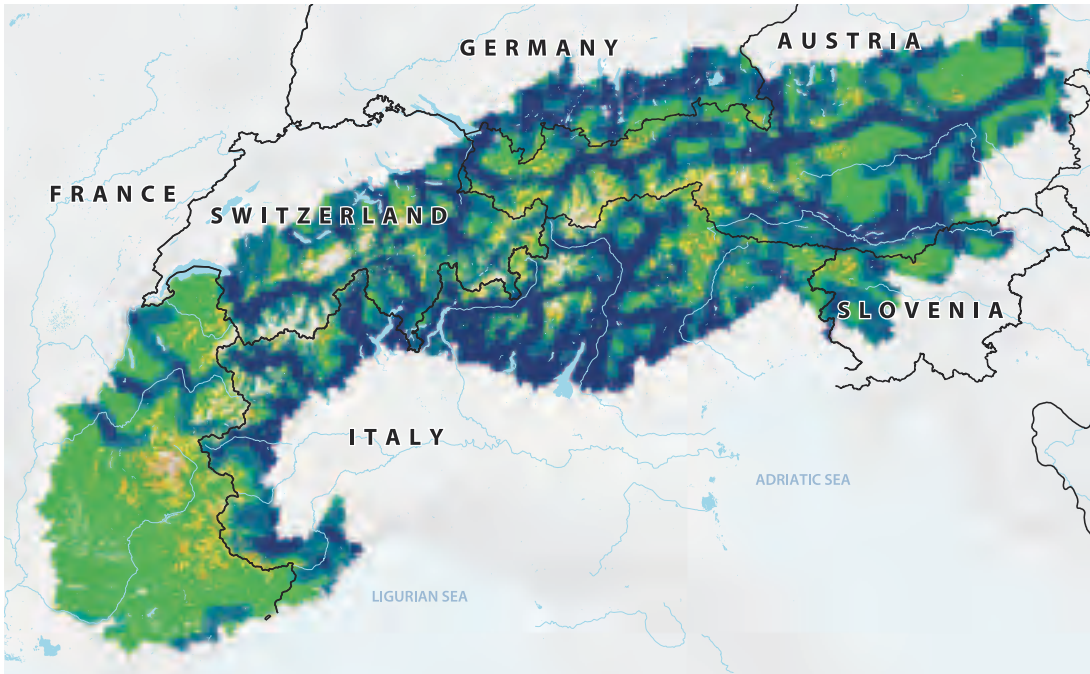
Other critical issues are:

- griffon vultures hunt cooperatively. Consequently, as soon as the breeding colonies fall below a certain threshold, they quickly disappear;
- because of its flight modality, the species depends on the presence of ascending currents.
- Power lines are an example for the concurrence of anthropogenic disturbance that can effect Gyps fulvus. Other artificial anthropogenic structures that might have negative impacts on potential breeding sites and on distribution are wind wheels.

Fig. III.6. *suitable potential breeding sites for griffon vulture © EURAC*

Potential breeding sites of the griffon vulture
The figure shows potential breeding sites in red, taking into account food availability and anthropogenic disturbances (in this case represented by electric power lines).
Resolution: 1km²





PILOT REGION AND IMPLEMENTED ACTIVIT

Pilot Regions and implemented activities

The 7 Pilot Regions of **ECONNECT** were selected following a clearly defined process and in accordance with a set of shared criteria, encompassing diverse natural and ecological conditions.

This proceeding intended to achieve the development and test of concrete implementation strategies and measures so to improve ecological connectivity

The following gives an overview of the pilot regions and the implemented measures. These were applied in the following areas: conservation, forestry, agriculture, integrated management, land use planning, science and awareness raising.

© Berchtesgaden National Park

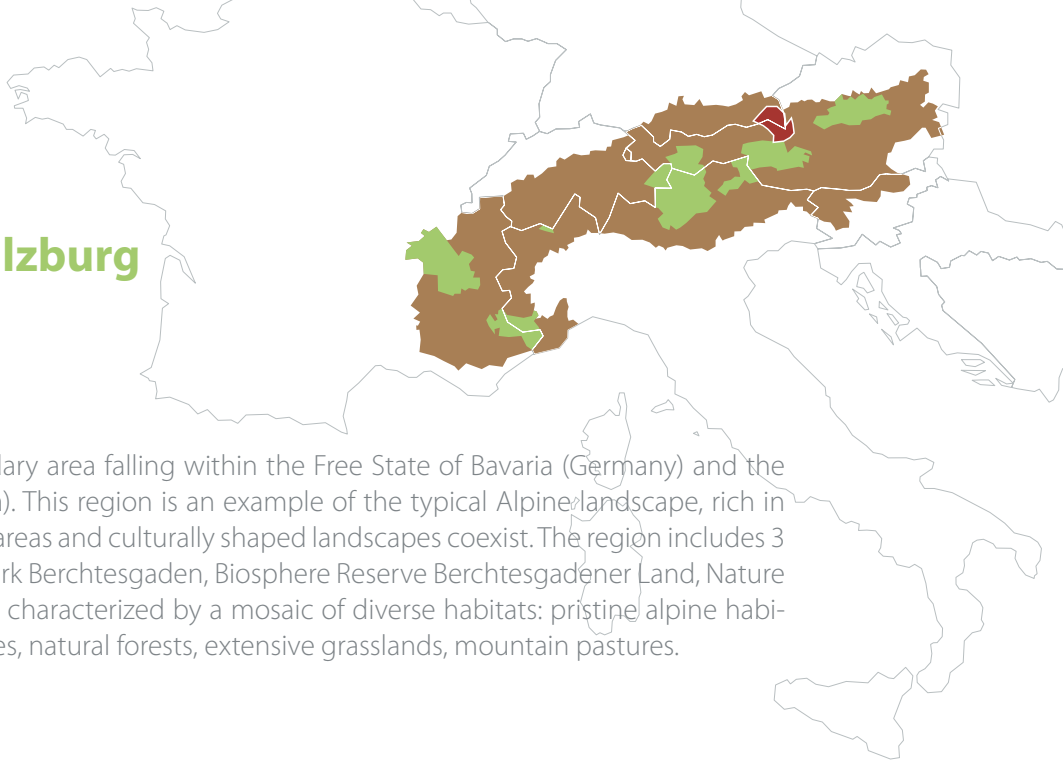
Actions in the field

Included the following interventions

- Utilisation of extensive grasslands
- Construction of underpasses for amphibians
- Saletbach-revitalisation and connectivity study
- Transboundary exchange of best practices

PILOT REGION

Berchtesgaden-Salzburg
(Austria - Germany)



This Pilot Region is a transboundary area falling within the Free State of Bavaria (Germany) and the Federal State of Salzburg (Austria). This region is an example of the typical Alpine landscape, rich in biodiversity where intact natural areas and culturally shaped landscapes coexist. The region includes 3 large protected areas: National Park Berchtesgaden, Biosphere Reserve Berchtesgadener Land, Nature Park Weissbach. The landscape is characterized by a mosaic of diverse habitats: pristine alpine habitats, traditional cultural landscapes, natural forests, extensive grasslands, mountain pastures.

A closer look at the measures in the transboundary region Berchtesgaden-Salzburg: extensively utilised grasslands

Extensively utilised grasslands are characteristic for the Pilot region "Berchtesgaden-Salzburg": traditional cultural landscapes such as extensive grasslands of the lowlands and pastures at higher altitudes show a broad spectrum of rare butterflies, grasshoppers, and plant species, thus being highly important for biodiversity conservation. However, in the past decades changes in traditional cultivation patterns have become apparent in the region: grassland areas are taken out of use, especially in unfavourable regions where access and cultivation are difficult. Simultaneously, the utilisation of privileged areas is intensified. This leads to a decline of extensively used open meadows and pastures. Hence the support of extensive utilisation practices helps maintain regional biodiversity and the provision of ecosystem services. It also helps to preserve the typical natural scenery with its high touristic potential.

In this Pilot region **ECONNECT** activities aimed at maintaining the regional ecological network of open extensive grasslands as part of the cultural landscape and the regional identity. Connectivity has also been considered within a larger spatial context with a particular focus on the functional integration of the protected areas into their surroundings. Initially a regionally adapted set of target species for characteristic types of grassland was identified. Based on these target species a spatial analysis of available data was conducted in order to propose project regions as well as precise measures in the field. Additionally, the results of the analysis were used to discuss planning responsibilities as well as opportunities to integrate the ecological network of extensive grasslands into different planning disciplines (e.g. spatial planning of communities, management plans of protected areas including Natura 2000 sites) during a transboundary planning workshop. Furthermore interfaces with existing initiatives and future actions could be identified together with different stakeholders and partners.

In "Berchtesgaden-Salzburg Region" **ECONNECT** contributed to the development of solutions for the maintenance of the regional cultural landscape - and demonstrated the importance of connectivity and landscapes which allow for the functioning of natural processes.

Actions in the field

Included the following interventions

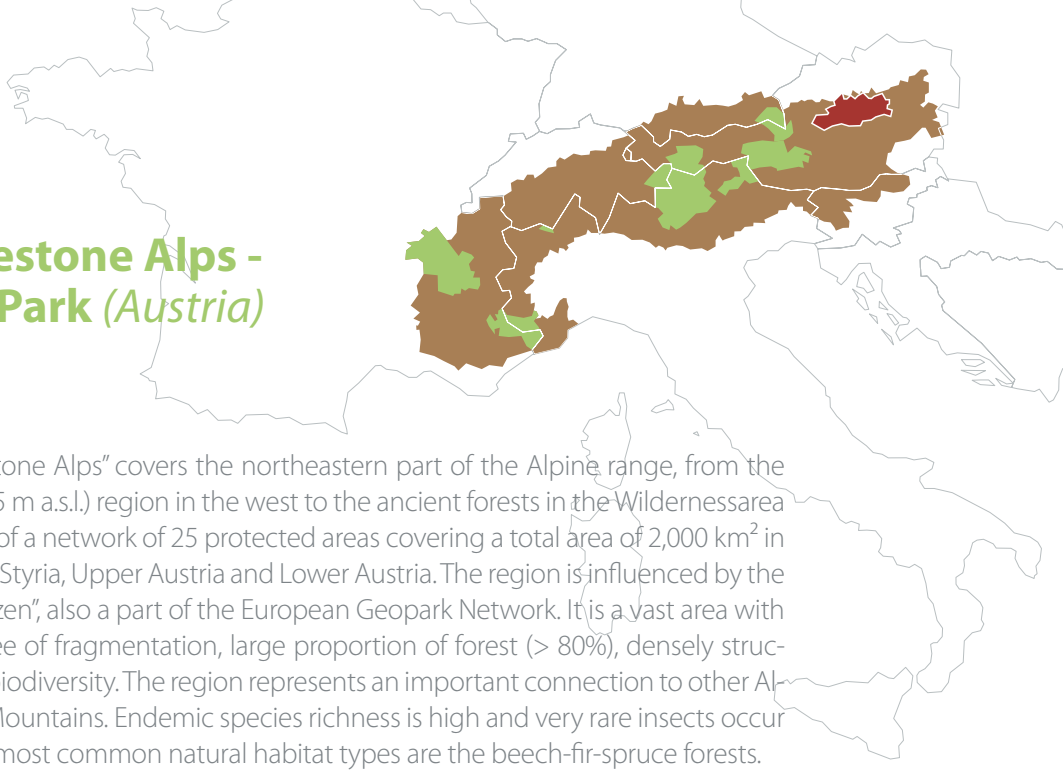
- Measures to protect the habitats of the White Backed Woodpecker
- Measures to protect the habitats of the Ural owl
- Awareness raising through a public "connectivity event"

Communication in the Northern Limestone Alps Region

The identification of the main stakeholders by the protected areas within the Pilot region was the main driving force of the communication efforts. All stakeholders identified were invited to information events and workshops in the pilot region. People from all three provinces participating in the project attended the events, representing protected areas, local governments, NGO´s and many others. At least 180 stakeholders took part in the process during the last three years. Personal interviews were recorded with 150 individual stakeholders. The main results are summarized in a database and include project ideas, methods and measures that can contribute to the creation of ecological networks in the region. The results of the interviews led to the implementation of four working groups: water-management, forest, grassland & pastures, and publicity.

PILOT REGION

The Northern Limestone Alps - Gesäuse National Park *(Austria)*



The Pilot Region "Northern Limestone Alps" covers the northeastern part of the Alpine range, from the last glaciers of the Dachstein (2.995 m a.s.l.) region in the west to the ancient forests in the Wildernessarea Dürrenstein in the east. It consists of a network of 25 protected areas covering a total area of 2,000 km^2 in the three Austrian federal states of Styria, Upper Austria and Lower Austria. The region is influenced by the history of mining in the "Eisenwurzen", also a part of the European Geopark Network. It is a vast area with low settlement density, low degree of fragmentation, large proportion of forest (> 80%), densely structured cultural landscape and rich biodiversity. The region represents an important connection to other Alpine regions and the Carpathian Mountains. Endemic species richness is high and very rare insects occur in proximity of water springs. The most common natural habitat types are the beech-fir-spruce forests.

A closer look at the measures in the Northern Limestone Alps: Habitat management to improve the distribution of the white-backed woodpecker

The White-backed Woodpecker (Dendrocopos leucotos) is a characteristic species in the forests of the Northern Limestone Alps. It depends on semi-natural to natural old forests with a sufficient amount of dead wood. It mainly builds its breeding burrow into hard wood trunks. Its menu consists to a large extent of wood-boring beetles as well as their larvae, with some additional insects, nuts, seeds and berries. The White-backed woodpecker is one of the rarest woodpeckers in Central Europe, Woodpeckers are an excellent indicator for good habitat conditions in forests, many other species such as birds, bats and other small mammals in the forest depend on the breeding borrows of the woodpeckers. Therefore the implementation of measures for the woodpecker has many additional positive effects on a large number of other endangered species, especially those dependent on dead wood.

The first step identified motivated partners to implement measures in their forests for the Woodpecker. The main forest landowners in the pilot region were contacted: ÖBF (Austrian State Forest), Styrian Federal Forests and the Federal Forests of Vienna. All three provided data from their forests concerning tree species composition and age class. These data, as well as a Digital Elevation Model (DEM), Corine Land Cover (landuse data) and mapping results for the White-backed Woodpecker were used in a MAXENT model to create a map of habitat suitability covering the pilot region.

Modelling results were verified during field excursions with foresters from all three forest landowners, showing that the modelling fits quite well with reality.

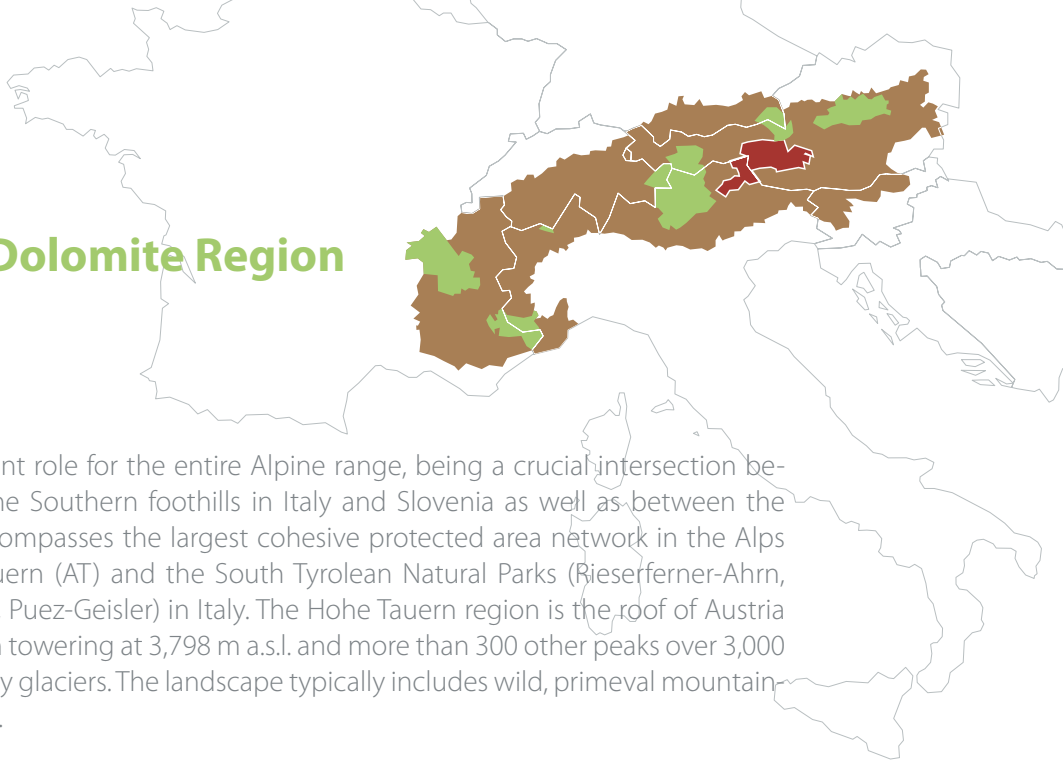
At a workshop with the forest companies further steps to implement measures for the Woodpeckers were decided. A common agreement was reached on an adapted management project, creating a matrix of sufficient deadwood as well as the long-term aim of large scale forest conversion to mixed stands.

© Hohe Tauern National Park

Actions in the field

Included the following interventions

- Western capercailie connectivity project Mallnitz
- Western capercailie connectivity project Matrei
- Winter sport visitor management project Larisa in Mallnitz
- Including ecological connectivity in the Austrian Strategy for National Parks



PILOT REGION

Hohe Tauern and Dolomite Region
(Austria - Italy)

The Pilot Region plays a significant role for the entire Alpine range, being a crucial intersection between the Northern Alps and the Southern foothills in Italy and Slovenia as well as between the Western and Eastern Alps. It encompasses the largest cohesive protected area network in the Alps with the National Park Hohe Tauern (AT) and the South Tyrolean Natural Parks (Rieserferner-Ahrn, Fanes-Sennes-Prags, Drei Zinnen, Puez-Geisler) in Italy. The Hohe Tauern region is the roof of Austria with the Grossglockner Mountain towering at 3,798 m a.s.l. and more than 300 other peaks over 3,000 m. 10% of its area is still covered by glaciers. The landscape typically includes wild, primeval mountainous habitats and cultivated lands.

A closer look at the measures in Hohe Tauern Pilot region: freedom for western capercaillie

On the basis of a study of the game population of Western Capercaillie (Tetrao urogallus) and the use of their habitat in the region of Mallnitz (Hohe Tauern National Park Carinthia) measures for improvement of the habitat were developed.

The Hohe Tauern National Park offers too small a habitat for the Western Capercaillie and so the study area and the area for implementation of measures was extended to the communities of Mallnitz and Obervellach. Areas involved: National Park 3,072 ha, 1,500 ha in the surrounding area, summing up a potential habitat for the Western Capercaillie of a 4,500 ha, over 27 hunting concessions.

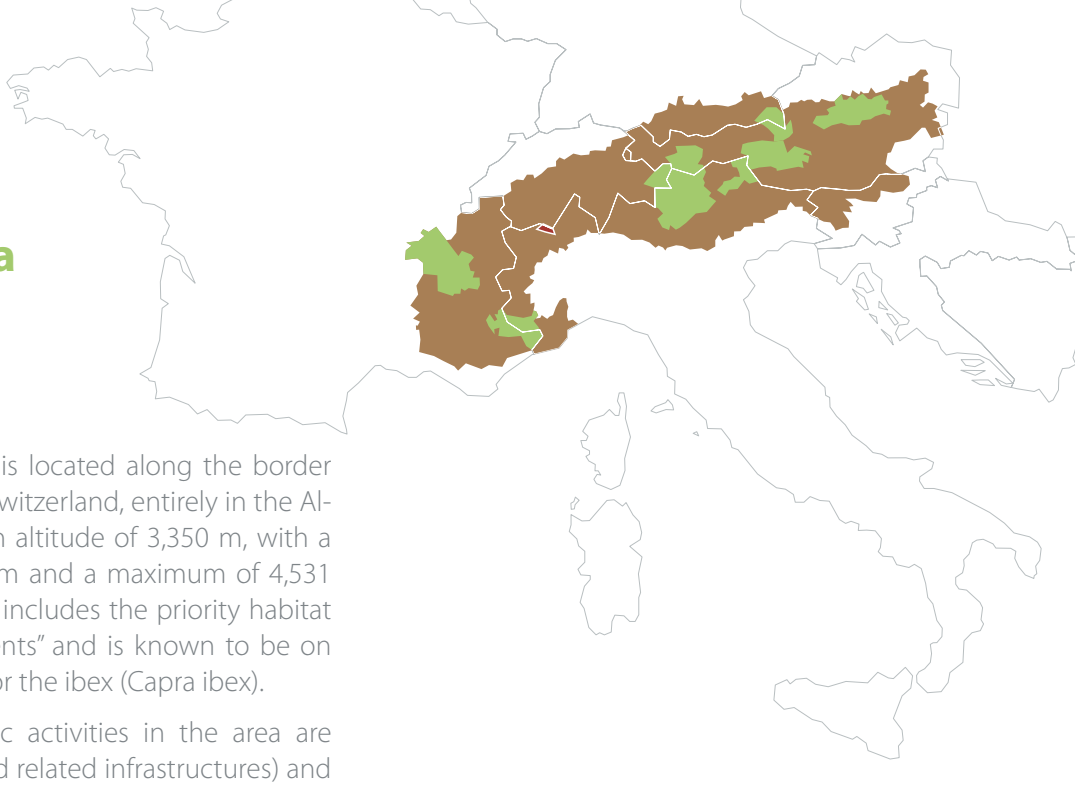
The first area for implementation selected was the so-called "Gassneralm" in the Kaponig valley in Obervellach. Due to the re-growth of forests in this Alpine pasture over time, the Western Capercaillie lost its habitat. Only in the area of "Gassnerhütte" evidence was found of the Western Capercaillie.

Together with the two private landowners and the project team the necessary improvement measures were identified, these included: forest tending, thinning, free cutting of larches, removing of the branch materials, weeding, alpine pasture clearing on this large 6,5 ha model area. The works were entrusted to a tree felling company. Three cable lines were necessary for the thinning of the dense tree population, which now serve as the Capercaillie flight paths. The canopy could be reduced from 90% to 60% - ideal conditions for the Capercaillies. The work was constantly supervised by the project team and was carried out successfully within 3 weeks.

This pilot project demonstrates the possibilities of inter-disciplinary cooperation between forestry, agriculture, hunting and nature conservation and acts as a role model for an comprehensive action plan for the "Carinthian Capercaille".

PILOT REGION

Monte Rosa
(Italy)

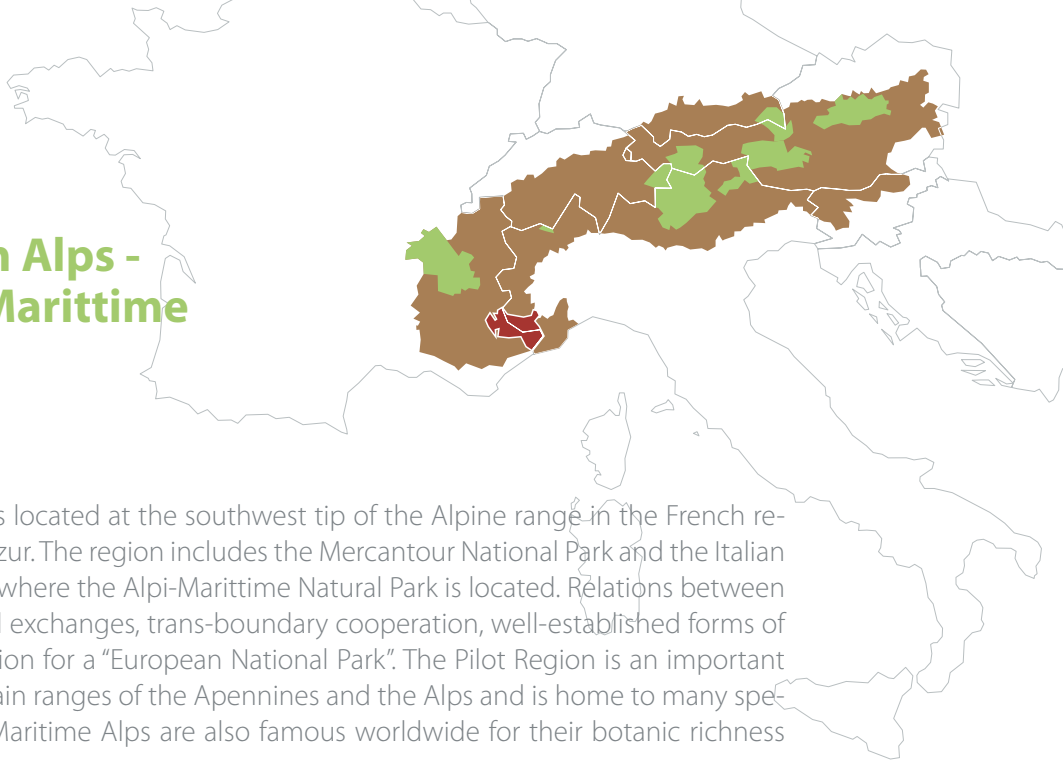


Monte Rosa massif is located along the border between Italy and Switzerland, entirely in the Alpine area at a mean altitude of 3,350 m, with a minimum of 2,000 m and a maximum of 4,531 m. The Pilot Region includes the priority habitat "Limestone pavements" and is known to be on an important area for the ibex (Capra ibex).

The main economic activities in the area are tourism (ski runs and related infrastructures) and agriculture (pastures).

Actions in the field
Included the following interventions

- Maintenance of landscape elements beneficial to ecological connectivity
- Adoption of new measures for connectivity improvement on the occasion of Special Area of Conservation (SAC) designation
- Regulation of tourist flows



PILOT REGION

The south-western Alps - Mercantour/Alpi Marittime

(France - Italy)

The South-Western Alps region is located at the southwest tip of the Alpine range in the French region of Provence-Alpes-Côte-d'Azur. The region includes the Mercantour National Park and the Italian regions of Liguria and Piedmont where the Alpi-Marittime Natural Park is located. Relations between the regions include close cultural exchanges, trans-boundary cooperation, well-established forms of collaboration and a common vision for a "European National Park". The Pilot Region is an important connection between the mountain ranges of the Apennines and the Alps and is home to many species of animals and plants. The Maritime Alps are also famous worldwide for their botanic richness (2600 species).

A closer look at the measures in Southwestern Alps-Mercantour/ Alpi Marittime: ski and biodiversity

Ski resorts with their numerous cable cars and other infrastructure represent a permanent danger for several species, especially birds (raptors, galliformes and others). To ensure a better coexistence between these animals and human winter sport activities, the Pilot region of the Alpi Marittime and Mercantour Parks equipped two ski resorts with experimental devices which make the cables visible: Limone Piemonte (I) and Isola (F) 2000. In Isola 2000 thanks to a close cooperation with the Mercantour National park and the ski resort management, 4 cable cars were equipped with more than 2000 devices produced with the help of students. Costs are relatively low (less than 5000 € for this pilot region) but the impact is quite promising. All devices will be replaced after 5 years. A monitoring program will evaluate the impact of these measures.

Actions in the field
Included the following interventions

- Improving hydric connectivity
- Improving terrestrial connectivity
- Improving aerial connectivity

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Actions in the field

Included the following interventions

Awareness campaign on light pollution on the 1st of October 2011

Improvement of a wall identified as a barrier for the fauna such as foxes, hedgehogs, stone martens and polecats, further work on barriers for the avifaun

A training session about "Connectivity, complementarity of the habitats and species approaches" was organized in collaboration with Cemagref. This training session was specifically addressed to the guards of the protected areas and the members of the association for the protection of nature

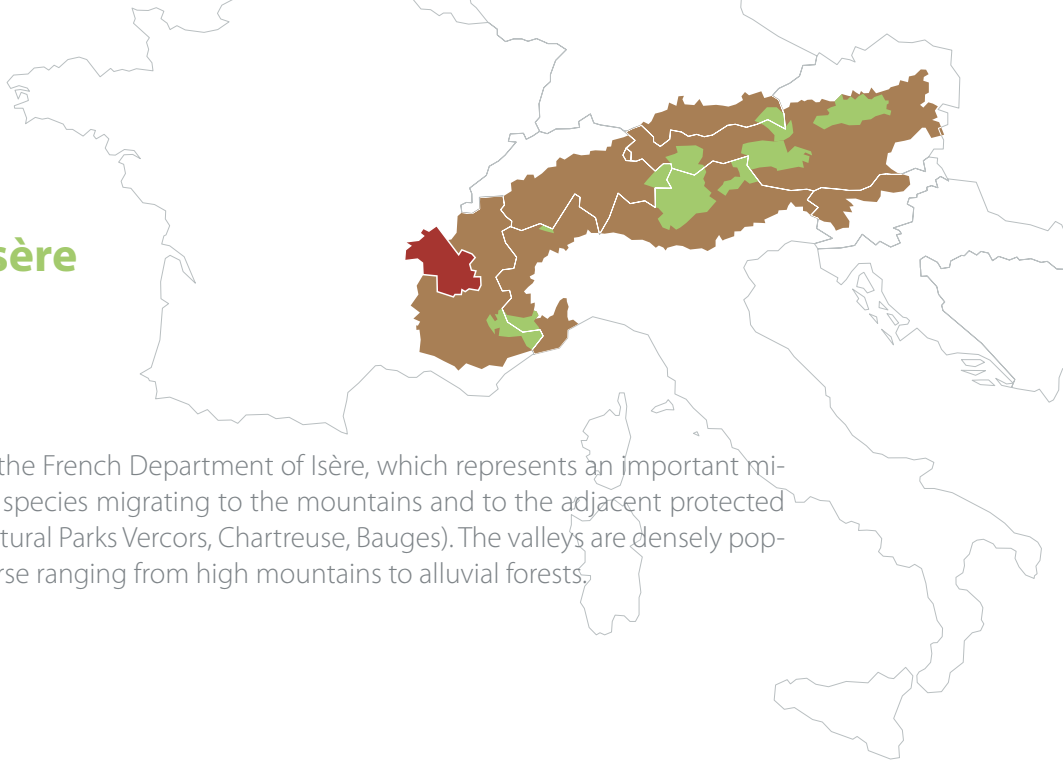
Methodological guide of hierarchical ecological networks

Communication in the French Department Isère

The Department took on the responsibility of establishing an ecological network in 2001 although it did not have the formal competence to do so. To fulfil this task it mainly acts as a coordinating body and attempts to implement an ecological network by working in close contact with the stakeholders, infrastructure managers, hunters' associations, fishermen and non-governmental organisations active in the field of nature protection. A special focus is given to cooperation with the municipalities in order to ensure that connectivity and migration corridors are maintained and restored in on-going land planning procedures.

PILOT REGION

The Department Isère
(France)



The Region of Rhône-Alps hosts the French Department of Isère, which represents an important migration route for birds and other species migrating to the mountains and to the adjacent protected areas (National Park Les Ecrins, Natural Parks Vercors, Chartreuse, Bauges). The valleys are densely populated. Habitats are rich and diverse ranging from high mountains to alluvial forests.

A closer look at the measures in the Department Isère: the "day of the night"

The ecology of the valley of Gresivaudan is highly damaged by human activities.

Even though this valley is surrounded by mountains, it is hardly possible to see the stars at night. There is no real "night" anymore. This very strongly affects the fauna. Animals avoid crossing fields and roads because many of them are illuminated. "A hunter said that since a road between two municipalities had been illuminated, there were no accidents with wild pigs". Although most of the population is unaware of this issue, it is a real problem regarding connectivity in populated areas.

Therefore a special event took place on the occasion of "The day of the night" at national level, a new area in the work of **ECONNECT**.

In this area some actions have already been implemented to restore the connectivity (in the framework of Paths of life - http://www.pathsoflife.eu) and this event provided the opportunity to go further, to raise awareness with the local stakeholders like municipalities and inhabitants and actually make municipalities switch off their lights.

For this event 47 municipalities were contacted by post, by mail and by phone to ask about their willingness to participate. Different examples exist already in other regions and some municipalities drew up a" light pollution charter" which can be signed by the municipalities to prove their engagement in favour of reducing light pollution in their area.

Work has been done with the association of municipalities of the Gresivaudan to change and adapt this charter. It will be signed by the municipality in the presence of the general councillor and the representative of the association of municipalities. This event was accompanied by detailed and strong media work. More than 20 municipalities agreed to participate: reducing or switching off their lights and organizing some animations to raise the awareness of the population about the issue.

© Swiss National Park

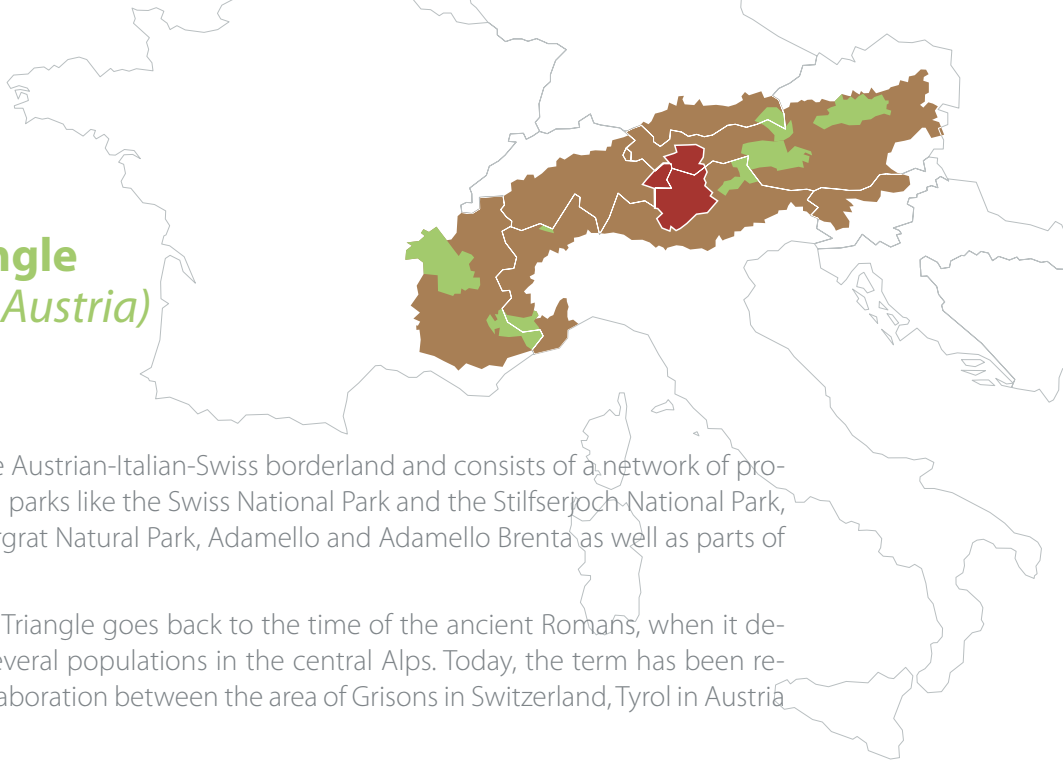
Actions in the field

Included the following interventions

- Preserve connectivity in the Rom riverine system
- Implement connectivity in the regional planning process
- Collaboration with the INSCUNTER project model - synergies in rural areas

PILOT REGION

The Raethian Triangle
(Italy - Switzerland - Austria)



This Pilot Region is situated in the Austrian-Italian-Swiss borderland and consists of a network of protected areas, national and natural parks like the Swiss National Park and the Stilfserjoch National Park, the Biosphere Val Müstair, Kaunergrat Natural Park, Adamello and Adamello Brenta as well as parts of South Tyrol Natural Parks.

The origin of the name Raethian Triangle goes back to the time of the ancient Romans, when it described the cultural alliance of several populations in the central Alps. Today, the term has been revived to refer to international collaboration between the area of Grisons in Switzerland, Tyrol in Austria and South-Tyrol in Italy.

The Raethian Triangle and the adjacent areas of Trentino and Lombardy are home to a wide range of Southern and Central Alpine habitats, from dry meadows to small remnants of previous riverine systems as well as the whole spectrum of forests from lower based broad-leaved forests to different coniferous forests at higher altitudes.

A closer look at the measures taken in the Raethian Triangle: Rombach River connectivity measures

The Rom - Rombach riverine system was a role model for showing the importance of international collaboration as well as of the involvement and engagement of local stakeholders in the field of ecological connectivity. While in Switzerland many measures were adopted to restore the ecological balance of the river, the Italian neighbours approved a plan to canalize its waters. Thus the connectivity of the riverine system was interrupted and the upper basin truncated from the lower part toward the Etsch valley.

Luckily, a local environmental conservation group manifested their opposition against the plan to channel the Rombach in Taufers - Tubre in Italy. Together with the party responsible for the **ECONNECT** pilot region Inn -Etsch, this local group identified a set of actions and measures to hamper the project or at least mitigate its impact. These actions include public discussions, awareness raising among local politicians and river events to show to a wider public the uniqueness of the river in this area. The highlight was the International Day of Biodiversity 2011. Over 120 experts from Switzerland, Italy and Austria searched for 24 hours for all occurring species. In a concerted action 1850 different species were identified.

ECONNECT will end in November 2011, but the definitive decisions will not yet be made at that time. It is therefore important to support further actions to keep the pressure high on local stakeholders. Long term actions - financially supported - are important, if ecological connectivity on aquatic systems in the Alps is to be achieved.

Awareness raising

No connectivity without stakeholders - communication in Pilot regions

From the very beginning, all **ECONNECT** Pilot regions made strong and harmonized efforts to involve all relevant private and public stakeholders as well as the general public in the region (including nature conservation authorities, forest, water and agricultural administrations, roads office, NGOs, spatial planners, landowners, farmers, fishermen's and hunters' associations, churches, etc.). The objective in all Pilot regions was to establish long lasting partnerships and to foster win-win solutions for the partners.

See ***box Communication in the Northern Limestone Alps Region*** and ***box Communication in the French Department Isère***.

Conclusions and future perspectives of the Pilot Regions

ECONNECT made a direct and major contribution to implement Article 12 of the Nature Conservation Protocol of the Alpine Convention, which encourages the enhancement of ecological connectivity in the Alpine space. Both **ECONNECT** and the parallel working Continuum Initiative and Platform "Ecological Network" of the Alpine Convention have contributed to the global network of protected areas promoted by the Convention of Biodiversity and by many further international and national agreements and strategies which refer to ecological networks or biodiversity.

ECONNECT brought up some very clear results with regards to the reasons why ecological connectivity is not available:

- a dense pattern of human activities prevents ecological connections from being functional;
- there is a limited knowledge on the complex theme of ecological connectivity among the administrations, stakeholders and the population;
- landowners and stakeholders are strongly concerned about the establishment of additional protected areas resulting in limitations in land use or even heteronomy;
- a lacking will of cooperation and coordination between the different authorities (state, federal, administrative bodies, departments) and sectors often leads to conflicts concerning competences and resources.

ECONNECT was able to provide some effective solutions to the problems identified. The most striking one was the concept of the contemporaneous involvement of Pilot Regions for the implementation process. The interdisciplinary and trans-sectoral planning and implementation between, protected areas and various administrations worked out very well.

Raising the awareness of stakeholders, population and administrations on the need for connectivity for the provision of future performance of eco-system services also lead to very good results in co-operation and implementation of measures.

It seems necessary to foresee a shift of competences towards a central unit, that should be responsible for transnational, transboundary or trans-provincial projects (at the administrative level). This unit should be provided with sufficient financial and personal resources and able to work in a trans-sectoral dimension.

Finally, the administrations of protected areas within the Pilot Regions need to be equipped with adequate financial and personal resources to pursue their complex tasks and functions.

POLICY RECOMMENDATIONS

Policy recommendations

The goal of **ECONNECT** has been the enhancement of ecological connectivity in the Alpine space. To this purpose **ECONNECT** developed new methodologies for connectivity analysis, modelled and mapped connectivity, implemented measures in the field and analysed legal aspects.

Next steps call for a commitment from policy and decision makers at all levels, from local to regional to trans-national. The following provides a summary of the major policy recommendations the project stipulates to stimulate further development of and support for the ecological connectivity concept. The implementation of these recommendations would result in enhanced effectiveness of programmes to conserve biodiversity both in cultural landscapes and in the wilderness areas of the Alps, and the ecosystem services associated with it.

© Hohe Tauern National Park

Promotion of ecological connectivity

While society appears to appreciate the value of protected areas (e.g. sanctuary, recreation) and generally recognizes the importance of biodiversity and the associated ecosystem services, there is a poor understanding of the dynamic needs of our environment. Therefore, given the rapid changes occurring, it is necessary to increase the awareness of the limitations of a static protected area approach to Alpine environmental protection in the face of rapid changes.

RECOMMENDATION: Promoting ecological connectivity for the Alpine society and economy.

Biodiversity and ecosystem services are vital to society and the economy. We are strongly dependent on them although, unfortunately, this is not fully acknowledged by people. Likewise, ecological connectivity represents an indispensable value for society and the economy because of the role it plays in ecosystem functioning. If connectivity between habitats were lost, the latter would gradually deteriorate and lose their capacity of supporting the original high biodiversity (and the related ecosystem services). Hence, ecological connectivity is a decisive factor for the survival, movements and adaptation potential of most plant and animal species and are consequently a decisive factor for the preservation of the related ecosystem services.

Spatial planning and landscape connectivity

The central role of ecological connectivity is poorly understood and even less recognised in spatial planning processes. Maintaining and restoring ecological connectivity in the landscape by preserving larger and connected tracts of habitat is essential for biodiversity conservation and for enhancing the resilience of the ecological processes in the face of global anthropogenic changes in the multi-functional Alpine landscape. Today, throughout the Alpine range, spatial planning and implementations are conducted separately and without coordination by a multitude of authorities and institutions (e.g. forestry, water management, transport).

RECOMMENDATION: Integrate the concept of ecological connectivity at all levels (local to international) using an inter-disciplinary approach.

Because the achievement of ecological connectivity requires interdisciplinary planning processes and measures, it must become central to a holistic spatial planning approach. The planning process must be integrated across all relevant sectors, including agriculture, tourism, industry, transport and environmental conservation. Ecological connectivity must be included in the spatial planning instruments of the local, regional and national management and governance authorities. Successful integration of ecological connectivity into spatial planning must consider diverse social, cultural, legislative, economic and ecological demands, while assigning sufficient resources and capacities for biodiversity conservation and the maintenance of ecosystem functions.

ECONNECT developed several tools and indicators for raising awareness and the implementation of ecological connectivity through a multi-sectoral planning process. (e.g. JECAMI - the Joint Ecological Continuum Analyses and Mapping Initiative, CSI - the Continuum Suitability Index and CARL - Connectivity Analysis of Riverine Landscapes).

A comprehensive legal framework in support of ecological connectivity in the Alpine region

A supporting legal framework is an essential prerequisite for the establishment of an ecological continuum throughout the Alps. The necessary legal frameworks are currently inadequate and do not cover the implementation of transnational ecological connectivity. To increase the chances of success, it is imperative to identify legal opportunities and obstacles for the feasibility of every project. An added difficulty is the lack or inadequacy of legal institutions governing private lands, where fragmentation needs to be reduced. Furthermore, due to the absence of an integrated legal framework connectivity issues are insufficiently taken into account in land use planning processes. Nowadays, such legal tools are often lacking so that the implementation of measures in favour of ecological connectivity at national and trans-national level is still a complicated process.

RECOMMENDATION: Establish a legal framework to implement ecological connectivity measures at various scales.

Connectivity is an issue involving very different scales and multiple and diverse stakeholders. It became clear within the **ECONNECT** project that the respect of private landowners' rights is a key element for the conservation and improvement of connectivity. It is impossible to achieve a sustainable ecological continuum without the participation of private and public landowners and interests groups.

Protected area authorities and key actors

Protected areas are a key element of ecological networks due to their spatial role in the network and their potentially catalytic function for the initiation and support of the necessary process to maintain and restore ecological connectivity. Protected areas are characterised by valuable interdisciplinary competences and know-how regarding several aspects which are essential for the process, like communication skills and specific ecological knowledge. Moreover, according to several international and European agreements and guidelines, they are obliged to ensure the spatial and functional integration of the protected area into its surroundings (e.g. Natura 2000)

However, since every protected area has boundaries, it is often very difficult for protected area managers to initiate and support a planning and implementation process in territories beyond the protected area itself. It is evident that protected area managers have no direct decision competence outside the protected areas' official boundaries, even though, as core zones, protected areas constitute a fundamental element of the ecological network of a certain region. The park managers need political support and official legitimisation to participate actively and act as an initiating organization in the process. Such legitimisation is particularly important for protected areas featuring a pilot region for connectivity in the Alps. Legitimisation has to be conferred by the competent administrative organ in accordance with the political systems of the individual Alpine countries (federal or centralised systems). Currently, legal competence for the landscape between protected areas lies mainly with the local, regional or national agencies and not with the protected area management authorities. The latter need to rely on the financial and human resources required to ensure an ecological continuum over the long term.

RECOMMENDATION: Enable protected area managers to play an active role in the local and regional ecological network by supporting and promoting the process and involving the relevant stakeholders.

Park borders are generally too constrained to allow for fully functional ecosystems on a scale large enough to conserve biodiversity. Indeed, the Alpine parks and nature reserves alone are too small to protect Alpine biodiversity, especially in times of climate change, when increased migration of fauna and flora is essential for the survival of whole groups of species.

Therefore, protected area managers should be enabled to actively support the functioning of ecological processes beyond the borders of the protected area itself. It is thus necessary that local or regional authorities grant them the official legal competence to take action in an area including the peripheral zones or the entire park region. Close cooperation with the competent administrative authority in questions of ecological connectivity is fundamental.

Establishment of a common management system for geographic data

Numerous, if not all, European and Alpine projects need access to a significant amount of various georeferenced data. Often these data have already been previously collected through previous European and national initiatives, projects, as well as by public administrations. However, access is frequently extremely constrained. Data collection and maintenance, for the most part, has been purchased with public funding and it would be an inordinate waste of resources to have to reacquire already existing data sets. Not only is data acquisition very costly, but there is also a risk of breaking copyright laws if licensing agreements of proprietary data are not managed well. Georeferenced data, which are needed for spatial analysis of habitats and barriers, are to a large degree owned by regional and national administrations and is thus public sector information. It is in everyone's interest to reuse this information in an analysis and thus create new information on which decisions can be based. This will enormously reduce time and money spent for data acquisition and management and will stimulate the creation of new information.

RECOMMENDATION: Make data which have been collected with public funds openly available through a joint data management system on a European (Alpine-wide) scale.

ECONNECT clearly showed that necessary and important data sets are widely dispersed among diverse institutions and that access is generally difficult, prohibitively expensive or impossible. In the various regions and countries of the Alpine Range data is often acquired and stored in different formats and with divergent spatial attributes. Lack of common standards and metadata add to this unsatisfactory situation. To solve this problem it is necessary to create a joint data management system with common standards, quality assessment, maintenance strategy and easy user access.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After ECONNECT: how to continue the process

Continuation/maximization of the project results after its conclusion

The **ECONNECT** project is coming to an end and it appears essential that the cumulative achievements in respect to furthering and implementing an ecological network in the Alpine space are maintained and expanded on in the next years. Due to the inerrant problem that the majority of funded projects only last for a short number of years the **ECONNECT** consortium in close consultation with the Continuum Initiative and the Platform Ecological Network of the Alpine Convention have discussed and developed initiatives to maintain the momentum in implementing ecological network strategies. In the near future, evaluation of the results from this project will be integrated with present and most importantly future EU strategies such as the EU Biodiversity Strategy, the EU 2020 goals and Green Infrastructure efforts. The next months will see several meetings and workshops that will propose a common vision based on the **ECONNECT** vision as to the establishment and "performance" of ecological networks in the Alps - a unified common vision appears essential in streamlining the next steps forward. Efforts are presently underway to capitalize on the results obtained in this project, this includes examining various future funding options and also in making sure that the results and tools from this project will be available for future initiatives. It appears essential to better integrate the established pilot regions in all future Alpine-wide initiatives and actions. Based on our experience in this project it can be detrimental to the overall goal of an Alpine-wide ecological network to separate local from the Alpine-wide actions. Certainly, in upcoming initiatives the integration of other essential sectors that markedly influence the decisions in respect to ecological networks in the Alps can be improved on. This urgently calls for trans-sectoral funding schemes, the development of a common language and a thorough evaluation process. This will require considering the actual costs engendered by destroying the ecological continuum in the Alps and developing and integrating metrics for ecosystem services in future ecological network initiatives and projects. Interestingly, **ECONNECT** has also clearly demonstrated that while a scientific basis for some of the most pressing questions related to the ecological network actually available, this information has not reached the actors in the field. Here a process of information dissemination and translation needs to be realized. This booklet clearly demonstrates the complexity and multi-faceted aspects in implementing ecological network in the Alps, no simple solution can be expected and this implies the need for novel approaches. The usual backward looking approach of investigating the past and generating selective and singular predictions and solutions for the future, is only sufficient for "tame problems", but in order to address the complex issue of the ecological continuum it appears necessary to apply a forward reasoning approach which identifies possible future scenarios and integrates uncertainties.

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