The Continuum Project

CATALOGUE OF POSSIBLE MEASURES TO IMPROVE ECOLOGICAL CONNECTIVITY IN THE ALPS

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The Ecological Continuum Project was started in June 2007 by ALPARC (Alpine Network of Protected Areas), CIPRA (International Commission for the Protection of the Alps), ISCAR (International Scientific Committee Alpine Research) and the European Alpine Programme of the World Wide Fund for Nature (WWF) with the aim of maintaining or restoring ecological connectivity between important areas for nature conservation in the Alps. The project is financed by the Swiss MAVA Foundation for Nature.

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I INTRODUCTION

This catalogue of measures has been elaborated in the frame of the Ecological Continuum Project. It lists a number of exemplary measures from the various Alpine countries that can contribute to the implementation of ecological networks.

Nature protection in protected areas alone is not sufficient for the long-term conservation of Alpine biodiversity. Successful nature protection and the associated conservation of biodiversity require ecologically compatible action across the entire space, particularly outside protected areas. The landscape can be enhanced through targeted measures and support programmes which focus on nature conservation. These can contribute to the implementation of an ecological network by facilitating the connectivity of habitats and protected areas.

An ecological network is made up of different components: alongside core zones, there are also connecting elements and buffer zones. These connecting elements may be linear (e.g. corridors such as hedges, forest strips or appropriately maintained streams) or patch-type (e.g. stepping stone biotopes). A key characteristic of these elements, however, is that they are not clearly defined and demarcated areas, and nor do they necessarily enjoy protected status. On the contrary, highly diverse spaces and structures within the landscape can take on this role if they are designed in an ecologically compatible and functional manner and are managed appropriately.

The measures listed in this catalogue therefore have a very important role to play. They offer examples of how, using targeted measures and actions, areas and structures can be created, conserved or restored so that they act as connecting elements within an ecological network. Suitably adapted practices are also listed here. Very often, minor changes can be introduced to greatly enhance the functionality of individual spaces, without prohibitions or restrictions needing to be imposed.

Nature conservation measures in particular can also contribute to the development of a biotope network. To this end, they must be implemented within the framework of a biotope networking project, which means considering the requirements of the biotope network from a broader spatial perspective and implementing the project in areas of particular importance for ecological connectivity, or targeting particular species.

The catalogue of measures has been developed as a tool to support the work in the pilot regions of the Ecological Continuum and the ECONNECT projects. However, it can and should also be used by other regions and actors in and outside the Alpine space who want to improve ecological connectivity. The catalogue is intended to offer stakeholders examples and ideas and also provides practical information such as the names of contact persons and references. In addition, the descriptions of the various measures include a brief evaluation of economic and ecological aspects wherever the authors had sufficient information available for this purpose.

A key characteristic of the catalogue is its practical approach. Its content should therefore not be regarded as scientifically-based research, but as a source of inspiration that will bring

users closer to the topic of “ecological networks”. It identifies practical examples and can thus act as a valuable source of ideas for users in the pilot regions. The catalogue also provides an overview of the various sectors and areas where measures to improve ecological connectivity could be beneficial.

The catalogue should not be regarded as a complete and definitive document; on the contrary, it should be supplemented and enhanced on an ongoing basis with new examples, especially those based on practical experience gained in the individual regional projects being implemented in the pilot regions.

1. Preface

This catalogue of measures does not offer a precise scientific analysis of the listed measures. Rather, the catalogue is primarily intended to introduce the user to as broad and diverse a range of measures as possible that could contribute to the implementation of the biotope network. As conditions (e.g. geographical and socio-political) in the Alpine countries vary very widely, some descriptions may be very general in scope or may only be of marginal relevance to the actual situation in another Alpine country. The authors’ descriptions and evaluations of the individual measures are based on information from various relevant publications, project descriptions, extensive Internet research, personal experience and surveys of experts and project workers. The individual examples given are therefore representative of many other similar measures. As it is very difficult to undertake a uniform assessment at this benchmark level, some of the authors’ own evaluations of individual measures should regarded not as scientifically validated data but, at best, as a broad approximation of scope and contexts.

2. Catalogue structure

The catalogue of measures consists of the following three core elements:

- A brief explanation of the various sectors of particular relevance to measures aimed at improving ecological connectivity, and a list of measures with a brief description.
- A more detailed description of the individual measures in the form of a profile, along with an evaluation of the measures according to various social, technical, ecological and economic criteria.
- An Excel table with summarised descriptions of the measures, which can be used as a database and tool for the targeted selection of individual, situation-appropriate measures.

The ensuing simple evaluation of the table summarises some of the conclusions from the evaluation of the measures so far contained in the catalogue. A selection of measures which the authors regard as particularly interesting in terms of their innovative approach, originality or exemplary implementation are described in more detail in the Annex, with reference to specific examples or projects.

2.1 Profiles

The measures, which are sub-divided into sectors and sub-sectors, are numbered individually and are thus clearly identifiable. The number can be used to search specifically for a particular measure in both the profiles and the table.

In order to standardise, as far as possible, the way the individual measures are presented and thus facilitate comparability between them, it was decided that the descriptions and evaluations of the individual measures should take the form of a profile. Since the range of different measures is very broad, it is not always possible to achieve complete coherence between the categories chosen for the profile; more detailed information can, however, be accessed via the references and links provided.

The differing situations (the differences between the individual countries and also between regions; the very different local requirements; considerable dependence on the specific starting conditions) mean that some of the authors' estimations, such as the costs or the time of realisation of individual measures, are often merely rough guidelines or cannot be quantified reliably on a generalised basis. This should be borne in mind by users.

As regards the individual categories:

- The main types of areas have been defined in accordance with the methodology which was also developed within the framework of the Continuum Project (this can be viewed under: Assessment report "Evaluation of Approaches" - http://www.alpine-ecological-network.org/index.php/services-mainmenu-8/downloads-documents). Further explanations of the species and habitat approaches can also be found in this document.
- Under participating stakeholders, both the stakeholders engaged in practical action (e.g. farmers) and those from authorities, associations and societies etc. who are involved in a broader sense, have been included under the collective term of "representatives/agents".
- The ecological impact and economic assessment of the individual measures have been drawn from experiences gained in particular projects and also, where available, from evaluations in scientific publications. It was not possible to undertake an in-depth analysis of all the scientific literature for these assessments, and it should therefore be expressly understood that these are the authors' evaluations only.

2.2 Table

The table is principally conceived as a digital tool that enables users to obtain an overview of the individual measures and select specific ones depending on what they need. The "Recherche" function can be used to combine criteria in different ways in order to select measures that fulfil certain conditions.

However, in order to better understand the table and its structure, as well as its possibilities and limits, some basic points need to be borne in mind. Besides the information contained in the profiles, there are some other categories that can only be found in the table. This allows the individual measures to be assessed according to additional criteria which in some cases require appropriate explanations.

The most important area of application of the table is the digital version's evaluation of potential biotope networking measures in the individual pilot regions. The measures identified by a specific search must, nonetheless, be assessed by an expert – who is conversant with both the local situation and the locally agreed biotope networking goals – to verify that they can realistically be implemented in a pilot region. It is always necessary to adapt measures to the local conditions in each area, which may also result in modifications to the evaluation criteria in the table.

2.2.1 Fundamental aspects of using the table

The table contains highly condensed information. This must be taken into account when using the "Recherche" function since the data in the table have gone through several stages, with the complexity of the information being reduced in each one. The entire range of possible forms of the individual aspects, even in relation to a single measure, is therefore no longer visible. Although the respective profiles contain more detailed information on the measures, even these are sometimes based on individual project examples in which complex issues have had to be summarised in a very simplified way.

This can mean, for example, that even when the time to realise the impact of a particular measure has been specified in the table as very long (several years), individual successes can, nonetheless, already emerge after a short period. This can be true of long-term projects, such as the revitalisation of streams; the long-term goal will certainly take several years to achieve, but individual small-scale interventions (e.g. the introduction of deadwood) can have a positive impact within a short space of time. Of all the various possibilities, the "most probable" or relevant option is shown in the table in each case.

This is true for almost all the categories in the table, particularly with regard to the costs and ecological impact of the individual measures. Users should therefore always work with the underlying information in the profiles as well, and should view the data in the table more as a source of ideas and inspiration rather than "truths". In any event, the planning and practical implementation of measures will require further research.

Essentially, searches within the Excel table are only possible in the columns containing the word "Recherche". Columns without the "Recherche" function contain further data which, although they cannot be queried directly, do provide important additional information. Searches for measures fulfilling particular conditions can be made increasingly specific by selecting several criteria, and can also be modified accordingly if required. Several filters can be used in different columns to make the selection criterion more precise. It should be noted here that after completing a search using the filter function, the previous filter(s) must first be re-set to "All" so that all the options are available again for a new search.

2.2.2 Evaluations in the table

The four evaluation levels of "high", "medium", "low" and "no direct effect" have been applied to the "ecological impact" and "socio-economic impact" categories. In terms of "ecological impact", this scale has been set in such a way that the more frequently a measure's positive effects on biodiversity, and on ecological connectivity in particular, have already been verified

in scientific studies and projects, the higher its impact is estimated to be. Conversely, the impact has been rated as low if the evidence is scarce.

Accordingly, an evaluation of “high” in terms of economic impact means that there is a possibility of making or saving money through this measure, and vice versa. Direct positive effects, as well as indirect ones such as job creation possibilities or contributions to regional development, are all included under socio-economic impact.

It should also be borne in mind that the “socio-economic impact” criterion, in particular, is a rough estimation that has in some cases been made on the basis of individual projects. Consequently, the situation can deviate widely in individual cases. The costs were often difficult to research as well, partly due to the fact that the actual costs of all the measures are highly dependent on a number of different factors and therefore vary widely. The situation at the outset, the size of the area and the specific conditions in a particular area all play an important role. These estimations are therefore rough ballpark figures and should not be regarded as firm amounts.

The same is true of ecological impact, which is also determined by the actual conditions in the area at the outset, and depends on whether the measure fits the respective context, whether it has been planned and implemented with care, and whether it has been appropriately regionalised. The evaluation in the table only provides an approximate indication and this may be different on actual implementation.

II THE IMPORTANCE OF THE VARIOUS SECTORS FOR THE BIOTOPE NETWORK

The task of safeguarding the areas necessary for the implementation of a biotope network can be undertaken in various ways. The areas of importance for ecological connectivity may be granted protected status, purchased by relevant institutions (e.g. nature conservation organisations, local authorities or rural associations) or leased on a long-term basis. These are undoubtedly the most effective instruments to secure the individual elements of a biotope network in the long term. However, it is not possible – and nor is it always appropriate, in terms of the objectives to be achieved – to protect all the areas within a network of interlinked biotopes in this way. Instead, the focus should be on creating good and conducive conditions for species-appropriate mobility of flora and fauna across as wide an area as possible. For that reason, other ways must be found to preserve the areas of relevance to the biotope network in an appropriate form so that they can perform their ecosystem function. The measures identified in this catalogue can make a contribution to this process.

Specific agricultural, forestry, landscape conservation and other measures and programmes aimed at ecological improvement can offer important support here. Often, individual elements also contribute to better connectivity of habitats. In the Alpine countries, numerous programmes and measures exist which are regulated – depending on the country and the legislation in place – at national or other level (cantonal, state, regional or local). In the agricultural sector, for example, support programmes and measures exist for specific extensive management methods, the planting and maintenance of hedges and other structural elements, and eco-friendly cultivation techniques (with a focus, for example, on field margins, crop rotation, and harvest dates/methods). These measures may directly aim to create transit structures and connecting elements or, more generally, seek to improve the permeability of certain landscape elements for the migration of fauna and flora, so that these serve as connecting areas within a biotope network.

In other areas too, such as forestry, spatial planning, hunting and fishing, water resources management, traffic and infrastructural planning and, indeed, more remote sectors such as environmental education and public relations work, more intensive efforts are under way to take account of and raise awareness of the importance of connectivity and habitat networking.

1. Relevant Sectors for the Implementation of Measures

1.1 Nature conservation

In general terms, it can be noted that all nature conservation measures can be deployed in the context of biotope network projects as well, either because they contribute to the preservation of specific habitats – which play an important role as core zones but also as transitional habitats or stepping stones in the biotope network – or enhance the quality and thus the permeability of a landscape matrix on a punctual basis or at specific conflict points and thus create connecting areas and/or structures.

The implementation of biotope networking measures, such as adapted use and management and the implementation of development and optimisation measures, can be regulated through contract-based nature conservation agreements. This applies not only to spaces which have been secured through designation as protected areas or through purchase, but especially to the other areas. The aim, however, should be to achieve as long as a contract period as possible.

Specific species protection measures for selected target species (e.g. beaver or wood grouse (capercaillie), as described in the catalogue) can also be used to support biotope network projects.

1.2 Agriculture

Farming and forestry are currently practised on around one-quarter of the whole Alpine area. The different management methods, cultures and lifestyles have helped to create landscape diversity but also diversity of fauna and fauna. For that reason, the continuation of what is in some cases very small-scale mountain farming and forestry is essential for the preservation of the Alps' unique habitats and associated biological diversity and goes beyond the straightforward generation of agricultural and commercial value-added.

Measures and programmes in the agricultural sector can help to make farmed areas more attractive as a habitat for diverse flora and fauna or connect suitable habitats. Ecologically significant areas can be taken out of cultivation, or can be cultivated using particularly eco-friendly methods to make them more hospitable and permeable for flora and fauna. The conservation and management, or indeed the creation of certain landscape structures such as rock fragment piles, pollards or species-rich field margins make a key contribution to the functionality of the agricultural landscape. However, these additional services provided by farmers must be appropriately rewarded/compensated.

1.3 Forestry and hunting

In terms of area used, forestry is the second largest sector in the Alpine regions. Forest covers more than one-third of the land area and is thus a dominant landscape feature. Its significance as a living, recreational, natural and economic space is widely acknowledged. Forests also have an impact far beyond their actual limits and are responsible for a wide range of ecosystem services (water and soil protection, climate, natural disasters). As they cover large areas, many of them contiguous, and due to their specific properties, forests play a key role both as a habitat and as a corridor for numerous forest-dependent species.

A forest's suitability and thus its quality as a corridor vary according to the type and intensity of use. If a forest is not used too intensively (and this is generally the case in the Alps due to relief and general conditions), and if it is not subject to too much intensive leisure and recreational use, it can be used as a corridor by relevant forest-dependent species. Numerous factors play a role in determining forest quality and its suitability as a connecting element: the proportion of deadwood and old growth, the structure of the forest edges, the connectivity of valuable biotopes within forested areas, and the selection and mix of tree species.

Appropriately adapted hunting also plays an important role in preserving a near-natural forest and therefore also optimum living and dispersion conditions for as broad a range of species as possible.

1.4 Tourism

The tourism industry is a key factor in landscape changes in the Alps, e.g. through the creation of large ski resorts and associated infrastructure or the construction of second homes. This has numerous direct ecological impacts on the environment, such as the often dramatic restructuring of the areas used for tourism. This causes a loss of traditional biodiversity, which is often replaced by less demanding and more tolerant species from non-Alpine regions. The relief, soil structure and hydrological regime are affected as well.

In addition, tourism has numerous indirect impacts, notably the expansion of settlement areas and infrastructure. This causes fragmentation of habitats and landscape and the sealing of soils. Then there is the traffic associated with tourism, and its impacts on flora and fauna. The infrastructures and construction associated with mass tourism can constitute particular points of conflict within an ecological network if they are located in ecologically significant and sensitive areas or extend across a wide area. Here, the creation of suitable resting sites (quiet zones) or the adoption of specific policy strategies may be helpful.

1.5 Spatial planning

Spatial planning plays a key role in the implementation of an ecological network. Its task is to incorporate the results of all planning processes and studies on ecological corridors and habitat connectivity into the relevant tools. Through the integration of relevant data into broader concepts, or through physical construction measures, for example, spatial planning make a valuable contribution to the development of ecological connectivity in the landscape.

1.6 Transport

The transport infrastructure, alongside intensive land use and settlement areas, makes a major contribution to the fragmentation of habitats. Concentration of settlement areas mainly takes place at valley locations. In the implementation of a biotope network, the points of conflict between transport and migration routes should be identified and addressed at selected sites, either through the construction of appropriate crossing opportunities (wildlife crossings, tunnels), prevention of accidents through the use of fences or other measures such as periodic road closures (e.g. during amphibian migration periods) and traffic-calming (bans on heavy haulage, decommissioning of roads, speed limits).

1.7 Water resources management

Watercourse systems and their wetlands can act as important large-scale corridors. In order to perform this function, however, the quality of the flowing waters and their riparian zones plays a key role: in particular, this involves near-natural banks and wetlands which are able to perform their major connective function on a permanent basis. The numerous barriers – in the form of sills, dams, weirs, etc., which fragment the rivers – must also be given particular consideration in the context of biotope network projects.

1.8 Environmental education and public relations work

Environmental education and public relations work are often neglected in many projects. However, informing and sensitising stakeholders and, indeed, the population at large can make a major contribution to the long-term success of biotope network initiatives and are therefore key aspects to be considered when planning ecological connectivity projects.

2. Natura 2000

The main objective of Natura 2000 is to create a coherent European ecological network of habitats and characteristic species in the EU member states. Natura 2000 therefore aims to achieve a coherent and functional habitat and biotope network. The Habitats Directive calls on member states to maintain and where appropriate develop connecting features of the landscape with a view to improving the ecological coherence of the Natura 2000 network (Articles 3 and 10). This does not create any obligation to designate new protected areas but

means that in addition to the Natura 2000 areas, the need for connecting elements must be considered in landscape planning.

The legal basis for Natura 2000 comes from Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) and Council Directive 79/409/EEC on the conservation of wild birds (Birds Directive). The EU-wide network of protected areas is intended to help preserve the European natural heritage in all its diversity. Natura 2000 also aims to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest, as listed in the Annexes of the two Directives. In order to ensure that they are representative, biogeographical regions based on the species' distribution areas are defined as a frame of reference. The Alpine arc, together with other European mountain regions, forms the Alpine biogeographical region.

Another important aspect of Natura 2000 in relation to ecological connectivity is the obligation to maintain, on a permanent basis, favourable conservation status of the species and habitat types through appropriate protection and development measures. For all areas of Community interest, measures must be identified to maintain the natural habitat types and species defined in the Directive, and these measures must be specified in appropriate management plans. One criterion for judging conservation status is ecological connectivity. As a means of guaranteeing implementation, the provisions of both the Habitats Directive (Article 17) and the Birds Directive (Article 12) require member states to draw up a report at regular intervals for the European Commission on the implementation of the measures taken under the two Directives. The Habitats Directive specifies that a report on the status of the elements of the Natura 2000 network must be submitted every six years. To that end, member states are required to undertake surveillance of the conservation status of the natural habitats and species of Community interest (Article 11 of the Habitats Directive). This surveillance should also take place outside Natura 2000 areas, as its purpose is to monitor the conservation status of the natural habitats and species with particular regard to priority natural habitat types and priority species, regardless of territorial context.

With these legally binding provisions and objectives, a range of instruments to promote ecological connectivity has been made available in the context of Natura 2000. The planning and implementation of measures to improve ecological connectivity must therefore be viewed in close association with Natura 2000. Furthermore, management plans and reporting and monitoring obligations within the Natura 2000 framework can make a targeted contribution to biotope connectivity, and have therefore been included in this catalogue of measures.

III OVERVIEW OF MEASURES

1. Nature Conservation

1.1 Biotope protection measures

1.1.1 Conservation, management and creation of new standing water bodies

Standing water bodies are refuges for rare protected aquatic plants and animals (amphibians, reptiles, birds, etc.) and are therefore key elements of a biotope network. At appropriate sites, they can be networked with other wetlands and with flowing waters. Despite many new creations, small water bodies still count among the most endangered landscape elements, making their conservation particularly important. Management interventions may be helpful in keeping smaller standing water bodies clear; they may also be conducive to various siltation stages and beneficial to habitats and the transformation of nutrient-rich and silted-up water bodies into near-natural ecosystems. The creation of standing water bodies (e.g. as protected areas for amphibians) is also an option, although conservation should take precedence over the creation of new small water bodies.

1.1.2 Controlling invasive species

Invasive species are alien plants and animals that have negative impacts on other species, biological communities or biotopes and thus pose a threat to biodiversity. Invasive species may also cause economic problems (e.g. when present as weeds) or health problems (such as allergies and diseases). Hybridisation with native species can also occur. In the context of ecological connectivity, particular account must be taken of invasive species as they are able to use the emerging connecting bridges in the landscape to penetrate into new areas. In the case of invasive neophytes, this applies especially to stream margins and riparian zones (distribution along collapsed river banks and via erosion and flooding), which, as natural connecting elements in the landscape, are also important elements of the biotope network. It should be noted that depending on the species and starting conditions, very specific measures may be required.

1.1.3 Restoration of wetlands

Wetland habitats are especially species-rich and are a dominant feature of the landscape structure in the Alpine region and the pre-Alps. Wetlands also provide a habitat for numerous rare and highly endangered species (e.g. the Azure Hawker (*Aeshna caerulea*)) and are therefore important elements of a biotope network. Wetland restoration measures can bring about an improvement in the hydrological regime of degraded wetlands and generally enhance habitat quality. Peat growth resumes in the rewetted areas, allowing an increase in typical wetland species. Rewetting can include impounding measures, e.g. blocking drainage

ditches, changes in the type of use, and management measures such as the removal of tree and shrub cover.

1.2 Species conservation measures

1.2.1 Creation of quiet zones for breeding birds by flowing waters

The structures associated with flowing waters, such as gravel banks, provide important habitats for a number of species which breed on gravel areas (e.g. the Common Sandpiper (*Actitis hypoleucos*) and Little Ringed Plover (*Charadrius dubius*)). These areas are often used for recreation and sporting activities. Management strategies, such as the creation of quiet zones for breeding birds at particular times (including bans on access), can cut through existing conflicts and contribute to habitat improvement. Relevant measures can include the adaptation and development of infrastructure, the creation of observation points, and channelling of and information for visitors using info-boards and signage.

1.2.2 Taking account of bat roosts during the restoration and renovation of old buildings

Because of its near-natural state and landscape diversity, the Alpine area is characterised by a fauna rich in bat species. Many species of bat are heavily dependent on buildings for their roosts because natural hiding places have become rare in woodlands as a result of intensive forms of cultivation. During the restoration or renovation of old buildings, disturbances to the bats and their roosting places can therefore easily occur. Appropriate measures during the restoration or renovation of old buildings can help to preserve and even improve bat roosting places. There is already a wealth of experience among bat experts, who often provide support during the renovation of buildings. Targeted consideration of relevant information on the ecology of roosting places of various species of bat can thus make a major contribution to habitat connectivity.

1.2.3 Specific species conservation measures: wood grouse (capercaillie)

The wood grouse (capercaillie) (*Tetrao urogallus*) is a characteristic species of light, structurally rich boreal and montane forest habitats. Due to its extensive spatial and specific habitat requirements, it is regarded as an umbrella species for the high-montane community. Acutely endangered as a result of habitat losses and degeneration, it is a target species under the EU Birds Directive. The species therefore plays a key role in nature conservation and spatial planning, not only from a conservation but also from a socio-cultural and socio-economic perspective. Due to its habitat requirements, support measures for capercaillie contribute directly to the implementation of biotope network concepts, e.g. through the creation of mosaics of different habitats and corridor and stepping stone structures.

1.2.4 Specific species conservation measures: beaver

Hardly any other species shapes and influences its habitat as actively as the beaver. The beaver makes burrows in riverbanks, builds dams, and fells trees. Before humans began to shape the landscape actively through their land use, there was a broad network of pools, created by beavers, along the watercourses. Many other species of fauna have developed in a water landscape which the beaver has done much to create. And yet the beaver was on the verge of extinction in Europe. It is now progressively recolonising numerous watercourses, also in the Alps. Since its return, the beaver is bringing many of the watercourses made moribund by human activity back to life and restoring their dynamism. It creates a mosaic of new habitats and structures by opening up vegetation, promoting deadwood, and creating pools and dams. This results in more attractive landscapes and a biotope network along the watercourses and helps to improve watercourse and flood protection.

1.3 Natura 2000

1.3.1 Production of Natura 2000 management plans

Binding provisions apply to the implementation of Natura 2000 areas (protected areas under the Habitats Directive and Birds Directive). They include a requirement to produce management plans defining mandatory conservation measures for the area in question. The plans consist of a basic part and a section containing relevant measures, which describes which species and habitat types contribute to the specific ecological value of the area and the conservation objectives that this creates for the area concerned. This gives rise to an obligation to maintain and where appropriate develop connecting features of the landscape with a view to improving the ecological coherence of the Natura 2000 network (Articles 3 and 10). Member states are also required to take measures to improve the connectivity of the Natura 2000 areas outside these areas themselves (Article 10).

1.3.2 Reporting duties and general monitoring in the Natura 2000 framework

The designation of Natura 2000 areas creates an obligation to maintain, on a permanent basis, favourable conservation status of the species and habitat types through appropriate protection and development measures (management plan). To this end, member states are required to draw up a report every six years on the implementation of the measures taken under the two Directives. The Habitats Directive also requires member states to undertake surveillance of the conservation status of the natural habitats and species of Community interest. The reports should therefore include the key findings of this surveillance. Consideration should also be given to improving the ecological coherence of Natura 2000 outside the designated Natura 2000 areas.

2. Cultural Landscape

2.1 Creating and maintaining diverse structures

2.1.1 Preservation, maintenance and replanting of hedges

Hedges are linear biotopes. They contribute to biodiversity and biotope connectivity, especially in heavily cleared landscapes with a small amount of, or no, forest or grassland. A healthy hedge with structural diversity provides a habitat for a large number of animals and is an important transit route for numerous small mammals and insects during migration and dispersion and when searching for food. Nowadays, hedgerows have virtually no commercial use and the trimming required for their regeneration tends not to take place. This means that a conscious decision must be taken to maintain the hedgerows as part of a biotope network as ageing hedges accommodate a far smaller number of species.

2.1.2 Planting of individual trees or tree groups

Individual trees and small tree groups are a key element of the landscape and have high ecological significance. They provide habitats and refuge for many different animal species and are therefore valuable stepping stones in the biotope network. They also enrich the appearance of the landscape (e.g. by visually enhancing large areas of farmland) and increase its recreational value (e.g. by providing shade for seating areas). Due to their cultural and historical value, too (e.g. as symbols of peace, or where they had a role in the execution of justice), individual trees have landscape significance. Old trees in particular should be preserved in farmland, one reason being that their cavities provide particularly valuable micro-habitats. The planting of new trees can also be supported.

2.1.3 Creation and maintenance of dry stone walls

Dry stone walls are traditional landscape elements. They provide various types of habitat depending on their specific micro-climate, especially for thermophilous (warmth-loving) open-country species. The cracks in the walls, which are filled with fine earth, provide specific micro-habitats in which various plant communities and wild flora occur. Dry stone walls are also important habitats for insects, reptiles and amphibians, and provide breeding sites for birds (e.g. wheatears (*Oenanthe*), Black Redstart (*Phoenicurus ochruros*), Blue Tit (*Cyanistes caeruleus*), and Great Tit (*Parus major*)). They constitute valuable stepping stones and insular biotopes in the agricultural landscape and due to their linear structure, have a connective effect. Other near-natural structures such as pioneer areas and margins should also be preserved along dry stone walls.

2.1.4 Creation, maintenance and preservation of rock fragment piles

Rock fragment piles are important structural elements of the landscape. From a nature conservation perspective, they constitute valuable stepping stones and insular biotopes in the agricultural landscape. A wide diversity of flora and fauna (insects, spiders, amphibians, reptiles and even small mammals) depend on these man-made habitats as their original habitats have disappeared in today's cultural landscape. These ecologically valuable structural elements must therefore form a key part of future landscape planning. As far as possible, the rock fragment piles should be created near waysides or forest edges or by hedgerows, not in an isolated position, in order to safeguard connectivity with a biotope network.

2.1.5 Maintenance and preservation of mixed orchards

Mixed orchards are a characteristic and attractive feature of the cultural landscape in many Alpine regions and are among the most valuable patch biotopes. Due to the structural diversity in mixed orchards and the resulting diverse mosaic-type habitats, they provide a habitat for a wide range of species of flora and fauna, including the Little Owl (*Athene noctua*), various insects such as butterflies, bees and beetles, spiders, and insectivores such as hedgehogs, bats and birds. Scientific studies have shown that mixed orchards – unlike modern dwarf-tree intensive production systems – form very richly structured habitats with species-rich communities. As a result of their declining economic significance, and being fairly high-maintenance, however, more and more mixed orchards have been cleared in recent decades or have fallen victim to ageing. However, in intensively used agricultural landscapes, they constitute important connective structures in the local biotope network and are also suitable for replanting as part of a biotope networking strategy. The conservation measures for these areas must include arrangements for mowing, fertilising, management and maintenance, and the preservation of ageing trees.

2.1.6 Encouragement of unpaved paths

Depending on their type and the way in which they are built, paths can have a low to high barrier effect. Pathway systems and their peripheral areas do not necessarily have a fragmenting effect on species of flora and fauna, however: if properly designed, they can also form important elements of the biotope network. They provide ways through the landscape and also form buffer zones to intensively farmed areas. From an ecological perspective, unpaved and "greened" paths and the strips of grass and vegetation, wooded areas, hollows, ditches etc. at their margins are extremely important. If the construction of new pathways is unavoidable, the need for sufficiently wide wayside areas should be taken into account during the planning process. Sunken paths, too, have diverse ecological functions as they provide many niches for flora and fauna with highly diverse requirements.

2.2 Resumption and continuation of old forms of use

2.2.1 Maintenance and restoration of traditional irrigation systems

As early as the Middle Ages, complex irrigation systems were created in various Alpine regions with low precipitation, in order to bring water from the mountains to the farmed areas in the valleys, often at some distance away. These artificial water transportation systems, often many kilometres in length (e.g. the “suonen” channels in Valais, Switzerland, the “acquedotti” in Val di Non (Trentino/Italy) and the “waale” in South Tyrol) are important landscape features with great significance for various associated habitats (lines of trees, mosaics of wet, semi-dry and dry sites). The conservation, restoration and maintenance of these elements are supported on a project basis or through the payment of maintenance premiums.

2.2.2 Grazing projects – landscape conservation with sheep

For a biotope network with nutrient-poor and dry sites, sheep grazing plays a key role. Due to their lack of economic viability using conventional cultivation methods, there is often a risk that these valuable biotopes will cease to be managed and maintained. Furthermore, these areas are in many cases being drastically reduced, with remaining oligotrophic grasslands often becoming isolated. Site gradients are being lost, successional processes terminate at stages of maturity, and there is a lack of new pioneer sites. Traditional grazing using sheep can ensure the sustainable management of these sites. To this end, testing and development of practicable area management methods are required in cooperation with sheep farmers and landowners.

2.2.3 Preservation of an open landscape through controlled burning

Open-country habitats such as embankments in wine-growing areas or terraced landscapes, dry grasslands, heaths or peat bogs are ecologically valuable areas. However, as they are often only of marginal suitability for agricultural use, and are costly and time-consuming to maintain, they are at risk from bush encroachment or the occurrence of problematical vegetation (e.g. Goldenrod (*Solidago virgaurea*) and blackberry). This impacts on the appearance of the landscape and on the ecological functionality of these areas. The maintenance of these areas through controlled burning may be a viable and cost-effective option here. However, this management technique will only be successful, from a nature conservation and technical perspective, if the personnel undertaking the measure are properly trained, as practical implementation of controlled burning requires strict adherence to procedural guidelines.

2.2.4 Tree maintenance and preservation of pollarded trees

Pollarded willows are characteristic elements of the landscape in various Alpine regions. The unusual shape of the heads of the trees is created when the young trunks and main branches are cut back to promote a more bushy growth of foliage. At the head of the trunk,

cavities are formed over time, and in the branches, the bark and especially the cavities, numerous species find a habitat and niches in which to breed. As many as 200 species of fauna can occur in the willows found in intact river meadows, for example. In the past, pollarded willows provided a source of wood, e.g. for fencing, shafts for tools, bindings for wine, basket-making etc., but they have no current value from this perspective today. In the context of large-scale agriculture, too, stands of pollarded willows are often regarded as a nuisance and are therefore removed. The management of pollarded willows is time-consuming and labour-intensive, and if they are not maintained, the trees often break apart. In networks of interlinked biotopes, they constitute important stepping stones and transit routes.

3. Agriculture

3.1 Use of grasslands

3.1.1 Set-aside

Set-aside areas distributed across the agricultural landscape can create high-quality habitats for wild fauna and flora and thus contribute on a sustainable basis to the conservation of characteristic communities in open farmland. Diverse vegetation structures, e.g. areas of wild herbs on agricultural fields, provide important areas for resting, breeding, feeding, mating or cover and provide overwintering areas for insects and spiders. They can compensate for the loss of former near-natural habitats and take on regulatory functions. They also act as a buffer to other habitats and due to their insular distribution, are important elements of the biotope network in the otherwise intensively used agricultural landscape.

3.1.2 Extensive use of grasslands

Extensively used grassland is extremely important for the biotope network due to its species richness. Alongside direct extensivisation of use (e.g. zero to moderate fertilisation, no use of plant protection products, no ploughing up of grassland or sowing), low frequency of cutting (max. 2-3 times a year), together with later cutting and specific mowing techniques can also help to improve biotope functions. High cutting (mowing height 10-12 cm) can protect amphibians, ants and ground breeders. By using mosaic and phased mowing (i.e. mowing at different times on different areas), and by leaving peripheral areas unmown, food sources can be created for insects (especially bees) as well as refuges for wild fauna.

3.1.3 Species-rich seeding on agricultural fields

Species-rich seeding of wild and cultivated plants on set-aside or other areas (e.g. "green" areas created in compensation for natural spaces lost through construction of roads etc.; fallow land in residential areas), can enrich the landscape’s appearance and make a valuable contribution to the biotope network. Seeding with wild species provides a source of food and cover for wild fauna and, depending on the mix of seeds used, can also provide habitats for

insects (butterflies, bees, ground beetles, spiders). Sown areas are also used by hedge dwellers (e.g. the Red-Backed Shrike (*Lanius collurio*)) as substitute habitats. Seeding should take place from mid-April to the end of June, and depending on the condition of the site, may require preparatory measures (e.g. removal of weeds, ploughing etc.). Suitable seed assortments are commercially available.

3.2 Extensivisation of agricultural use

3.2.1 Promotion of organic farming

Many endangered species of fauna and flora are dependent on agricultural habitats, so in terms of conserving biological diversity, extensivisation of agricultural use should be the aim on ecologically significant areas. In this context, organic farming has an extremely important role to play, one reason being that it avoids and reduces the environmental stresses which can otherwise arise in farming. Furthermore, the targeted creation of landscape elements (ecological compensation areas such as hedgerows, fallow areas, forest strips and extensive meadows) make an important contribution to the promotion of biological diversity. These areas are also important elements of a biotope network.

3.2.2 Extensive agriculture

Agricultural extensivisation measures include extensive and diverse crop rotation, reductions in the use of mineral fertilisers and chemical plant protection products, suspension of cultivation during breeding periods, and reduced density of grain sowing. Winter vegetation as well as green strips and patches of flowering plants can make a contribution to the extensivisation of use in the farmland biotope. In the long term, such measures promote the conservation and improvement of ecologically valuable habitats on farmland sites, especially for field breeders and wild herbs on agricultural fields. By upgrading farmland as a habitat, extensivisation measures make an important contribution to the biotope network. Extensively used areas are important insular and stepping stone biotopes, especially in an intensively used agricultural landscape.

3.2.3 Reduction or targeted use of fertiliser, pesticides and herbicides in agriculture

Appropriately managed agricultural spaces can act as stepping stone biotopes and connecting areas in a biotope network. As a rule, these areas, if they are to fulfil their function, must be managed extensively and in an ecologically compatible way. Non-use, or at least highly targeted use, of fertilisers, herbicides and pesticides encourages the development of appropriate characteristics and, even if no biotope networking strategy is in place, can help to introduce more biological diversity in the landscape matrix.

3.3 Special programmes for agricultural areas

3.3.1 Species-rich Grasslands Programme

The species inventory of a grassland reflects the way in which it is managed and its location. If the management method remains unchanged, the species composition will generally remain unchanged as well. This correlation opens up the opportunity to link subsidies for extensive grassland to the occurrence of key species of flora. In order to implement this innovative, results-oriented approach, a list of meadow flowers serves as a simple tool for reliable identification of extensive species-rich grassland. Promotion depends on the occurrence of certain easily identifiable plant species (indicator plants). Participating farmers undertake to preserve the species richness of their grasslands (meadows and pasturage). Farmers retain the choice of practices and resources to be used, so that biodiversity is not seen as a constraint: it calls upon their technical skills and sense of responsibility. They are also sensitised to issues such as nature conservation and biodiversity.

3.3.2 Agricultural field margin projects

Agricultural field margins are managed strips, a few metres wide, along agricultural fields. They are cultivated without the use of pesticides so that wild herbs and the fauna adapted to them are able to disperse and survive. In some cases, the strips are sown with a mixture of flowering plants (“blossoming belts”) or planted with shrubs and trees. The agricultural field margins not only provide a habitat for rare species of plant and contribute to the protection of soils and water resources; they also constitute important linear transit routes and form buffer zones between various forms of use.

4. Forestry

4.1 Restrictions on use

4.1.1 Creation of forest reserves

Areas of woodland which are particularly valuable in nature conservation terms are important elements of a biotope network; these include areas with remnants of potential natural vegetation, old-growth forest, coppice forest and special sites (river-meadow and humid forests, gorges, steep slopes). Natural forest reserves can constitute an important tool in maintaining a representative network of forested areas of appropriate quality. Here, the various stages in the development of forest structures and their typical fauna and flora can be maintained, without use, in the various natural forest communities and habitat types. They also act as significant biotopes or stepping stones in a more or less relatively non-natural environment.

4.1.2 Calming measures for forests that merit protection

Forests are increasingly being used for recreational and leisure purposes by individuals and groups seeking an experience of nature. This can have negative impacts (e.g. noise, creation of informal pathways), especially in forested areas which are valuable from a nature conservation perspective and which form important elements of a biotope network. Areas with remnants of potential natural vegetation, old-growth forest, coppice forest and special sites (river-meadow and humid forests, gorges, steep slopes) are particularly valuable in nature conservation terms and should be kept free from negative influences as far as possible. As a way of calming these areas, various measures can be adopted, including the targeted creation of circular pathways and infrastructural services (visitor and parking facilities) in areas of woodland which are less in need of protection, as well as the production of information boards and brochures and the development of educational pathways.

4.2 Resumption and continuation of old forms of use

4.2.1 Maintenance and management of coppice forests

Coppice forests are particularly species-rich habitats and make a contribution to the preservation of cultural and historical diversity. Newly coppiced areas of woodland are sunny spaces which are notable for their diverse habitat mosaic in a relatively small space. They thus contain important habitats for many species of flora and insects, as well as the Sand Lizard (*Lacerta agilis*) and Green Woodpecker (*Picus viridis*), and provide substitute habitats for the Hazel Grouse (*Bonasa bonasia*). Regular cutting on 3- to a maximum of 40-year-old rotation areas can improve the species inventory by promoting structural diversity and, in intensively used farmland, can serve as a stepping stone in the biotope network. Oak, birch, hornbeam, sycamore, black locust, sweet chestnut and black alder are the main species of tree found at colline to sub-montane altitudes. Coppice forests also play a major role in river-related ecosystems (e.g. grey alder coppice forests) and are particularly important elements of a biotope network here.

4.2.2 Extraction of timber: conserving stocks and soils

Extraction of timber is a major intervention in forest stocks and inevitably causes disturbance to flora and fauna. Despite careful planning and implementation, it is impossible to avoid damage to the remaining stands. Known as skidding damage, this can have sometimes considerable negative impacts on individual trees and on forest stands. Furthermore, extraction often also involves the creation of forestry roads, which have a fragmenting effect. In terms of landscape permeability, alternative methods of extraction (e.g. cable logging, horse logging etc.) should be given preference. The use of horses, in particular, causes less damage to stands and regeneration areas, and protects the forest floor as it does not leave tracks or cause widespread compaction of soils or oil pollution etc. Horses can also be used on slopes, and if sledges are used, can continue in winter.

4.3 Creation and maintenance of structures

4.3.1 Conservation of nest, hollow and biotope trees

In a commercial forest, besides the creation and maintenance of old-growth and deadwood islands, the conservation of specific individual trees (nest and hollow trees, trees with rotten sections or fungal infections, or bizarre trees) in the forest stand plays an important role. Between the old-growth and deadwood islands, these individual trees serve as stepping stones or transitional biotopes, especially for less mobile species of fauna in search of new habitats. These trees are particularly important in intensively used forest stands. They also help to safeguard, in the medium to long term, a sufficient high proportion of biotope trees in the forest. The definition of the number, distribution, species and characteristics of these trees must take place in line with local conditions.

4.3.2 Conservation and development of old-growth and deadwood islands

In the normal commercial forest, trees are grown for optimum timber quality and are felled before they reach biological maturity. However, many species of flora and fauna are dependent on old, very old and even dead trees. In areas of woodland, groups of trees should therefore be preserved beyond the commercial cutting interval in order to create old-growth and deadwood habitats. These old-growth and deadwood islands also perform an important role in ecological connectivity.

4.3.3 Structurally rich forest edges

The edges of forests and woodland are often located next to agricultural areas, lakes or rivers, open meadows, pasturage or roads and railways. Together with other structural elements such as hedges, forest strips or riparian strips, they are an important element of a biotope network. Due to their function as transitional zones, they provide a place of refuge and particularly valuable habitats. They are also important as stepping stone biotopes, e.g. for wild bees, beetles, bats, birds and hedgehogs. Valuable forest edges comprise a shelterbelt, shrub belt and herbaceous fringe. These three components vary in age and are layered and irregular in structure.

5. Traffic

5.1 Species conservation measures along transport routes

5.1.1 Measures for seasonal amphibian migration

Most amphibians in Central Europe undertake various migrations during their lives, including the seasonal spring migrations to their spawning grounds. They invariably encounter numerous barriers which they must overcome, especially the dense transport network where millions of amphibians are killed by vehicles every year. There are many measures which could be taken to protect amphibians during migration and to help reduce the barrier effects; these include warning signs for drivers; mobile seasonal fences for amphibians; substitute spawning grounds; temporary road closures; and permanent protection systems (amphibian tunnels), etc.

5.1.2 Underpasses for small animals

Underpasses for small animals are pipes made from concrete or steel which are incorporated into the road-body crossways or at angles as crossing aids for small mammals, amphibians, reptiles and invertebrates. Conduits obstruct animals' free access to the road and lead them to the underpasses. An uninterrupted link between the conduits and the underpasses is essential. The conduits should run parallel to the road, and should if possible be supplemented with guide structures placed at right-angles to the tunnel openings. These crossing aids for amphibians and small animals should be incorporated at an early stage during road-building and should be ready for operation before traffic is permitted to use the road. Retrofitting of these systems is rarely possible due to the high costs involved. The advantage of these permanent protection systems is that they work all year round and require very little management.

5.1.3 Warning systems for the prevention of accidents involving deer

This involves the installation of warning systems for the prevention of accidents involving deer at known deer crossing points. A network of infrared sensors covers both sides of the road to a distance of around 300 m. If an animal enters this area, it is detected by the sensors. These send an impulse to a traffic warning signal which lights up and warns approaching drivers of the immediate danger.

5.1.4 Green bridges/wildlife crossings

A wildlife crossing, or green bridge, is intended to serve as an aid to wild animals, enabling them to cross busy transport routes such as motorways, highways and even railway lines safely and thus mitigating the impacts of increasing landscape fragmentation. The position of these crossings is particularly important: wildlife crossings should be located at known animal crossing points or specific "conflict points" in the transregional transport network. In order to

screen the view of the transport routes to be crossed, the edges of the bridge are often planted with hedgerows, with much of the rest of the surface of the bridge being covered in vegetation as well. There are now numerous studies which provide information about required dimensions, vegetation, technical construction details etc.

5.2 Upgrading of associated infrastructural areas

5.2.1 Use of indigenous seeds and plants

During renaturation measures and other construction projects (construction of roads, railways and watercourses, and landscaping), but also in gardens and city parks, it is important not only to select site-appropriate species but also to use indigenous seeds and plants of local origin. The use of non-local seed may result in locally specific adaptations and regional biotopes being squeezed out or impaired, which may have a negative impact on other organisms, such as nectar-collecting and pollinating insects. Furthermore, some individual species may behave in an invasive manner. The use of indigenous seeds also helps to safeguard biotope-specific species diversity and promote native wild plants, thus contributing to the biotope network and the preservation of genetic diversity in line with the Convention on Biological Diversity (CBD).

5.2.2 Site-appropriate “greening” in road and watercourse construction and landscaping

When creating green areas during the construction of roads, railways and watercourses and landscaping projects, seed assortments are often used which, due to their species poverty, are not suitable for ecologically valuable “greening” or are not site-appropriate and therefore result in biologically impoverished landscape areas. The result is a large number of seriously eroded sites at higher altitudes, vegetation-free embankments, and river banks which are far from being in a natural state. If, on the other hand, site-appropriate seed mixtures are used, with adapted species which are suitable for elevated sites, for example, the green spaces can become valuable elements of a biotope network.

5.2.3 Managed mowing of roadside verges

Delaying mowing gives plants the opportunity to bloom and form fruits and seeds. In this way, they can provide food and cover for insects and other small animals. The habitat quality of green strips and roadside verges depends on various factors, and mowing is one of the factors which are easiest to influence. By delaying mowing of verges until late summer, or by using mosaic-type mowing techniques, which involves mowing only a small area at a time, habitat conditions can be improved, e.g. for butterflies and various other species.

6. Water resources management

6.1 Creating natural structures

6.1.1 Revitalisation of flowing waters

Very often, the space and dynamics left to most of the rivers in the Alpine region are severely limited. At the same time, flowing waters are highly conducive to cross-border cooperation as they generally flow through several countries and often form natural boundaries which may also constitute national borders. To improve flowing water functions, a range of measures can be adopted to return flowing waters to a natural unimpeded state, at least in part, thus enabling them to develop in a near-natural manner. Possible measures range from the introduction of deadwood to comprehensive rehabilitation measures and expansion.

6.1.2 Management and maintenance of flowing waters

Flowing water systems, from source to mouth, form linear connecting elements and, together with their associated ecosystems (riparian forests, woodland), form important corridors for the migration and dispersion of flora and fauna. In many cases, however, the space and financial resources required for the comprehensive revitalisation of obstructed rivers are not available. However, upgrading can be achieved with near-natural, differentiated management concepts which can be integrated into the legally prescribed management work along water bodies (flood protection). As part of this process, a holistic view should be taken of the embankments, riparian zones and water bodies, and adjacent green spaces (biotope network) should also be included. Appropriate maintenance measures include management of meadows, woodland (bank stabilisation), and regeneration in the areas of erosion. An individual management plan should be produced for each body of water, clearly defining the development goals.

6.1.3 Creation of riparian strips and woodland

Riparian strips, as the transition between water surfaces and land, are of particular ecological significance for water quality and are an important connecting element in the biotope network. These riparian strips play a key role in intensively used landscapes in terms of maintaining water functions (filter/buffer functions, protection of embankments, prevention of erosion). The restoration, or the development and maintenance, of existing riparian strips is thus a key priority in the active protection of the aquatic environment. The riparian zone also creates habitats, provides food and serves as a protective and resting space, and also provides nesting and breeding places. Riparian strips should therefore be equipped with site-appropriate near-natural vegetation and typical tree species.

6.1.4 Conservation of riparian forests

Riparian forests are the natural type of vegetation along streams and rivers, and are strongly influenced by flooding and high groundwater levels. Due to their small-scale mosaic of different site conditions, riparian forests count among Europe's most species-rich habitats. Due to their preference for river meadows as their habitat, near-natural riparian forests have virtually disappeared from Central Europe, however, as many riparian forests have been cleared and transformed into pasturage. Riparian forests have high recreational value, store water and improve groundwater quality. Depending on their size and condition, they can also contribute to flood protection. As ecosystems associated with flowing waters, they are extremely important for ecological connectivity. Measures to maintain and develop the riparian forests may include, for example, planting of typical tree species, near-natural management, securing of existing areas and maintaining structures associated with the riparian forests (e.g. standing water bodies).

6.2 Removal of barriers

6.2.1 Creation of fish passes and other fish migration aids

Obstructions such as river bottom steps, weirs, retention basins etc. can be found along many Alpine streams and rivers. These constitute insurmountable obstacles to the migration of fish and other organisms in flowing waters. Fish migration aids (also known as fish ladders or fish passes) are installed in flowing waters in order to give fish, in particular, the opportunity to overcome these artificial obstacles. There are numerous versions of these aids (river bottom slides, fish ramps, fish passes, bypass flume(s) …), which can be deployed to suit the target species, the obstacle to be overcome, and local conditions.

7. Public Relations Work and Sensitisation

7.1 Communications

7.1.1 Sports competitions

Sports competitions can help raise public awareness of biotope networks. In particular, the importance of wildlife corridors can be conveyed very effectively through the selection of a high-profile species of fauna. Organising races at local level can encourage hikers, walkers and runners and draw attention to the need to network habitats of specific species. Besides the sports competition, information can be provided, e.g. through an appropriate flanking programme and exhibitions which raise awareness of how the animals live and the obstacles to their migration. Additional funds (e.g. for the purchase of areas to create a biotope network) can also be sought in this way. This raises awareness of rare species of fauna and sensitises the public to the issue of landscape fragmentation.

7.1.2 Information campaigns in towns and municipalities

Settlements are among those areas which may contribute to the fragmentation of the landscape and whose development may contribute to habitat decline. However, it may be possible to mitigate these effects with measures adopted in the gardens and green spaces of towns and villages. The permeability of the areas and, above all, spatial restrictions can be increased, habitats can be created or made more environmentally compatible, and the use of pesticides and herbicides can be dispensed with, etc. By means of information campaigns and brochures sent out along with building permits, for example, the public can be encouraged to adopt these measures. Possible measures include: creation of near-natural hedges from local timber, permeability of fencing around properties, “insect hotels”, bee forage etc.

7.1.3 Guided tours and information events

In the implementation of measures and thus the realisation of biotope network projects at local level, spatial and landscape planners and municipal administrations have a role to play as key actors alongside the nature conservation organisations, which are often the driving forces behind biotope network projects. Local information events and guided tours are a good way of informing these actors (as well as other stakeholders such as farmers, hunters etc.) about the issue of biotope networks and ecological connectivity and ways of realising them in practice. What is important, to ensure the success of these initiatives, is to prepare summary documentation (e.g. a manual with decision-making aids) and to present the benefits and value-added which such projects can generate at local level (multifunctionality of corridors which are significant not only in ecological terms but also perform key social functions as spaces for leisure and creation as well as economic functions, e.g. through the sustainable management of roadside grass verges).

7.1.4 Management competitions

A particular commitment to nature and species conservation and the preservation of valuable regional cultural landscapes, also within the framework of biotope network initiatives, can be rewarded through competitions. At the same time, the public can be informed about farmers’ commitment, thus increasing the acceptance of biotope networking measures. In this way, the services provided by agriculture for the preservation of the cultural landscape or networks of interlinked biotopes can be rewarded, while raising awareness of measures adopted within the framework of regional cultural landscape programmes. For farmers, the provision of public information and the ensuing recognition of their work can create incentives to manage their areas in a manner conducive to biotope connectivity.

7.2 Environmental education

7.2.1 Educational pathways

The purpose of an educational pathway is to impart and increase knowledge while offering an experience of nature, recreation and raising environmental awareness. Pathways also offer a good opportunity to bring the issue of biotope networks closer to the public and thus publicise a local or regional project. The “Green Light for Ecological Corridors” educational pathway, for example, was developed as part of a transnational project. Along the pathway, there are numerous information boards which explain the significance of ecological corridors. The boards were designed in conjunction with school classes from the local area.

7.2.1 Development and provision of educational materials on biotope networks and ecological connectivity

The description of this measure is based on the “*Nature sans frontières*” (Nature without Frontiers) games kit from the French nature conservation organisation FRAPNA. Children are the adults of tomorrow – and will be responsible for decision-making and action. For that reason, it is important to teach them about ecological relationships and the key functions of natural systems. This can be achieved simply and effectively through play. That is the aim of this educational games kit. It is a practical tool which enables children and young people to learn about the mobility needs of various sample species, recognise possible barriers and identify simple solutions to overcome them. The easily accessible games are ideally suited to the classroom and excursions into the local environment. The kit comprises a theoretical guide with explanations of the issues, suggested action and solutions (80 pages); an activity book with instructions for observations, 12 experiments and various activities (60 pages), and several games (card games, board games, identification sets etc.).

7.2.3 Visitor information

Information boards can be used to sensitise the public to the issue of biotope networks and inform them about relevant measures, e.g. in a nature conservation area. Visitors can also be channelled through a specific area by the information boards. In this way, usage can be shifted towards less sensitive areas, while efforts are made to preserve the tranquillity of, and reduce the burden on, areas in special need of protection. Information points are a good way of providing information and supporting active learning processes and “light-footprint” observation opportunities. Depending on the area, cultural and historical information can also form part of the pathway.

7.3 Stakeholder participation

7.3.1 Volunteer programmes

Some providers offer various target groups, e.g. families and schools, the opportunity to undertake voluntary work in the ecological sphere (e.g. in woodlands). Participants thus make an active contribution to forest, climate and species protection while gaining a very intensive experience of the ecosystem at the same time. The purpose of the volunteering is to improve habitat quality at specific project sites. Relevant programmes also inform the volunteers about connections within the various habitats and make a contribution to sensitisation and awareness-raising. Focussing measures on the creation of a biotope network is an option in this context. Cooperation through current "corporate social responsibility" initiatives also helps to raise environmental awareness and increase knowledge of the importance of connectivity measures in an up-to-date way while drawing attention to the problems arising in this context.

7.3.2 Countryside management measures

Countryside management measures can involve joint action between various stakeholders (nature conservation bodies, hunters, fishermen, farmers etc.) and the local population. Within the framework of these events, measures of relevance to ecological connectivity can also be implemented. This includes the promotion of near-natural structures along watercourses. Activities can be undertaken at local or regional level at various intervals. The implementation of measures also increases the acceptance of the biotope network and raises public awareness at the same time.

7.3.3 Monitoring by farmers

Farmers, with their areas distributed through the landscape, are key elements of transregional networks of interlinked biotopes and are therefore important partners in the implementation of relevant measures. They also possess extensive knowledge and many years of experience which they can contribute to the planning and implementation of biotope networking measures. It is therefore extremely important to involve farmers as stakeholders. They can also perform a key function by monitoring the development of endangered and/or rare species on their own farmland. This observation process raises awareness and also improves their understanding of the purpose of certain management requirements (e.g. extensive use, set-aside etc.). For the monitoring of the biotope network, appropriate and effective indicator systems must be defined.

8. Hunting

8.1.1 Hunting ban areas, game protection areas, quiet zones, game reserves

These various types of areas are intended to protect flora and fauna from disturbance or pressure from hunting. They are subject to different regulations, depending on the country or region: in Switzerland's "quiet zones" for game, for example, tourists, sportspersons and visitors may not leave the paths at specific times or enter the habitats of sensitive and rare species of fauna. Other activities such as skiing, snowshoeing, camping or organised sports events are also governed by specific rules. Alpine farming and agricultural management are not affected by restrictions in the quiet zones, and hunting is also permitted. In France, on the other hand, hunting is strictly prohibited in the game reserves, as it is in Switzerland's hunting ban areas and game protection areas.

9. Spatial planning

9.1.1 Taking account of the elements of ecological networks in planning tools

The consideration of central elements of a biotope network in spatial planning is extremely important for the long-term and sustainable creation of a biotope network. This is the only way to ensure long-term connectivity. Planning must, however, be flexible enough to take account of the dynamic character of the biotope network. Depending on the type and significance of the elements, they should be taken into account in different tools and at different levels (at local level, areas for a small-scale network; at regional level, key migration corridors and solutions for major conflict points). There are already a number of examples in existence, notably in Switzerland with the creation of the REN in guidance planning (*Richtplanung*) or in France, where individual municipalities have incorporated elements of the local biotope network in their land-use planning.

9.1.2 Wildlife/ecological spatial planning

Wildlife/ecological spatial planning (WÖRP) is an instrument developed in Austria and is used in a number of Austrian states, as well as the canton of Graubünden in Switzerland and Liechtenstein. The aim of this concept is better long-term incorporation of species of wildlife into the cultural landscape. In this context, the protection and sustainable use of wildlife populations and the avoidance of damage to wildlife in agriculture and forestry are of key importance. An integrated planning approach aims to harmonise the creation of biotope networks with studies on game stocks and the carrying capacity of biotopes. WÖRP can be applied, in principle, to all wildlife species. It includes large-scale spatial planning (nationwide basic planning) related to the spatial distribution of wildlife populations and detailed regional planning.

10. Tourism and Leisure

10.1 Creating synergies with tourism

10.1.1 Tourist marketing of the biotope network

Valuable habitats of different species of fauna and flora also have high recreational value which, with appropriate sustainability strategies, can generate synergies between nature conservation and tourism strategies. Tourist marketing of the biotope network is conceivable in this context. On the one hand, appropriate tourist offers can inform visitors and guests about the biotope network. On the other, tourism can contribute to the conservation and protection of habitats. Corresponding effects can be achieved through an integrated marketing strategy in which the biotope network is actively promoted via the marketing and imparted through appropriate guided tours, for example. The focus should be on particularly attractive biotopes which also increase regional value-added (e.g. mixed orchards). In this way, sustainable agriculture, crafts and commerce in the region can be promoted and the biotope network will be increasingly appreciated in the long term by locals and visitors alike due to its positive economic effects.

10.1.2 Trails to connect protected areas

In Switzerland (Haute-Engadine, Haut-Valais, southern Tessin), the WWF, together with regional tourism offices, has created three transboundary Emerald Trails with a total of 50 stages. The stages and their attractions, as well as accommodation options, are described in detail on the Internet. The trails link various protected areas, Natura 2000 sites and emerald areas and can thus draw attention to aspects of ecological connectivity. A similar initiative is the “NaturaTrails” scheme set up by the Friends of Nature in Austria and Germany.

10.2 Leisure

10.2.1 Guidance for winter sportspeople

Ski touring and snowshoeing have become increasingly popular winter sports in recent years, offering an experience of the winter landscape off the pathways and pistes. However, they take sportspersons into the refuge areas of wild animals, which are highly sensitive to disturbance in winter. For critically sensitive zones, the German Alpine Association (DAV) publishes information for touring skiers regarding recommended routes (this includes demarcation of sensitive areas, waymarking, and information boards and maps at car parks). Efforts are also being made to promote cooperation with the authors and publishers of guidebooks.

10.2.2 Agreements on environmentally compatible practice of sports with sportspersons and associations

Many of the sports carried out in the natural environment can cause major disturbance and even the destruction of habitats. Mountain biking, paragliding, canyoning and climbing are just a few examples. In order to guarantee that sports are practised in a more environmentally compatible manner, agreements for sensitive areas can be reached with sports groups and associations. One example is the climbing strategies adopted by the German Alpine Association (DAV). Many rocky crags and rockfaces provide refuge for rare and protected species of flora and fauna. To ensure that these unique biotopes are not damaged by climbers, strategies for environmentally compatible climbing are both useful and necessary. The package of measures adopted by the German Alpine Association (DAV) on eco-friendly climbing involves working with public authorities and nature conservation organisations to develop climbing strategies. The DAV is relying on a wide variety of solutions to identify, at micro level, those areas where environmentally compatible climbing is possible and those where no climbing should take place in the interests of nature conservation. Uniform marking of crags, temporary closure of crags or sections of them, and local wardens with responsibility for crags are just some of the key elements of these strategies.

10.2.3 Flight bans over sensitive areas

Many near-natural landscapes and landscapes which are valuable from a nature conservation perspective are very attractive recreational spaces, for besides offering ideal conditions for sports and leisure, they also offer very special experiences of nature. With the increasing pressure of use, however, conflicts can emerge between the interests of “nature consumers” and nature conservation objectives. These may affect areas which constitute important habitats for rare and sensitive species and which are of major importance for the biotope network. Various types of sport (kite-flying, paragliding, gliding) may also have a negative impact. With the development of quiet zones and the simultaneous creation of alternative offers for sportspersons and holiday-makers in areas which are relatively tolerant of disturbance, incentives can be created for sportspersons to abandon those areas which are highly sensitive to disturbance. The provision of attractive substitute sites is intended to create “win-win situations”.

11. Other

11.1.1 Connectivity measures with support from church-owned land

The churches are important owners of land and farmland which are also suitable for the creation of a network of interlinked biotopes, and can thus serve as an important partner. If the church backs the development of a biotope network and works actively to ensure that appropriate measures are implemented on its property, the tenants can also be sensitised to the importance of the biotope network, and tenancies can be linked to the implementation of relevant measures. In order to increase acceptance of the biotope network and plan

appropriate measures, the planning process should involve as many different stakeholders as possible (besides church workers, this should include nature conservation experts, local community representatives, farmers etc.). Appropriate public relations work can be used to encourage similar initiatives in other regions.

11.1.2 Environmentally compatible design of power lines

Power lines have been a feature of the landscape for almost 100 years. At present, there is virtually no alternative to them when it comes to Europe's extra high voltage sector. The lines must be regularly maintained in order to ensure that there is no encroachment of vegetation on the cables. During these interventions, there is the opportunity to create interesting biotopes on these linear-type surfaces and design them in such a way that they take on a role in a biotope network. With well-thought-out and systematic biotope management planning, these surfaces could become important habitats, connecting routes, stepping stones and corridors in the biotope network.

11.1.3 Light pollution/light smog audits

The term "light pollution" denotes the brightening of the night sky caused by artificial light sources whose light is dispersed into the atmosphere. This can have various effects: the growth cycle of plants, for example, may be influenced by an artificially brightened environment. The sensory organs of nocturnal animals are specially adapted to night-time conditions, which makes them particularly sensitive to artificial light. Animals therefore attempt to avoid sources of light, so a well-lit street can therefore constitute a major barrier and contribute to habitat fragmentation. A large proportion of light pollution comes from poorly constructed or poorly installed light sources and can be avoided without any negative impacts, e.g. on road safety. An audit of public lighting can help to identify problem areas and offer appropriate solutions.

11.1.4 Safety measures on electricity masts and cables

In the Alps, too, the energy supply is generally reliant on a dense network of overground cables. For birds, especially migratory species, these cables – and to an even greater extent, dangerously constructed electricity masts – pose a major hazard. Masts are a popular roosting and resting place for many species of bird. The type of mast construction determines whether these are safe places for birds. On many masts in the mid-voltage network, for example, the arrival or departure of a bird in flight may trigger an earth fault or short circuit which kills the bird. For large species of bird in particular, such as white and black storks, the Eurasian Eagle Owl (*Bubo bubo*), Lesser Spotted Eagle (*Aquila pomarina*) and Griffon Vulture (*Gyps fulvus*), electrocution by power lines is now one of the main causes of population decline. In areas which birds regularly fly over in large numbers at low altitude (e.g. topographical bottlenecks in valleys), the cables should be laid underground or the areas bypassed altogether. If this is not possible, safety measures should be applied to cables and masts.

11.1.5 Corridor contracts

In 2008, the French region of Rhône-Alpes completed the mapping of its regional ecological network. In order to support projects and initiatives which contribute to maintaining or improving ecological connectivity, the region offers so-called “corridor contracts”. Ideally, projects receiving support should involve several local authorities. Contracts are awarded for a period of five years. Support is provided for schemes which directly help to maintain or improve connectivity, as well as to schemes which aim to safeguard the elements of a biotope network in the long term via planning tools, environmental education and public relations work. A guide has been produced for prospective stakeholders which contains detailed information on the regional scheme and the contractual process.

IV DESCRIPTIONS OF MEASURES

The 69 measures currently contained in the catalogue are presented in the form of individual profiles. They cover the key aspects of each measure in a standardised format. The profiles form the basis for the ensuing summary of all measures in the table, which allow queries to be carried out. They are structured by sector and sub-sector and are classified by number (see Section III, Overview of Measures).

1.1.1 Conservation, management and creation of new standing water bodies

1. Nature conservation; 1.1 Biotope protection measures

Standing water bodies include a wide variety of aquatic habitats such as lakes, pools, ponds and tarns. They are refuges for rare protected aquatic plants and animals (amphibians, reptiles, birds, etc.) and are therefore key elements of a biotope network. At appropriate sites, they can be networked with other wetlands and with flowing waters. Standing water bodies are often drained or filled in so that they can be used for other purposes, making their conservation particularly important. Management interventions may be helpful in keeping smaller standing water bodies clear; they may also be conducive to various siltation stages and beneficial to habitats and the transformation of nutrient-rich and silted-up water bodies into near-natural ecosystems. The creation of standing water bodies (e.g. as protected areas for amphibians) is also an option, although conservation should take precedence over the creation of new small water bodies

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Use of appropriate management measures (e.g. creation of buffer zones against fertiliser and pesticide inputs, thinning-out of riparian woodland) improves habitat quality.
	☑ Element of ecol. connectivity	Standing water bodies are important elements of a functioning network of different wetlands (e.g. peat bogs, headwaters, humid forests, etc.) as a stepping stone system consisting of near-natural wetland biotopes.
	☐ Other	
Impact	☑ Immediate ☑ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Depending on starting conditions, the impact of appropriate management measures may occur within the short term; when creating new ponds, a number of key criteria must be adhered to.	
Implementation period	☑ Short (days) ☑ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: Most management measures at standing water bodies can be implemented in the short term. Larger interventions in a water body's internal structure (restoration and remediation) requires more comprehensive planning.	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: In general, the impact is local but depending on the connectivity situation, it may also be regional in scope.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☑ Forestry ☑ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☑ Spatial planning ☐ Transport	
	Other: Countryside management, voluntary nature conservation, private individuals.	
Legal situation	Management measures can be supported from various funding programmes (e.g. contract-based nature conservation). Payments amount to around € 450-600/ha. Near-natural lakes are generally legally protected nature conservation areas.	
Economic/financial aspects	Costs of implementing the measure (€):	Costs vary considerably depending on the type of measure being implemented. Costs of creating new standing water bodies are estimated at approx. € 20,000 (2000 m²) - 70,000, depending on size.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☑ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Intact standing water bodies contribute to an attractive and diverse landscape appearance (tourism)
Evaluation	Management measures at standing water bodies have long made an important contribution to the conservation, management and development of ecologically valuable areas. Relevant experience is available from the responsible authorities/nature conservation associations.	
Information & contact	Information sources:	The various nature conservation agencies and organisations (NABU, BUND, LBV, Pro Natura etc.). More information and examples can also be accessed at:http://www.landwirtschaft-mlr.baden-wuerttemberg.de/servlet/PB/menu/1064781_l1/index1221750829191.html
	Contact:	

1.1.2 Controlling invasive species

1. Nature conservation; 1.1 Biotope protection measures

Invasive species are alien plants and animals that have negative impacts on other species, biological communities or biotopes and thus pose a threat to biodiversity. Invasive species may also cause economic problems (e.g. when present as weeds) or health problems (such as allergies and diseases). Hybridisation with native species can also occur. In Switzerland, 107 alien species are classed as problematical, including mammals, birds, reptiles, amphibians, insects and plants. When dealing with alien species and adopting measures to limit them, prevention, monitoring, acceptance, surveillance and control all have a role to play. In the context of ecological connectivity, particular account must be taken of invasive species as they are able to use the emerging connecting bridges in the landscape to penetrate into new areas. In the case of invasive neophytes, this applies especially to stream margins and riparian zones (distribution along collapsed river banks and via erosion and flooding), which, as natural connecting elements in the landscape, are also important elements of the biotope network.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☐ Priority areas for biodiversity ☑ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Awareness of the impacts of invasive species is required, justifying control measures (e.g. specific threat posed to rare or endangered species, risk of penetration of invasive species into new areas).
	☑ Element of ecol. connectivity	Control measures constitute major intervention and generally entail considerable effort as well as damage to other species (e.g. scarification as a result of root removal)
	☑ Other	Measures should only take place if it is certain that the habitat concerned can be restored to a stable ecological state following the measure and its long-term conservation in this state is guaranteed.
Impact	☐ Immediate ☑ Several months ☑ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: The duration of measures until the attainment of an effect is difficult to estimate and depends substantially on the species concerned and the measures taken.	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☑ Long (months) ☑ Very long (years)	
	Comments: Here too, many different measures and implementation periods are possible.	
Scope of implementation	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: The impact of measures is very limited in spatial terms.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☑ Forestry ☑ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Water resources management, voluntary nature conservation	
Legal situation	International treaties, European and national legislation regulate the management of invasive species: Convention on Biological Diversity, Habitats Directive, Birds Directive, federal states' nature conservation legislation, plant protection legislation, hunting legislation	
Economic/financial aspects	Costs of implementing the measure (€):	Very variable. Cost of controlling all stocks of Japanese Knotweed in Germany, for example, is € 6.2 mill. + € 16.7 mill. for subsequent stabilisation of river banks
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☐ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	High costs of control can be set against the very substantial economic impacts associated with alien species, estimated at USD 13.8 billion p.a. in the US
Evaluation	In view of the many examples, a species-specific perspective must be taken. Comprehensive experience has been gained with various measures to deal with some species (e.g. Japanese Knotweed: mowing, grazing, herbicide use, combined procedures). It is always important to weigh up the relationship between the negative impacts, on the one hand, and intervention and its costs, on the other.	
Information & contact	Information sources:	Comprehensive information on neophytes in Germany: http://www.floraweb.de/neoflora/index.html, Delivering Alien Invasive Species In Europe (DAISIE): http://www.europe-aliens.org/, North European and Baltic Network on Invasive Alien Species (NOBANIS): http://www.nobanis.org, Report on invasive species in Switzerland: http://www.nobanis.org/files/invasives%20in%20CH.pdf; aquatic alien species: http://www.aquatic-aliens.de/species-directory.htm
	Contact:	

1.1.3 Restoration of wetlands

1. Nature conservation; 1.1 Biotope protection measures

Wetland habitats are especially species-rich and are a dominant feature of the natural landscape structure in the Alpine region and the pre-Alps. Wetlands also provide a habitat for numerous rare and highly endangered species (e.g. the Azure Hawker (Aeshna caerulea)) and are therefore important elements of a biotope network. Wetland restoration measures can bring about an improvement in the hydrological regime of degraded wetlands and generally enhance habitat quality. Peat growth resumes in the rewetted areas, allowing an increase in typical wetland species. This also improves the function of wetlands as CO2 sinks and water stores, supporting the avoidance of and adaptation to climate change. Rewetting can include impounding measures, e.g. blocking drainage ditches, changes in the type of use, and management measures such as the removal of tree and shrub cover.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☐ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Improving the quality of wetland habitats (typical wetland vegetation and fauna) through mowing of wet meadows and litter meadows, debushing and impoundment. Development of structurally rich forest/open land transitions as habitats for black grouse and wood grouse (capercaillie).
	☑ Element of ecol. connectivity	Intact peat bogs are important elements of a network of different wetlands (headwaters, humid forests, etc.)
	☐ Other	
Impact	☐ Immediate ☑ Several months ☑ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Wetland restoration measures must be long-term in focus and constantly reviewed. Depending on the measure and the starting conditions, impacts may be achieved quickly or over the long term.	
Implementation period	☑ Short (days) ☑ Medium (weeks) ☑ Long (months) ☑ Very long (years)	
	Comments: Wetland restoration measures should be embedded in a long-term comprehensive strategy, although individual measures can be implemented over the short term.	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☐ National	
	Comments: The scope of impact can be increased if relevant measures are embedded in a comprehensive (regional) strategy.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☑ Forestry ☐ Hunting ☐ Local community ☑ Agriculture ☑ Nature conservation ☑ Spatial planning ☐ Transport	
	Other: Countryside management, water resources management, voluntary nature conservation.	
Legal situation	Wetland restoration mesures can be integrated into various countryside management programmes and receive appropriate funding on that basis.	
Economic/financial aspects	Costs of implementing the measure (€):	Costs vary with size of area, measures to be implemented and implementation period (approx. € 150-6000/ha)
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☑ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Tourism and marketing strategies can be promoted as part of a comprehensive strategy (e.g. use of litter, "peat bog tourism").
Evaluation	Numerous wetland restoration initiatives exist. Often, such measures are successfully implemented as part of biotope network initiatives. Socio-economic aspects such as sensitising and informing the public and political decision-makers, promoting "peat bog tourism" and the development of marketing strategies for agricultural products from the region play a role (e.g. *Allgäuer Moorallianz*).	
Information & contact	Information sources:	http://www.cipra.org/de/cc.alps/wettbewerb/moorrenaturierung http://www.idee-natur.de/allgaeu1.html
	Contact:	Dr. Christine Margraf, Bund Naturschutz in Bayern e.V. christine.margraf@bund-naturschutz.de

1.2.1 Creation of quiet zones for breeding birds by flowing waters

1. Nature conservation; 1.2 Species conservation measures

The structures associated with flowing waters, such as gravel banks, provide important habitats for a number of species which breed on gravel areas (e.g. the Common Sandpiper (Actitis hypoleucos) and Little Ringed Plover (Charadrius dubius)). These areas are often used for recreation and sporting activities. Management strategies, such as the creation of quiet zones for breeding birds at particular times (including bans on access), can cut through existing conflicts and contribute to habitat improvement. Relevant measures can include the adaptation and development of infrastructure, the creation of observation points, and channelling of and information for visitors using info-boards and signage.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☐ Priority areas for biodiversity ☑ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	The creation of a quiet environment on gravel banks during breeding periods improves habitat quality for gravel-breeding species.
	☑ Element of ecol. connectivity	Natural flowing water systems and their associated structures are valuable elements of a biotope network and form stepping stone biotopes for some species.
	☐ Other	
Impact	☐ Immediate ☑ Several months ☑ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Depending on the time of implementation, the quiet zones can soon start to be used as a breeding ground.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☑ Long (months) ☑ Very long (years)	
	Comments: When planning measures at the specific site, a longer time period should be planned (involvement of all stakeholders, assessment of stocks of breeding birds, etc.)	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☐ National	
	Comments: The breeding areas may be of transregional importance for some species.	
Stakeholders/sectors concerned	☐ Protected areas ☑ Tourism ☐ Forestry ☐ Hunting ☑ Local community ☐ Agriculture ☑ Nature conservation ☑ Spatial planning ☐ Transport	
	Other: Fishing, water resources management, voluntary nature conservation, sport	
Legal situation	Relevant measures can be funded from countryside management programmes.	
Economic/financial aspects	Costs of implementing the measure (€):	Costs are heavily dependent on starting conditions and the scope of the requisite measures.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	When combined with attractive offers for visitors, tourist value-added can be generated.
Evaluation	As part of the Interreg III B Project "Living Space Network" (Pilot Project "Running Waters"), a conservation strategy for gravel-breeders at Halblech was developed. However, conflicts between gravel-breeding species of bird and recreational use exist at almost all stretches of rivers where gravel banks still exist. There are also examples of the creation of quiet zones, with low disturbance, for wild mammals and birds along the Danube.	
Information & contact	Information sources:	INTERREG project: http://www.lsn.tirol.gv.at/de/doc/kiesbrueter.pdf Danube: http://www.land-oberoesterreich.gv.at/cps/rde/xchg/ooe/hs.xsl/73053_DEU_HTML.htm
	Contact:	e.g. Office of the Government of Upper Austria, Department of Spatial Planning, Economic and Rural Development, Nature Conservation Division

1.2.2 *Taking account of bat roosts during the restoration and renovation of old buildings*

1. Nature conservation; 1.2 Species conservation measures

Because of its near-natural state and landscape diversity, the Alpine area is characterised by a fauna rich in bat species. Many species of bat are heavily dependent on buildings for their roosts because natural hiding places have become rare in woodlands as a result of intensive forms of cultivation. During the restoration or renovation of old buildings, disturbances to the bats and their roosting places can therefore easily occur. Appropriate measures during the restoration or renovation of old buildings can help to preserve bat roosting places. There is already a wealth of experience among bat experts, who often provide support during the renovation of buildings. Targeted consideration of relevant information on the ecology of roosting places of various species of bat can thus make a major contribution to habitat connectivity.

	☐ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☐ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Many species of bat (including several listed in Annex II of the Habitats Directive) are dependent on old buildings for their roosts.
	☑ Element of ecol. connectivity	The roosts, together with the hunting grounds, are important elements of an ecological network. The distance between exits and the nearest vegetation and potential hunting grounds must be considered.
	☐ Other	
Impact	☐ Immediate ☑ Several months ☑ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: With appropriate restoration measures, the roosts may be colonised by the bats within the first year.	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: Relevant measures can be integrated into restoration work. The measures should be carried out while the bats are absent and should not lead to major changes to the characteristics of the roosts.	
Scope of implementation	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: Measures focus on individual buildings but the connectivity situation (e.g. proximity of hunting grounds) should be considered. A comprehensive strategy should also be in place, requiring support from bat experts during restoration work.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☐ Forestry ☐ Hunting ☑ Local community ☐ Agriculture ☑ Nature conservation ☑ Spatial planning ☐ Transport	
	Other: Building authority, churches, architects	
Legal situation	Restoration of bat roosts often requires permission under nature conservation legislation.	
Economic/financial aspects	Costs of implementing the measure (€):	Costs depend on starting conditions and the needs of the bat species concerned; compensation payments may be available in some cases.
	Sources of financing:	☑ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Taking account of bats during the restoration of buildings may incur additional costs.
Evaluation	Within the framework of the Interreg III B Project "Living Space Network", comprehensive Guidelines for the Renovation of Buildings were produced, drawing on more than 230 case studies relating to the renovation of buildings, mainly from the Alpine area, and containing specific information for around 20 different bat species.	
Information & contact	Information sources:	Guidelines: http://www.lsn.tirol.gv.at/de/doc/leitfad_fledermaus.pdf; Interreg Project: http://www.alpinespace.org/uploads/media/LSN_Handbook_for_Bats_Protection_DE.pdf http://www.fledermausschutz.at/downloads/GuidelinesfortheRenovationofbuildings.pdf (en)
	Contact:	Dr Guido Reiter, Austrian Co-ordination Centre for Bat Conservation and Research (KFFÖ) Dr Andreas Zahn, Co-ordination Centre for Bat Conservation in South Bavaria

1.2.3 Specific species conservation measures: wood grouse (capercaillie)

1. Nature conservation; 1.2 Species conservation measures

The wood grouse (capercaillie) (Tetrao urogallus) is a characteristic species of light, structurally rich boreal and montane forest habitats. Due to its extensive spatial and specific habitat requirements, it is regarded as an umbrella species for the high-montane community. Acutely endangered as a result of habitat losses and degeneration, it is a target species under the EU Birds Directive. The species therefore plays a key role in nature conservation and spatial planning, not only from a conservation but also from a socio-cultural and socio-economic perspective. Due to its habitat requirements, support measures for capercaillie contribute directly to the implementation of biotope network concepts, e.g. through the creation of mosaics of different habitats and corridor and stepping stone structures.

	☐ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☑ Large forested areas ☐ Densely populated areas ☑ Perimeters of protected areas ☐ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	Reduction of fragmentation effect of normal commercial forest stands.
	☑ Habitat improvement	All measures primarily aim to improve the habitat for grouse and thus address the primary threat to the species.
	☑ Element of ecol. connectivity	Structures which characterise wood grouse (capercaillie) habitat are suitable as connective structures for other species as well.
	☑ Other	Various potential fields of conflict are addressed in relation to the wood grouse (capercaillie) (tourism/recreation, commercial forestry).
Impact	☐ Immediate ☐ Several months ☐ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: Management measures for wood grouse populations entail long-term commitment and permanent changes to usage and procedures.	
Implementation period	☑ Short (days) ☐ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: Individual management measures do not take up much time, but a regular and comprehensive approach is required to achieve the desired impacts.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: With wood grouse in particular, measures always have regional as well as local significance.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☑ Forestry ☑ Hunting ☑ Local community ☐ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Sports associations (skiing), forest owners	
Legal situation	Wood grouse is protected by a raft of legislation (Natura 2000).	
Economic/financial aspects	Costs of implementing the measure (€):	Varies widely according to the measures undertaken; no general estimate possible.
	Sources of financing:	☑ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Measures which benefit the wood grouse will also have a positive impact on other species in montane forests.
Evaluation	In some regions, wood grouse is regarded as an umbrella species for biotope network projects. It is reliant on richly structured and differentiated habits. Ecological connectivity is therefore particularly important here, especially as wood grouse populations are often highly endangered.	
Information & contact	Information sources:	e.g. Capercaillie Action Plan, Federal Office for the Environment (FOEN), Switzerland. Detailed information about the wood grouse (capercaillie): www.waldwissen.net
	Contact:	e.g. National coordination centre of the Swiss species recovery programme for birds: Ueli Rehsteiner, Swiss Association for the Protection of Birds SVS/BirdLife Switzerland ; Reto Spaar, Swiss Orthithological Institute

1.2.4. Specific species conservation measures: beaver

1. Nature conservation; 1.2 Species conservation measures

Hardly any other species shapes and influences its habitat as actively as the beaver. The beaver makes burrows in riverbanks, builds dams, and fells trees. Before humans began to shape the landscape actively through their land use, there was a broad network of pools, created by beavers, along the watercourses. Many other species of fauna have developed in a water landscape which the beaver has done much to create. And yet the beaver was on the verge of extinction in Europe. It is now progressively recolonising numerous watercourses. Since its return, the beaver is bringing many of the watercourses made moribund by human activity back to life and restoring their dynamism. It creates a mosaic of new habitats and structures by opening up vegetation, promoting deadwood, and creating pools and dams. This results in more attractive landscapes and a biotope network along the watercourses and helps to improve watercourse and flood protection.

	☐ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☑ River systems ☐ Large forested areas ☐ Densely populated areas ☐ Perimeters of protected areas ☐ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Many other species of fauna have developed in a water landscape which the beaver has done much to create. It is therefore described as a key species of fauna for small water bodies. Long-term studies in Germany have shown that the beaver has an extremely positive effect on numerous species of aquatic and riparian flora and fauna.
	☑ Element of ecol. connectivity	The beaver helps to restore water bodies and thus actively increases species diversity and the diversity of water body structures, thus creating natural corridors along the watercourses.
	☑ Other	The beaver also helps to clean the watercourses; the water flows more slowly as a result of the dams built by beaver, causing sediments and substances such as chemicals and nutrients to be deposited. These substances would otherwise promote algal growth and lead to oxygen depletion. More flood events occur in regions without beavers' dams.
Impact	☐ Immediate ☐ Several months ☐ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: The restructuring of watercourses by beaver is a long-term process.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☐ Long (months) ☑ Very long (years)	
	Comments: In areas where beaver occurs, conflicts will always arise. Coexistence with beaver must be re-learned for the long term.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☐ National	
	Comments: Measures to promote beaver, but also the problems caused by them, must be addressed at both local and regional level.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☑ Forestry ☑ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☑ Transport	
	Other: Water resources management, land owners	
Legal situation	In some federal states, the beaver is covered by hunting legislation.	
Economic/financial aspects	Costs of implementing the measure (€):	Varies according to the measures adopted. Farmers receive payment for ecological services in areas with beaver.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	The beaver provides various "ecological" services, including flood protection.
Evaluation	There are various conflicts with beaver: collapsed pathways, felled trees, agricultural damage. However, this damage rarely occurs more than 10 m from the river bank. This should be established as a buffer zone along watercourses in order to restore their natural dynamism and thus make an effective contribution to the biotope network.	
Information & contact	Information sources:	e.g. Biberfachstelle (Beaver Advice Centre), Neuchatel, Switzerland
	Contact:	Contact person at Beaver Advice Centre: Christof Angst

1.3.1 Production of Natura 2000 management plans

1. Nature conservation; 1.3 Natura 2000

Natura 2000 is an EU-wide network of protected areas intended to preserve the endangered habitats and species in the EU. It comprises the protected areas defined in Council Directive 79/409/EEC on the conservation of wild birds (Birds Directive) and in Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive), and aims to build a coherent ecological network. Binding provisions apply to the implementation of Natura 2000, including a requirement to produce management plans defining mandatory conservation measures for the area in question. The plans consist of a basic part and a section containing relevant measures, which describes which species and habitat types contribute to the specific ecological value of the area and the conservation objectives that this creates for the area concerned. This gives rise to an obligation to maintain and where appropriate develop connecting features of the landscape with a view to improving the ecological coherence of the Natura 2000 network (Articles 3 and 10). Member states are also required to take measures to improve the connectivity of the Natura 2000 areas outside these areas themselves (Article 10).

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☑ River systems ☑ Large forested areas ☐ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	The measures laid down in the management plan must impact positively on the areas' environmental status with all its species and habitats (favourable conservation status, requirement for improvement)
	☑ Element of ecol. connectivity	The coherence of the Natura 2000 network must be safeguarded. Measures should be promoted that protect both the specific network of habitats inside and outside an area and the overall site which has other valuable biotopes (national biotope network).
	☐ Other	
Impact	☐ Immediate ☐ Several months ☑ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: The production of management plans usually takes a period of 1-3 years, and the measures to be implemented are only carried out after the planning process has been completed.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☐ Long (months) ☑ Very long (years)	
	Comments: The measures contained in the management plan are planned for a long period of time (approx. 10 years). The implementation periods of the individual measures can differ greatly.	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☐ National	
	Comments: The measures contained in the management plan must take account of the specific connectivity in the area; individual management measures can be of transregional importance.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☑ Forestry ☑ Hunting ☐ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Landscape planning, water resources management	
Legal situation	The management plans are based on the Habitats Directive, the Birds Directive and No. 6.1 of the Joint Declaration of 4 August 2000 concerning the protection of the European Natura 2000 network. The implementation of the measures is to be supported by state programmes (e.g. contract-based nature conservation programmes).	
Economic/financial aspects	Costs of implementing the measure (€):	Depending on the species and habitats in the area concerned, about €150-190 per $km^{2.}$
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	In the case of Natura 2000, account must be taken of socio-economic interactions with other sectors as well as of the environmental structure and nature conservation concerns.
Evaluation	The management plans for most Natura 2000 areas are currently being produced. Few experiences have therefore been made as to how connectivity measures are actually being included in the management plans and what the long-term impacts of these will be. In principle, the demarcation of Natura 2000 areas alone will not be enough to achieve the goal of a coherent ecological network.	
Information & contact	Information sources:	EU information: http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm
	Contact:	Further information may be obtained from the national authorities concerned.

1.3.2 Reporting duties and general monitoring in the Natura 2000 framework

1. Nature conservation; 1.3 Natura 2000

Natura 2000 is an EU-wide network of protected areas intended to preserve the endangered habitats and species in the EU. It comprises the protected areas defined in Council Directive 79/409/EEC on the conservation of wild birds (Birds Directive) and Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive), and aims to build a coherent ecological network. The designation of Natura 2000 areas creates an obligation to maintain, on a permanent basis, favourable conservation status of the species and habitat types through appropriate protection and development measures (management plan). To this end, member states are required to draw up a report at regular intervals (6 years) on the implementation of the measures taken under the two Directives. The Habitats Directive also requires member states to undertake surveillance of the conservation status of the natural habitats and species of Community interest. The reports should therefore include the key findings of this surveillance. Consideration should also be given to improving the ecological coherence of Natura 2000 outside the designated Natura 2000 areas.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☑ River systems ☑ Large forested areas ☐ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	The reporting duties and monitoring activities relate to the measures laid down to preserve favourable conservation status and their impacts. This is the first comprehensive statutory regulation for monitoring success in nature conservation.
	☑ Element of ecol. connectivity	The coherence of the Natura 2000 network must be safeguarded. Measures should be promoted that protect both the specific network of habitats inside and outside an area and the overall site which has other valuable biotopes (national biotope network).
	☐ Other	
Impact	☐ Immediate ☐ Several months ☐ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: Reports have to be produced on the status of the Natura 2000 network components every six years and member states should also undertake general surveillance of the natural habitats and species in question.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☐ Long (months) ☑ Very long (years)	
	Comments: As part of Natura 2000, measures to improve the connectivity situation (conservation status of species) are planned and monitored over the long term.	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☐ National	
	Comments: General surveillance should also take place outside Natura 2000 areas, as its purpose is to monitor the conservation status of the natural habitats and species with particular regard to priority natural habitat types and priority species, regardless of territorial context.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☑ Forestry ☑ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Landscape planning	
Legal situation	Pursuant to Article 11 of the Habitats Directive, general surveillance of the species and habitats of community interest should be undertaken and the main results of this general surveillance must be included in the report. The reporting duty is carried out pursuant to Article 17 of the Habitats Directive.	
Economic/financial aspects	Costs of implementing the measure (€):	Very variable as they are heavily dependent on the data already available, the reported species and habitats, the conservation status etc.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	In the case of Natura 2000, account must be taken of socio-economic interactions with other sectors as well as of the environmental structure and nature conservation concerns.
Evaluation	The current reporting period runs from 2007 to 2013 and the next reports must be submitted in 2013. For the first time, these must be based on suitable monitoring systems, and can include a comparison with the previous report (2007). This will show the effectiveness of the measures undertaken, also in relation to the connectivity situation.	
Information & contact	Information sources:	EU information: http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm
	Contact:	Further information may be obtained from the national authorities concerned.

2.1.1 Preservation, maintenance and replanting of hedges

2. Cultural landscape; 2.1 Creating and maintaining diverse structures		
Hedges are linear biotopes. They contribute to biodiversity and biotope connectivity, especially in heavily cleared landscapes with a small amount of, or no, forest or grassland. A healthy hedge with structural diversity provides a habitat for a large number of animals and is an important transit route for numerous small mammals and insects during migration and dispersion and when searching for food. Nowadays, hedgerows have virtually no commercial use and the trimming required for their regeneration tends not to take place. This means that a conscious decision must be taken to maintain the hedgerows as part of a biotope network as ageing hedges accommodate a far smaller number of species.		
	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	In cleared agricultural landscapes with large fields and land surfaces, hedges, as transit routes and ecological corridors, can reduce the fragmenting effect of the agricultural land.
	☑ Habitat improvement	Hedges are very important habitats for numerous birds, insects, amphibians, spiders and also some species of mammals.
	☑ Element of ecol. connectivity	Due to their linear form, they act as 'transit routes' for birds and bats, for example, and in most cases, they are the only way for reptiles to survive migration. In a biotope network, e.g. with rock fragment piles or small bodies of water, the valuable ecological impact of hedges is increased further by spatial contact with other species.
	☑ Other	Hedges have a stabilising effect on the surrounding agricultural landscape, provide visual cover and some noise insulation and are thought attractive by people. They differ greatly from their surroundings in terms of exposure to sunlight, evaporation, temperature, soil moisture, air humidity and wind exposure.
Impact	☐ Immediate ☑ Several months ☑ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Depending on the type of hedge and technique used, replanted hedges take different amounts of time to fully develop and become populated by fauna. Their function as transit structures can be fulfilled relatively quickly.	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: To allow them to regenerate, the shrubs forming the hedges must be trimmed in sections every 10 to 20 years depending on the type of shrub. The margin must be maintained every 1 to 2 years .	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: The direct impact of hedges is very localised, however they can also gain regional importance when integrated in a biotope system.	
Stakeholders/sectors concerned	☐ Protected areas ☑ Tourism ☑ Forestry ☑ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other:	
Legal situation	In many regions the preservation, maintenance and replanting of hedges are supported by nature conservation or agricultural subsidies.	
Economic/financial aspects	Costs of implementing the measure (€):	Costs vary greatly depending on the different maintenance and planting or construction techniques.
	Sources of financing:	☑ Private sector: sponsor(s) ☑ Private sector: other ☑ Public: European ☑ Public: national ☑ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Provision of wood without using any additional land, creation of regional value-added chains, preservation of yield increases from land near hedges, enhancement of the landscape for tourism.
Evaluation	The positive impact of hedges in biotope network projects has been described in numerous scientific studies, whereby account must be taken of the objective of these biotope network projects here. Such investigations and strategies to maintain and valorise hedge landscapes exist in the Champsaur Valley, at the edge of the Ecrins National Park in France, for example.	
Information & contact	Information sources:	Nature conservation societies, nature conservation departments in authorities, numerous regional biotope network projects (e.g. the Grand Marais (Grosses Moos) biotope network: www.biotopverbund.ch/)
	Contact:	"Grosses Moos" project leader: Martin Johner Head of Scientific Department, Ecrins National Park: Richard Bone

2.1.2. Planting of individual trees or tree groups

2. Cultural landscape; 2.1 Creating and maintaining diverse structures

Individual trees and small tree groups are a key element of the landscape and have high ecological significance. They provide habitats and refuge for many different animal species and are therefore valuable stepping stones in the biotope network. They also enrich the appearance of the landscape (e.g. by visually enhancing large areas of farmland) and increase its recreational value (e.g. by providing shade for seating areas). Due to their cultural and historical value, too (e.g. as symbols of peace, or where they had a role in the execution of justice), individual trees have landscape significance. Old trees in particular should be preserved in farmland, one reason being that their cavities provide particularly valuable micro-habitats. The planting of new trees should also be supported. Trees with a trunk circumference of at least 12-14 cm should be planted, and should be well-adapted to the chosen site.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Individual trees enhance the surrounding landscape and provide an important habitat for numerous species of fauna.
	☑ Element of ecol. connectivity	In open countryside and agricultural landscapes, individual trees constitute valuable stepping stones and thus play an important role in connecting isolated near-natural landscape elements.
	☑ Other	Beneficial to local climate.
Impact	☐ Immediate ☑ Several months ☑ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: Newly planted trees develop their function in the biotope network with increasing age.	
Implementation period	☑ Short (days) ☑ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: Prior to planting, meticulous planning is required; maintenance is essential after planting.	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: Individual trees play an important role as stepping stones in the local biotope network.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☐ Forestry ☐ Hunting ☐ Local community ☑ Agriculture ☑ Nature conservation ☑ Spatial planning ☑ Transport	
	Other: Countryside management	
Legal situation	In most regions, particularly large and ancient individual trees are often designated "natural monuments" or "protected landscape elements".	
Economic/financial aspects	Costs of implementing the measure (€):	Funding can be provided in some regions for individual trees and rows of trees on arable land (approx. € 20/tree); costs depending on size amount to approx. € 100-400/tree; cost of maintenance € 40-100/tree/year
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Individual trees and groups of trees are valuable landscape-enriching elements and sources of food (fruit, blossom for tea) and of timber and fuelwood.
Evaluation	The major importance of individual trees and groups of trees for nature conservation is apparent, inter alia, from their designation as protected landscape elements or natural monuments. Their importance for the biotope network is recognised and they are often promoted/protected within the framework of biotope network initiatives. They are also suitable as an element of an inner-city biotope network.	
Information & contact	Information sources:	More information can be obtained from the responsible nature conservation agencies and at: http://www.landwirtschaft-mlr.baden-wuerttemberg.de/servlet/PB/menu/1109685/index.html
	Contact:	

2.1.3 Creation and maintenance of dry stone walls

2. Cultural landscape; 2.1 Creating and maintaining diverse structures

Dry stone walls are traditional landscape elements. They provide various types of habitat depending on their specific micro-climate, especially for thermophilous (warmth-loving) open-country species. The cracks in the walls, which are filled with fine earth, provide specific micro-habitats in which various plant communities and wild flora occur. Dry stone walls are also important habitats for insects, reptiles and amphibians, and provide breeding sites for birds (e.g. wheatears (Oenanthe), Black Redstart (Phoenicurus ochruros), Blue Tit (Cyanistes caeruleus), and Great Tit (Parus major)). They constitute valuable stepping stones and insular biotopes in the agricultural landscape and due to their linear structure, have a connective effect. Other near-natural structures such as pioneer areas and margins should also be preserved along dry stone walls.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Promotion of typical plant species such as algae, lichens and mosses, moths and snails. Quiet areas and winter quarters for invertebrates and reptiles. Some species of wild bee (mason bee - Chalicodoma siculum) nest in the cracks in the walls.
	☑ Element of ecol. connectivity	Dry stone walls often have a corridor function and are important for connectivity. Their significance increases when linked to other near-natural landscape structures and they can, among other things, enhance structurally rich forest edges.
	☐ Other	
Impact	☑ Immediate ☑ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Dry stone walls can be populated immediately after construction .	
Implementation period	☑ Short (days) ☑ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: The construction of new walls takes place from November to March, and damage is then monitored every year. Heavily overgrown walls should be partially cleared of shrubs, at least half of the wall should be left to grow wild and loose growth should be tolerated.	
Scope of implementation	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: Due to their impact as a stepping stone biotope, dry stone walls also play a role in regional biotope networks.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☐ Forestry ☐ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☑ Spatial planning ☐ Transport	
	Other: Landscape planning, voluntary nature conservation	
Legal situation	Subsidies for dry stone walls are possible through countryside management programmes and also within programmes for steep slopes (e.g. viticulture).	
Economic/financial aspects	Costs of implementing the measure (€):	Depending on the quality of the stones (one tonne per continuous metre), a new construction costs in the region of €310-470 per m^2 (excluding excavation works), time expenditure: 2-4 m/day with experienced workers.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	With appropriate subsidies, the additional costs for building and maintaining dry stone walls will be low.
Evaluation	Dry stone walls are regarded as important structural elements of the landscape and provide habitats for various species of flora and fauna. Their importance in the biotope network is increased when linked to other suitable near-natural landscape structures.	
Information & contact	Information sources:	e.g. BirdLife: http://www.birdlife.ch/pdf/trockenmauern.pdf or: http://www.landwirtschaft-mlr.baden-wuerttemberg.de/servlet/PB/menu/1063566/index.html
	Contact:	Schweizer Vogelschutz SVS/BirdLife Schweiz

2.1.4 Creation, maintenance and preservation of rock fragment piles

2. Cultural landscape; 2.1 Creating and maintaining diverse structures

Rock fragment piles are important structural elements of the landscape. From a nature conservation perspective, they constitute valuable stepping stones and insular biotopes in the agricultural landscape. A wide diversity of flora and fauna (insects, spiders, amphibians, reptiles and even small mammals) depend on these man-made habitats as their original habitats have disappeared in today's cultural landscape. These ecologically valuable structural elements must therefore form a key part of future landscape planning. As far as possible, the rock fragment piles should be created near waysides or forest edges or by hedgerows, not in an isolated position, in order to safeguard connectivity with a biotope network. Management involves occasional clearing of vegetation and, if necessary, re-stacking.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Rock fragment piles provide resting places and habitats for various species of animals, as well as frost-proof winter quarters: the sand lizard (Lacerta agilis), the white wagtail (Motacilla alba alba), various species of mouse and also ground beetles, spiders, woodlice, snails, ants, bugs and wild bees.
	☑ Element of ecol. connectivity	Rock fragment piles constitute valuable stepping stones and insular biotopes in the agricultural landscape. In a biotope network with a hedge, for example, a spatial contact is produced and the valuable ecological impact is increased further.
	☑ Other	If the rock fragments are piled in a linear form, rock fragment walls emerge, which can be important as corridors.
Impact	☑ Immediate ☑ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Rock fragment piles can be populated immediately after construction .	
Implementation period	☑ Short (days) ☐ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: Building and maintaining rock fragment piles do not take very long. Occasionally they have to be cleared of vegetation and may have to be re-stacked.	
Scope of implementation	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☑ National	
	Comments: Most of the species that inhabit rock fragment piles have relatively small ranges. As a stepping stone biotope, however, rock fragment piles also have a part to play in a local biotope network.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☐ Forestry ☑ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other:	
Legal situation	In many regions, rock fragment piles are protected by law. Their conservation is supported by nature conservation and/or agricultural subsidies.	
Economic/financial aspects	Costs of implementing the measure (€):	The construction and maintenance of rock fragment piles are not expensive (a few hours of work per year). Subsidies amount to approx. €25 per rock fragment pile.
	Sources of financing:	☑ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	None
Evaluation	The ecological importance of rock fragment piles for various species of flora and fauna has been recognised. Their significance in an ecological network comes mainly from the interaction with other landscape structures (hedges, streams, ponds, rock fragment walls etc.). They must also be integrated meaningfully into an overall strategy.	
Information & contact	Information sources:	From various nature conservation organisations, the Nature and Biodiversity Conservation Union (NABU), the Federation for Environment and Nature Protection in Germany (BUND), Pro Natura, the French nature conservation organisation FRAPNA,…; and from the various regional administrations (nature conservation and agriculture departments).
	Contact:	

2.1.5 Maintenance and preservation of mixed orchards

2. Cultural landscape; 2.1 Creating and maintaining diverse structures		
Mixed orchards are a characteristic and attractive feature of the cultural landscape in many Alpine regions and are among the most valuable patch biotopes. Due to the structural diversity in mixed orchards and the resulting diverse mosaic-type habitats, they provide a habitat for a wide range of species of flora and fauna. Scientific studies have shown that mixed orchards – unlike modern dwarf-tree intensive production systems – form very richly structured habitats with species-rich communities. As a result of their declining economic significance, and being fairly high-maintenance, however, more and more mixed orchards have been cleared in recent decades or have fallen victim to ageing. However, in intensively used agricultural landscapes, they constitute important connective structures in the local biotope network. The conservation measures for these areas must include arrangements for mowing, fertilising, management and maintenance, the preservation of ageing trees, etc.		
	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Mixed orchards constitute habitats that are particularly rich in structures and species due to the diverse fruit varieties, the varying tree maturities and the various structures associated with meadows with an abundance of species and flowers. They accommodate up to 5000 species of flora and fauna.
	☑ Element of ecol. connectivity	They constitute important connective structures in the local biotope network, particularly in intensively used agricultural landscapes.
	☑ Other	Mixed orchards have a positive impact on the local climate due to their windbreak function and their cooling effect in summer. Soil protection and water pollution control, conservation of genetic diversity.
Impact	☐ Immediate ☐ Several months ☐ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: Their positive impact on flora and fauna comes mainly from their structural diversity: in the case of replanted orchards, this only occurs with time and in existing orchards it is only possible with regular, expert maintenance.	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments:The requisite expert maintaince of mixed orchards comprises several different and regular tasks throughout the year (mowing, pruning, harvesting, tree management, …)	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: In itself, a mixed orchard has a high ecological value as a patch biotope, which is increased significantly when it forms part of a network comprising several nearby areas.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☐ Forestry ☐ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☑ Spatial planning ☐ Transport	
	Other: Countryside management, voluntary nature conservation	
Legal situation	The Birds Directive and the Habitats Directive deal indirectly with the mixed orchard habitat. They specify a direction while the concrete implementation is based on the precise provisions of national laws, guidelines, promotion programmes and initiatives (in Bavaria, subsidies of approx. €5/tree, max. 100 trees/ha)	
Economic/financial aspects	Costs of implementing the measure (€):	Replanting costs in the region of €2500-5000/ha depending on the planting method, preparatory measures, tree density etc. Depending on the land, number of trees and working time, subsidies or aid are granted for product marketing, which vary greatly from region to region.
	Sources of financing:	☑ Private sector: sponsor(s) ☑ Private sector: other ☑ Public: European ☑ Public: national ☑ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	On tourism through the enhancement of the landscape, on the regional economy and identity through local products (labels, old fruit varieties, juice etc.)
Evaluation	Various projects within the framework of the 'BayernNetzNatur' (Bavarian Nature Network) biotope network have shown that initiatives relating to mixed orchards not only have positive effects on the inhabitant flora and fauna, but also play an important role in issues such as regional value-added and development, the formation of regional networks, creation of identity etc., and that biotope network projects can be structured around such 'core initiatives'.	
Information & contact	Information sources:	From regional and national authorities (nature conservation, agriculture) and, for example, the "Streuobst 2000 Plus" initiative from the Bavarian agricultural authority to promote the cultivation of mixed orchards in Bavaria.
	Contact:	Expert: Stefan Kilian, Bavarian State Research Center of Agriculture, Institute for Agricultural Ecology, Organic Farming and Soil Protection (LFL-IAB)

2.1.6 Encouragement of unpaved paths

2. Cultural landscape; 2.1 Creating and maintaining diverse structures

Depending on their type and the way in which they are built, paths can have a low to high barrier effect. Pathway systems and their peripheral areas do not necessarily have a fragmenting effect on species of flora and fauna, however: if properly designed, they can also form important elements of the biotope network. They provide ways through the landscape and also form buffer zones to intensively farmed areas. From an ecological perspective, unpaved and "greened" paths and the strips of grass and vegetation, wooded areas, hollows, ditches etc. at their margins are extremely important. If the construction of new pathways is unavoidable, the need for sufficiently wide wayside areas should be taken into account during the planning process (at least 2.50 m wide grass and vegetation strips, at least 5 m wide wooded strips along pathways). Sunken paths and 'greened' dirt tracks, too, have diverse ecological functions as they provide many niches for flora and fauna with highly diverse requirements.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☑ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	Reduction of the barrier effect of paths for insects (e.g. beetles and spiders)
	☑ Habitat improvement	Unpaved paths are important for some bird species as well as brown hares (Lepus europaeus). Wet sites by paths are used by some species, e.g. as spawning areas for the yellow-bellied toad (Bombina variegata) or as a source of nesting material.
	☑ Element of ecol. connectivity	Unpaved paths constitute important elements of a biotope network, particularly in cleared agricultural landscapes, due to their linear structure, the valuable micro-habitats they provide and their margin and border areas.
	☐ Other	Trees and shrubs planted on field pathways counter soil erosion.
Impact	☐ Immediate ☑ Several months ☑ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: The new habitats created by the unpaved paths, or the near-natural design of existing pathways, are populated quickly.	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: The implementation periods of suitable measures depend on the situation at the outset. The measures can be integrated easily into new pathway projects.	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: In principle, the impact is more localised, but the measure can gain regional importance with a large scale approach.	
Stakeholders/sectors concerned	☐ Protected areas ☑ Tourism ☑ Forestry ☐ Hunting ☐ Local community ☑ Agriculture ☑ Nature conservation ☑ Spatial planning ☑ Transport	
	Other: Voluntary nature conservation (e.g. preservation or recultivation of sunken paths), countryside management	
Legal situation	The design of pathways is not directly governed by any laws, but the creation of near-natural pathways can be supported through close collaboration with the agriculture and forestry sectors, as well as through landscape planning (developing guiding principles).	
Economic/financial aspects	Costs of implementing the measure (€):	The exact costs depend on the situation at the outset, and subsidies from countryside management programmes are sometimes possible.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Unpaved paths are also more attractive for recreational use (hiking, mountain biking) and therefore have a high touristic value.
Evaluation	Some examples show that, after the 'greening' of paths, there are more frequent occurences of animals such as rabbits/hares, butterflies and bees and even songbirds and birds of prey. Unpaved and 'greened' paths can also be advantageous for farmers as, in the long term, they can reduce the costs of controlling insects and mice in their fields. Diverse experiences have been made, e.g. in countryside management associations or nature conservation authorities. In Upper Austria, the preservation and development of paths with little paving have been defined as overarching goals in landscape planning.	
Information & contact	Information sources:	Upper Austria: www.ooe.gv.at/cps/de/xchg/SID-31C32BFF-BD5213B7/ooe/hs.xsl/71437_DEU_HTML.htm
	Contact:	e.g. Office of the Government of Upper Austria, Department of Spatial Planning, Economic and Rural Development, Nature Conservation Division

2.2.1. Maintenance and restoration of traditional irrigation systems

2. Cultural landscape; 2.2 Resumption and continuation of old forms of use

As early as the Middle Ages, complex irrigation systems were created in various Alpine regions with low precipitation, in order to bring water from the mountains to the farmed areas in the valleys, often at some distance away. These artificial water transportation systems, often many kilometres in length (e.g. the "suonen" channels in Valais, Switzerland, the "acquedotti" in Val di Non (Trentino/Italy) and the "waale" in South Tyrol) are important landscape features with great significance for various associated habitats (lines of trees, mosaics of wet, semi-dry and dry sites). The conservation, restoration and maintenance of these elements are supported on a project basis or through the payment of maintenance premiums.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☐ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☐ Densely populated areas ☐ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	As a result of the abandonment of the irrigation systems, pipe installation and the use of sprinkler systems on farmland, important landscape structures and habitats that act as corridors or stepping stone biotopes in a functional ecosystem (e.g. lines of deciduous trees on dry slopes) are disappearing.
	☑ Element of ecol. connectivity	Due to their net-like structure, the irrigation systems form linear connecting elements in a biotope network.
	☐ Other	
Impact	☐ Immediate ☐ Several months ☐ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: This is a long-term measure whose initial outcomes can only be observed after several years as the associated flora and fauna only gradually become established and habitats take time to recover and develop.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: Maintenance, repair and management measures are long-term activities.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: These measures are mainly suitable for implementation in regions where such irrigation systems and channels exist. Depending on the size of the system, the measures may affect individual municipalities or entire regions.	
Stakeholders/sectors concerned	☐ Protected areas ☑ Tourism ☐ Forestry ☐ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Land owners.	
Legal situation	The management and restoration of traditional irrigation systems are funded by agricultural and/or nature conservation programmes in various areas.	
Economic/financial aspects	Costs of implementing the measure (€):	In South Tyrol, for example, maintenance of the "waale" receives an amount up to a maximum of 70% of recognised projected costs.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	In the tourism sector, may be marketed successfully as part of a hiking trail concept (e.g. the Waalweg paths in South Tyrol).
Evaluation	Experience has been gained in South Tyrol, which has the most extensive system in the Alpine region, Valais, Switzerland, and elsewhere.	
Information & contact	Information sources:	Information about contributions to landscape management in South Tyrol: Amt für Natur- und Landschaft (Office of Nature and Landscape) http://www.provinz.bz.it/natur/index_d.asp Project: "Kulturlandschaft Zeneggen 2000" (Cultural Landscape Zeneggen 2000) http://www.zeneggen.ch/
	Contact:	e.g. Amt für Natur- und Landschaft (Office of Nature and Landscape), South Tyrol

2.2.2 Grazing projects – landscape conservation with sheep

2. Cultural landscape; 2.2 Resumption and continuation of old forms of use		
For a biotope network with nutrient-poor and dry sites, sheep grazing plays a key role. Due to their lack of economic viability using conventional cultivation methods, there is often a risk that these valuable biotopes will cease to be managed and maintained. Furthermore, these areas are in many cases being drastically reduced, with remaining oligotrophic grasslands often becoming isolated. Site gradients are being lost, successional processes terminate at stages of maturity, and there is a lack of new pioneer sites. Traditional grazing using sheep can ensure the sustainable management of these sites. To this end, testing and development of practicable area management methods are required in cooperation with sheep farmers and landowners.		
	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☐ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	Tests using plant seeds have shown that the diaspores can been found in sheep's wool for a period of several months. Species and gene exchanges can take place in this way, or a new population of a species can occur, even between areas that are kilometres apart.
	☑ Habitat improvement	In grazed areas, certain plant species are promoted through the browsing and feet of the sheep while others are decimated. Overall, these processes are more dynamic than mowing. Bush encroachment is prevented in these areas.
	☑ Element of ecol. connectivity	Grazing performs an important function in the biotope network. Flocks of sheep can promote the dispersion of species between individual areas by transporting diaspores and, in rarer cases, even small animals. This can be very important for the exchange of genes and species between isolated areas.
	☐ Other	
Impact	☑ Immediate ☐ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: The direct impact of the grazing on the land, as well as the indirect impact from the transport function performed by the sheep, occur immediately after grazing is commenced.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: During the vegetation period, the flocks of sheep are herded along tracks from one area requiring treatment to the next in accordance with a fixed grazing plan.	
Scope of implementation	☐ Very localised (plot) ☐ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☐ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: Regional strategies must be produced to enable sufficient grazing land to be provided for the sheep and achieve connectivity effects through migratory grazing.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☐ Forestry ☐ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Countryside management associations, municipalities, districts and other local authorities	
Legal situation	Grazing can be supported at local and regional level by means of contract-based nature conservation and maintenance premiums (approx. €160-260/ha/year)	
Economic/financial aspects	Costs of implementing the measure (€):	The costs of sheep grazing are around €175-385/ha/year.
	Sources of financing:	☑ Private sector: sponsor(s) ☑ Private sector: other ☐ Public: European ☐ Public: national ☑ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	The products from sheep farming (wool, meat, dairy products) provide regional value-added. Sheep farming jobs are created.
Evaluation	Plants and animals use sheep for transport. A roving flock of sheep can reduce isolation effects in many ways: on the one hand, the tracks create connectivity between the areas, and on the other, the wandering flock of sheep can act as a living biotope network by transporting various organisms in their wool or hooves.	
Information & contact	Information sources:	e.g. the grazing strategy from the Bavarian Environment Agency in the Lech valley (www.lfu.bayern.de)
	Contact:	Lebensraum Lechtal (the habitat of the Lech valley) project management: www.lebensraum-lechtal.de

2.2.3. Preservation of an open landscape through controlled burning

2. Cultural landscape; 2.2 Resumption and continuation of old forms of use

Open-country habitats such as embankments in wine-growing areas or terraced landscapes, dry grasslands, heaths or peat bogs are ecologically valuable areas. However, as they are often only of marginal suitability for agricultural use, and are costly and time-consuming to maintain, they are at risk from bush encroachment or the occurrence of problematical vegetation (e.g. Goldenrod (Solidago virgaurea) and blackberry). This impacts on the appearance of the landscape and on the ecological functionality of these areas. The maintenance of these areas through controlled burning may be a viable and cost-effective option here. However, this management technique will only be successful, from a nature conservation and technical perspective, if the personnel undertaking the measure are properly trained, as practical implementation of controlled burning requires strict adherence to procedural guidelines.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☐ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☐ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Burning as a method of managing embankments and other sites helps to maintain an open landscape and therefore also open-country habitats such as dry grasslands, sandy dry vegetation, montane dry grasslands, heath and peat bogs.
	☑ Element of ecol. connectivity	Open linear spaces such as embankments in managed cultural landscapes form complex networks which can act as connecting elements in a biotope network. Patches of woodland and shrubs increase this effect.
	☐ Other	
Impact	☐ Immediate ☑ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: The regeneration and recolonisation of the managed areas take place during the vegetation period. Once the area offers some cover, it can be used as a corridor.	
Implementation period	☑ Short (days) ☑ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: Controlled burning on specific areas is very swift. However, this management measure should be embedded in a local or regional strategy, and depending on the number of sites to be managed, may be fairly time-consuming.	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: When individual sites are managed in this way, the impact remains very localised. However, if several spaces undergo this form of management as part of a broader strategy, important stepping stone biotopes and connecting elements are created.	
Stakeholders/sectors concerned	☐ Protected areas ☑ Tourism ☐ Forestry ☐ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Viticulturalists in wine-growing areas.	
Legal situation	Burning must comply with local nature conservation and agricultural legislation.	
Economic/financial aspects	Costs of implementing the measure (€):	The costs of controlled burning amount to approx. ca. € 50-150/ha, so generally, it is up to 50% cheaper than other management options.
	Sources of financing:	☐ Private sector: sponsor(s) ☑ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	In areas with a structurally rich, open cultivated landscape, controlled burning can help to preserve the landscape appearance. Savings made due to lower implementation costs.
Evaluation	The outcomes of trials in Baden-Wuerttemberg, for example, which have been carried out for around 25 years, indicate that controlled burning has a role to play in maintaining open grasslands, their structure and species diversity. However, ensuring that farmers comply with the guidelines on controlled burning may be problematical and may lead to conflicts with nature conservation objectives and the local community.	
Information & contact	Information sources:	Global Fire Monitoring Center (GFMC) http://www.fire.uni-freiburg.de/
	Contact:	Prof. Dr. Johann G. Goldammer, Head of Fire Ecology Research Group, University of Freiburg

2.2.4 Tree maintenance and preservation of pollarded trees

2. Cultural landscape; 2.2 Resumption and continuation of old forms of use

Pollarded willows are characteristic elements of the landscape in various Alpine regions. The unusual shape of the heads of the trees is created when the young trunks and main branches are cut back to promote a more bushy growth of foliage. At the head of the trunk, cavities are formed over time, and in the branches, the bark and especially the cavities, numerous species find a habitat and niches in which to breed. As many as 200 species of fauna can occur in the willows found in intact river meadows, for example. In the past, pollarded willows provided a source of wood, e.g. for fencing, shafts for tools, bindings for wine, basket-making etc., but they have no current value from this perspective today. In the context of large-scale agriculture, too, stands of pollarded willows are often regarded as a nuisance and are therefore removed. The management of pollarded willows is time-consuming and labour-intensive, and if they are not maintained, the trees often break apart. In networks of interlinked biotopes, they constitute important stepping stones and transit routes.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☐ Priority areas for biodiversity ☑ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Regular cutting of the willows results in rapid thickening of the trunk, with areas of decay and cavities developing at the upper end as the years pass. In the cracks, niches and hollows of these old stands of pollarded trees, numerous species of small mammals, insects and birds etc. find a habitat and niches in which to breed.
	☑ Element of ecol. connectivity	As linear structures, e.g. along small watercourses, they can act as transit routes. As isolate trees they form important stepping stones in the cultural landscape.
	☑ Other	Pollarded willows are suitable for use to reinforce ditches and banks and can thus replace masonry in the rehabilitation of watercourses to some extent.
Impact	☐ Immediate ☐ Several months ☐ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: Pollarded trees develop their habitat and stepping stone biotope function with increasing age.	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: Caring for the trees is time-consuming and labour-intensive. Managing a large number of trees is likely to be fairly time-consuming. Regular cutting only takes place every 8-10 years, however, so that the management can be spread over a number of years.	
Scope of implementation	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: As part of a local or regional strategy for the management of the pollarded trees, the biotope networking impact can be substantially increased.	
Stakeholders/sectors concerned	☐ Protected areas ☑ Tourism ☑ Forestry ☐ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☑ Spatial planning ☐ Transport	
	Other: Water resources management, watercourse protection.	
Legal situation	Management, maintenance and new planting of pollarded willows are subsidised in various Alpine regions. In some regions, these trees enjoy protect status as significant elements of the cultural landscape.	
Economic/financial aspects	Costs of implementing the measure (€):	Subsidies can amount to around € 25-30 per tree.
	Sources of financing:	☑ Private sector: sponsor(s) ☑ Private sector: other ☐ Public: European ☐ Public: national ☑ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Pollarded willows provided a source of wood, e.g. for fencing, shafts for brooms, bean poles, bindings for wine, basket-making, firewood, etc.. This has decreased in significance but is now being revived in local projects. The wood is used in schools and kindergartens as a material to build play tunnels, lattice fencing, etc. Willow rods can also be used in private gardens and for reinforcing banks in "green" hydraulic engineering.
Evaluation	Pollarded trees are important and particularly striking features of a cultural landscape and are closely linked with various traditional forms of use. For that reason, in addition to their ecological function, it is important to integrate them into biotope networking strategies. They can develop symbolic significance for entire projects (see project run by Burgenland Society for Nature Conservation).	
Information & contact	Information sources:	Braun, Konold (1998): Kulturgeschichte und Bedeutung der Kopfweiden in Südwestdeutschland. Beiheft 89, Veröffentlichungen für Naturschutz und Landschaftspflege in Baden-Württemberg. 240 p.
	Contact:	e.g. Pollarded tree project run by Burgenland Society for Nature Conservation: www.naturschutzbund.at/burgenland/

3.1.1. Set-aside

3. Agriculture; 3.1 Use of grasslands

Set-aside areas distributed across the agricultural landscape can create high-quality habitats for wild fauna and flora and thus contribute on a sustainable basis to the conservation of characteristic communities in open farmland. Diverse vegetation structures, e.g. areas of wild herbs on agricultural fields, provide important areas for resting, breeding, feeding, mating or cover (e.g. for Corn Bunting (Emberiza calandra), Skylark (Alauda arvensis) and Brown hare (Lepus europaeus)) and provide overwintering areas for insects and spiders. They can compensate for the loss of former near-natural habitats and take on regulatory functions. They also act as a buffer to other habitats and due to their insular distribution, are important elements of the biotope network in the otherwise intensively used agricultural landscape. Areas of wild herbs on agricultural fields can be established as rotational fallow and wildflower strips (established for 2-6 years in the agricultural landcape; the fields are sown with native field species and wild herbs and are not fertilised or treated with pesticides).

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☐ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Set-aside areas act as buffer zones between different forms of use, especially close to ecologically valuable biotopes, and provide a habitat for rare species.
	☑ Element of ecol. connectivity	Fallow areas act as stepping stone biotopes. This impact is greatly increased through the inclusion of the areas in local planning.
	☑ Other	Set-aside areas reduce nitrogen inputs and contribute to soil protection.
Impact	☐ Immediate ☑ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Areas enhanced in this way provide year-round habitats.	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: Establishment and maintenance (seeding with site-appropriate mixes of native grasses/herbs, soil management) of the set-aside areas can be well-integrated into routine land management.	
Scope of implementation	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: The impact of the measure can be greatly increased if individual sites are integrated into a broader network (e.g. field margins, extensively managed areas, hedges).	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☐ Forestry ☐ Hunting ☐ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other:	
Legal situation	Relevant measures are subsidised through various countryside management and cultural landscape programmes.	
Economic/financial aspects	Costs of implementing the measure (€):	Set-aside may be subsidised by up to €200/ha p.a.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Subsidies can provide a basic income for farmers. Set-aside also enhances the appearance of the landscape and safeguards pollination of crops.
Evaluation	Set-aside was introduced by the EU from 1988/89 (mandatory from 1993/94) to 2007/08 with the aim of regulating the quantities of farm goods being produced. In Switzerland, direct payments are still linked to "evidence of ecological performance", which includes, among other things, the provision of an appropriate proportion of ecological compensation areas.	
Information & contact	Information sources:	http://www.landwirtschaft.ch/de/wissen/oekologie/ Further information is available from the relevant authorities.
	Contact:	

3.1.2 Extensive use of grasslands

3. Agriculture; 3.1 Use of grasslands

Extensively used grassland is extremely important for the biotope network due to its species richness. Alongside direct extensivisation of use (e.g. zero to moderate fertilisation, no use of plant protection products, no ploughing up of grassland or sowing), low frequency of cutting (max. 2-3 times a year), together with later cutting and specific mowing techniques can also help to improve biotope functions. High cutting (mowing height 10-12 cm) can protect amphibians, ants and ground breeders. By using mosaic and phased mowing (i.e. mowing at different times on different areas), and by leaving peripheral areas unmown, food sources can be created for insects (especially bees) as well as refuges for wild fauna.

	☑ Appropriate habitat approach ☐ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☐ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	Extensivisation increases the permeability of the landscape matrix and thus mitigates possible barrier effects of farmland.
	☑ Habitat improvement	Species-rich grassland fulfils the habitat requirements of rare species and acts as a buffer zone between different forms of use and intensively used areas.
	☑ Element of ecol. connectivity	Extensive areas of grassland are important elements of the biotope network. The impact is increased if individual areas are integrated into a network of extensively used margins and scattered dry meadows.
	☑ Other	Supports groundwater and soil protection; protects against erosion.
Impact	☐ Immediate ☑ Several months ☑ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Species-rich grassland provides valuable refuge areas, including in winter. The impact is especially high during the vegetation period.	
Implementation period	☑ Short (days) ☑ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: Extensive management practices can be well-integrated into land management. Some specialist equipment may be required (e.g. double blade cutting bar). Long-term strategies (min. 5 years) should be aimed for.	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: Local planning of a network of extensively used areas and scattered species-rich meadows increases the impact of individual sites.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☐ Forestry ☑ Hunting ☐ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other:	
Legal situation	Extensive grassland use is an element of cultural landscape/countryside management programmes and contractual nature conservation. Subsidies are therefore provided for specific extensivisation schemes.	
Economic/financial aspects	Costs of implementing the measure (€):	Renunciation of mineral fertiliser use is subsidised to approx. €150/ha; up to approx. €300/ha is paid for adherence to provisions governing cutting times.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Enrichment of landscape appearance and therefore increased recreational value; ensures pollination of agricultural crops.
Evaluation	The promotion of extensive grassland has long formed part of cultural landscape conservation programmes and contractual nature conservation. Further information can be obtained from the relevant authorities and nature conservation organisations. Funding criteria and conditions vary widely according to country and region.	
Information & contact	Information sources:	All relevant nature conservation and agricultural authorities.
	Contact:	

3.1.3. Species-rich seeding on agricultural fields

3. Agriculture; 3.1 Use of grasslands

Species-rich seeding of wild and cultivated plants on set-aside or other areas (e.g. "green" areas created in compensation for natural spaces lost through construction of roads etc.; fallow land in residential areas), can enrich the landscape's appearance and make a valuable contribution to the biotope network. Seeding with wild species provides a source of food and cover for wild fauna and, depending on the mix of seeds used, can also provide habitats for insects (butterflies, bees, ground beetles, spiders). Sown areas are also used by hedge dwellers (e.g. the Red-Backed Shrike (Lanius collurio)) as substitute habitats. Seeding should take place from mid-April to the end of June, and depending on the condition of the site, may require preparatory measures (e.g. removal of weeds, ploughing etc.). Suitable seed assortments are commercially available.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☐ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Areas which have undergone species-rich seeding provide habitat for rare species and can have a buffer effect in the intensively used agricultural landscape.
	☑ Element of ecol. connectivity	The relevant areas can act as stepping stone biotopes in the biotope network, and the impact can be increased if integrated into a broader strategy.
	☑ Other	Soil fertility.
Impact	☐ Immediate ☑ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Some months elapse between the adoption of the preparatory measures and the appearance of the full impact during the vegetation period.	
Implementation period	☑ Short (days) ☑ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: Seeding does not involve a great deal of work, and generally, no management is required afterwards.	
Scope of implementation	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: If integrated into a broader strategy (local planning) which includes field margins, for example, a heightened impact can be achieved.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☐ Forestry ☑ Hunting ☐ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Countryside management, bee-keepers, voluntary nature conservation organisations.	
Legal situation	Species-rich seeding can form part of countryside management/cultural landscape programmes.	
Economic/financial aspects	Costs of implementing the measure (€):	Costs are likely to amount to approx. €150/ha p.a. over a 5-year period.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Depending on the seed mixture, specific plants can be used (herbs, flowers). Enhances the visual appearance of the landscape (tourism). Significance for hunting, bee-keeping.
Evaluation	Areas which have undergone species-rich seeding have long formed part of contractual nature conservation programmes. There are various examples of schemes which have been implemented as part of biotope networking initiatives. In Bavaria, a pilot project ("The Biotope Network in the Cultural Landscape") was carried out from 2000-2005, and various seed mixtures are available via this scheme.	
Information & contact	Information sources:	http://www.lwg.bayern.de/landespflege/landschaftspflege/25786/ansaat_pilotpro.pdf http://www.lebensraum-brache.de/Projekte/Lebensraum_Brache/index.php
	Contact:	Bavarian State Institute for Viticulture and Horticulture (LWG), Countryside Management Department, contact: Martin Degenbeck

3.2.1. Promotion of organic farming

3. Agriculture; 3.2 Extensivisation of agricultural use		
Many endangered species of fauna and flora are dependent on agricultural habitats, so in terms of conserving biological diversity, extensivisation of agricultural use should be the aim on ecologically significant areas. In this context, organic farming has an extremely important role to play, one reason being that it avoids and reduces the environmental stresses which can otherwise arise in farming. Furthermore, the targeted creation of landscape elements (ecological compensation areas such as hedgerows, fallow areas, forest strips and extensive meadows) make an important contribution to the promotion of biological diversity. These areas are also important elements of a biotope network.		
	☑ Appropriate habitat approach ☐ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Extensively managed spaces are important habitats for a wide range of species and act as buffer zones in an intensively farmed landscape.
	☑ Element of ecol. connectivity	Extensive areas are important elements of the biotope network. The impact is increased if individual areas are integrated into an network of extensively used margins and scattered dry meadows.
	☑ Other	Positive impact on soils and the hydrological regime.
Impact	☐ Immediate ☑ Several months ☑ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: A positive impact can already be achieved after the implementation of individual measures (e.g. creation of hedge structures); a longer period is required for full conversion to organic farming, however.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☐ Long (months) ☑ Very long (years)	
	Comments: The length of time required for conversion to organic farming depends, among other things, on operating structures. As a rule, at least 12 months must elapse until produce can be marketed as organic.	
Scope of implementation	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: Tends to be localised, as individual organic farms are scattered across the countryside. With a larger-scale approach and the incorporation of other structures, the connectivity impact increases accordingly.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☐ Forestry ☐ Hunting ☐ Local community ☑ Agriculture ☐ Nature conservation ☐ Spatial planning ☐ Transport	
	Other:	
Legal situation	Organic farming and conversion can be subsidised from countryside management/cultural landscape programmes (generally approx. € 200-500/ha p.a.).	
Economic/financial aspects	Costs of implementing the measure (€):	Conversion is extremely cost-intensive (additional equipment, more space, etc.). Exact costs are highly dependent on operating structures.
	Sources of financing:	☑ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	From a long-term perspective, positive effects through financial support and greater security of sales. Good marketing strategies are key.
Evaluation	The positive impact of organic farming on the natural environment and landscape is recognised and backed by numerous studies. This demonstrates the importance of organically farmed areas as elements of the biotope network. Information about conversion and funding opportunities can be obtained from the relevant ministries, authorities and growers' associations.	
Information & contact	Information sources:	Organic farming in Rhön: Innovative example of how to ensure sales: http://www.bionade.com/bionade.php/10_de/12_projekte/01_biolandbau?usid=49aff28dacd8749aff28dad54f
	Contact:	

3.2.2. Extensive agriculture

3. Agriculture; 3.2 Extensivisation of agricultural use

Agricultural extensivisation measures include extensive (restriction of intensive crop cultivation, i.e. maize, wheat) and diverse crop rotation (cultivation of at least five different crops per year), reductions in the use of mineral fertilisers and chemical plant protection products, suspension of cultivation during breeding periods, and reduced density of grain sowing. Winter vegetation as well as green strips and patches of flowering plants can make a contribution to the extensivisation of use in the farmland biotope. In the long term, such measures promote the conservation and improvement of ecologically valuable habitats on farmland sites, especially for field breeders and wild herbs on agricultural fields. By upgrading farmland as a habitat, extensivisation measures make an important contribution to the biotope network. Extensively used areas are important insular and stepping stone biotopes, especially in an intensively used agricultural landscape.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☐ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	Extensivisation increases the permeability of the landscape matrix and thus decreases the possible barrier effects of farmland.
	☑ Habitat improvement	Measures for the extensivisation of agriculture improve habitat quality (species richness) and create buffer zones to areas of intensive use.
	☑ Element of ecol. connectivity	Extensively used areas are important elements of a biotope network. The impact is increased if individual areas are integrated into a network of extensively used spaces (including other biotope types, e.g. meadows).
	☑ Other	Supports groundwater and soil protection, protection from erosion.
Impact	☐ Immediate ☑ Several months ☑ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: The impact of relevant measures starts soon after implementation.	
Implementation period	☑ Short (days) ☑ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: Extensive management practices can be well-integrated into land-use management. The aim should be to establish long-term strategies (at least 5 years).	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: Local planning of a network of extensively used areas (including grassland) increases the impact of individual extensive areas.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☐ Forestry ☐ Hunting ☐ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other:	
Legal situation	Extensivisation measures form part of cultural landscape/countryside management programmes and contractual nature conservation programmes, with appropriate subsidies for specific extensivisation measures.	
Economic/financial aspects	Costs of implementing the measure (€):	Depending on the measure, subsidies of €50-1000/ha may be available.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Extensivisation of agriculture also enriches landscape appearance and hence its recreational value.
Evaluation	The provision of support for extensive agriculture is an established part of programmes for the conservation of the cultural landscape and contractual nature conservation programmes. Further information about funding conditions can be obtained from the relevant authorities and nature conservation organisations.	
Information & contact	Information sources:	All relevant nature conservation and agricultural authorities.
	Contact:	

3.2.3. Reduction or targeted use of fertiliser, pesticides and herbicides in agriculture

3. Agriculture; 3.2 Extensivisation of agricultural use

Appropriately managed agricultural spaces can act as stepping stone biotopes and connecting areas in a biotope network. As a rule, these areas, if they are to fulfil their function, must be managed extensively and in an ecologically compatible way. Non-use, or at least highly targeted use, of fertilisers, herbicides and pesticides encourages the development of appropriate characteristics and, even if no biotope networking strategy is in place, can help to introduce more biological diversity in the landscape matrix.

☑ Appropriate habitat approach ☑ Appropriate species approach

Main type of area

☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas
☐ Densely populated areas ☑ Perimeters of protected areas
☑ Areas under high pressure from agriculture, tourism etc.

Ecological impact

☑ Reduction of fragmentation	Large, intensively managed agricultural spaces contribute to landscape fragmentation. Reduction of inputs on these areas or extensivisation, especially with appropriate distribution of the areas concerned, can mitigate this impact.
☑ Habitat improvement	Non-use, or at least reduced use, of fertilisers, herbicides and pesticides preserves species diversity and enhances agricultural areas in ecological terms.
☑ Element of ecol. connectivity	Especially if embedded in an overall concept, these areas serve as connecting elements and stepping stone biotopes.
☑ Other	Can help to protect the hydrological regime and soils (erosion).

Impact

☑ Immediate ☐ Several months ☐ 1 - 2 years ☑ Long-term (3 years+)

Comments: The impact of non-use or reduction occurs immediately; the impacts on water and soil are more long-term in nature.

Implementation period

☑ Short (days) ☐ Medium (weeks) ☐ Long (months) ☐ Very long (years)

Comments: Generally entails a reduced workload.

Scope of implementation

☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National

Scope of impact

☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National

Comments: The impacts can be felt on the area concerned and in the locality (biodiversity).

Stakeholders/sectors concerned

☐ Protected areas ☐ Tourism ☐ Forestry
☑ Hunting ☑ Local community ☑ Agriculture
☑ Nature conservation ☐ Spatial planning ☐ Transport

Other:

Legal situation

The use of fertiliser, pesticides and herbicides in agriculture is regulated by legislation pertaining to agriculture and nature conservation.

Economic/financial aspects

Costs of implementing the measure (€):	Cost savings result from reduced use; possibility of subsidies.
Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☑ Public: other ☑ Public: regional ☑ Public: local
Socio-economic impacts	Positive impacts on water, soils, health. Farmers may experience reduced yields.

Evaluation

As part of biotope networking projects, these measures are only genuinely effective with proper planning and the involvement of many farmers. In Switzerland, however, positive experience has been gained in a number of projects, although compensation payments for farmers also play an important role here.

Information & contact

Information sources:	Agricultural and nature conservation authorities, e.g. in Switzerland: www.bafu.admin.ch
Contact:	

3.3.1. Species-Rich Grassland Programme

3. Agriculture; 3.3 Special programmes for agricultural areas

The species inventory of a grassland reflects the way in which it is managed and its location. If the management method remains unchanged, the species composition will generally remain unchanged as well. This correlation opens up the opportunity to link subsidies for extensive grassland to the occurrence of key species of flora. In order to implement this innovative, results-oriented approach, a list of meadow flowers serves as a simple tool for reliable identification of extensive species-rich grassland. Promotion depends on the occurrence of certain easily identifiable plant species (indicator plants). Participating farmers undertake to preserve the species richness of their grasslands (meadows and pasturage). Farmers retain the choice of practices and resources to be used, so that biodiversity is not seen as a constraint: it calls upon their technical skills and sense of responsibility. They are also sensitised to issues such as nature conservation and biodiversity.

	☑ Appropriate habitat approach ☐ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	With appropriate extensive management of meadows, species diversity of fauna as well as flora is increased.
	☑ Element of ecol. connectivity	With a sufficient number of areas and appropriate distribution as part of a biotope networking strategy, these meadows can become core and connecting elements of a biotope network.
	☐ Other	
Impact	☐ Immediate ☑ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: The positive impact on flora and fauna continues throughout the vegetation period.	
Implementation period	☑ Short (days) ☐ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: To achieve the stated goal (species richness), extensivisation of agriculture is generally required, which also reduces workload.	
Scope of implementation	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: The management method only has a direct impact on the plot concerned. For a corresponding impact in a biotope network, areas managed in this way must be appropriately distributed in line with an overall concept.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☐ Forestry ☐ Hunting ☐ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other:	
Legal situation	Voluntary participation by farmers in the measure.	
Economic/financial aspects	Costs of implementing the measure (€):	In the Regional Natural Park (PNR) of the Massif des Bauges in France, for example, the contract is remunerated with € 89/ha in all participating areas.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☐ Public: local
	Socio-economic impacts	If tourism professionals are involved, this measure can add value to tourism (local products, flowering landscape, events such as meadow management competitions)
Evaluation	The Species-Rich Grassland Programme has been under way in Baden-Württemberg (Germany) since 2002 and has proved very successful. Here, more than 10,000 farmers have participated in the scheme, which is funded by the MEKA II and III programmes. In France, a total of eight natural parks are experimenting with similar programmes. Experience in the Regional Natural Park (PNR) of the Massif des Bauges has been very positive, both from the farmers' and the Park's perspective.	
Information & contact	Information sources:	Oppermann R., Gujer H.U. (ed.) (2003): Artenreiches Grünland bewerten und fördern - MEKA und ÖQV in der Praxis. Ulmer, 199 p.
	Contact:	Parc naturel régional du Massif des Bauges; contact: Philippe Mestelan

3.3.2. Agricultural field margin projects

3. Agriculture; 3.3. Special programmes for agricultural areas

Agricultural field margins are managed strips, a few metres wide, along agricultural fields. They are cultivated without the use of pesticides so that wild herbs and the fauna adapted to them are able to disperse and survive. In some cases, the strips are sown with a mixture of flowering plants ("blossoming belts") or planted with shrubs and trees. The agricultural field margins not only provide a habitat for rare species of plant and contribute to the protection of soils and water resources; they also constitute important linear transit routes and form buffer zones between various forms of use.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	They form buffer zones between various forms of use, especially along well-used field paths and adjacent to ecologically valuable biotopes, and provide habitats for rare species.
	☑ Element of ecol. connectivity	Along fields and paths, the field margins form a network of linear connecting elements. Inclusion of these areas in local plans increases this impact significantly.
	☑ Other	On soils at risk of erosion or on cropland near waterways, positive impacts can be achieved in terms of soil and water protection and lowering of flood peaks.
Impact	☐ Immediate ☑ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Field margins provide habitats all year round. Their main role, however, occurs after the cultivation of the fields in the vegetation period, when the wild herbs on the agricultural fields have achieved full growth.	
Implementation period	☑ Short (days) ☐ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: The management and development of field margins can be well-integrated into routine land management. It is important to select site-appropriate species and to use indigenous seeds and plants of local origin.	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: The development of a local plan for the creation of agricultural field margins can greatly increase the impact of the measure by integrating individual sites into a broader network.	
Stakeholders/sectors concerned	☐ Protected areas ☑ Tourism ☐ Forestry ☐ Hunting ☐ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other:	
Legal situation	Agricultural field margin projects exist in numerous regions. Regional or local guidelines specify the funding rates, application process, conditions for participation, contract period, monitoring procedures, sanctions etc.	
Economic/financial aspects	Costs of implementing the measure (€):	The subsidy rates are established regionally. They mainly cover the loss of revenue resulting from set-aside and possible costs of seeding.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	With their net-like structure in cleared agricultural landscapes, they create an appealing and diverse landscape appearance with increased recreational value.
Evaluation	Implementation of the projects often fails due to excessive red tape. In many regions, however, these projects are being implemented very successfully, also as part of biotope networking initiatives, and adding value to tourism.	
Information & contact	Information sources:	Further information can be obtained from regional agencies (nature conservation and agriculture), e.g. in Baden-Württemberg (Germany).
	Contact:	

4.1.1. Creation of forest reserves

4. Forestry; 4.1 Restrictions on use

Areas of woodland which are particularly valuable in nature conservation terms are important elements of a biotope network; these include areas with remnants of potential natural vegetation, old-growth forest, coppice forest and special sites (river-meadow and humid forests, gorges, steep slopes). Natural forest reserves can constitute an important tool in maintaining a representative network of forested areas of appropriate quality. Here, the various stages in the development of forest structures and their typical fauna and flora can be maintained, without use, in the various natural forest communities and habitat types. They also act as significant biotopes or stepping stones in a more or less non-natural environment (especially forests on valley floors, (former) river-meadow forests).

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☑ Large forested areas ☐ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	The maintenance of near-natural forested areas without use improves habitat quality for typical and in some cases rare species of fauna (natural processes of forest dynamics, typical species inventory). Forested areas with low levels of disturbance and fragmentation are maintained.
	☑ Element of ecol. connectivity	With close connectivity with other valuable habitats (dry meadows, fens, high bogs, flood plains), forest reserves act as significant biotopes, stepping stones or connecting corridors in a more less non-natural environment.
	☐ Other	
Impact	☑ Immediate ☑ Several months ☑ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: Depending on the starting conditions in the forest stand, a near-natural state may have to be established first.	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: The administrative process associated with designation as a forest reserve usually takes some time.	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: Local planning can increase the impact of the measure as individual areas can then be integrated into a broader network (other forested areas, valuable habitats outside the forest).	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☑ Forestry ☐ Hunting ☐ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other:	
Legal situation	In most cases, a representative network of natural forest reserves (also: natural forest cells, forest reserves, etc.) is covered by individual legislation applicable to forests. Forest reserves are usually established as a contract-based model with voluntary participation.	
Economic/financial aspects	Costs of implementing the measure (€):	Financial support is usually provided as a basic amount (approx. € 15/ha) + a flat rate for default on contract (up to € 340/ha)
	Sources of financing:	☑ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Legislation on forests and nature conservation governs the payment of compensation for forest reserves.
Evaluation	Natural forest reserves exist in Germany, Austria and Switzerland, for example, where they are well-established as contributions to nature conservation. Information can be obtained from the relevant authorities and various nature conservation organisations.	
Information & contact	Information sources:	e.g. St. Gallen's forest reserve strategy: http://www.wald.sg.ch/home/st_galler_wald/waldreservate.html
	Contact:	

4.1.2. Calming measures for forests that merit protection

4. Forestry; 4.1 Restrictions on use

Forests are increasingly being used for recreational and leisure purposes by individuals and groups seeking an experience of nature. This can have negative impacts (e.g. noise, creation of informal pathways), especially in forested areas which are valuable from a nature conservation perspective and which form important elements of a biotope network. Areas with remnants of potential natural vegetation, old-growth forest, coppice forest and special sites (river-meadow and humid forests, gorges, steep slopes) are particularly valuable in nature conservation terms and should be kept free from negative influences as far as possible. As a way of calming these areas, various measures can be adopted, including the targeted creation of circular pathways and infrastructural services (visitor and parking facilities) in areas of woodland which are less in need of protection, as well as the production of information boards and brochures and the development of educational pathways

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☑ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Calming of forested areas improves habitat quality for typical and in some cases rare species of fauna.
	☑ Element of ecol. connectivity	Forested areas which have undergone calming measures are important refuge areas and are therefore very important elements of the biotope network. Corresponding measures can also be carried out in peri-urban areas (targeted calming of individual forested areas).
	☐ Other	
Impact	☑ Immediate ☑ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Measures can start to have positive impacts very quickly. However, experience has shown that it takes some time for the measures to be accepted by all user groups.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☑ Long (months) ☑ Very long (years)	
	Comments: Strategies for the channelling of visitors require comprehensive planning. Stakeholders must be involved from the outset in order to increase acceptance.	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: Channellling masures should be planned on a broader spatial basis as otherwise, conflicts will simply be shifted to neighbouring areas.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☑ Forestry ☑ Hunting ☑ Local community ☐ Agriculture ☑ Nature conservation ☑ Spatial planning ☐ Transport	
	Other: Sports clubs/associations.	
Legal situation	Strategies for visitor channelling should be integrated into landscape and protected area planning (e.g. including Natura 2000 sites). Measures may also be eligible for funding under rural development programmes.	
Economic/financial aspects	Costs of implementing the measure (€):	Due to the long planning period and the sometimes cost-intensive measures (infrastructure), several thousands of euros must be reckoned with, depending on the activities being planned.
	Sources of financing:	☑ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Attractive educational pathways and circular pathways can add value to tourism and also be utilised for environmental education purposes.
Evaluation	The awareness of the need for visitor channelling measures has increased considerably in recent years. Relevant strategies already exist in protected areas of various categories. Strategies for targeted channelling of visitors are already in place in peri-urban woodland in particular.	
Information & contact	Information sources:	e.g. http://www.biosphaerenreservat-vessertal.de/projekte/blenkung/einf.htm Project in the Bavarian Alps (Allgäu): http://www.dbu.de/PDF-Files/A-19778.pdf
	Contact:	

4.2.1. Maintenance and management of coppice forests

4. Forestry; 4.2 Resumption and continuation of old forms of use

Coppice forests are particularly species-rich habitats and make a contribution to the preservation of cultural and historical diversity. Newly coppiced areas of woodland are sunny spaces which are notable for their diverse habitat mosaic in a relatively small space. They thus contain important habitats for many species of flora and insects, as well as the Sand Lizard (Lacerta agilis) and Green Woodpecker (Picus viridis), and provide substitute habitats for the Hazel Grouse (Bonasa bonasia). Regular cutting on 3- to a maximum of 40-year-old rotation areas can improve the species inventory by promoting structural diversity and, in intensively used farmland, can serve as a stepping stone in the biotope network. Oak, birch, hornbeam, sycamore, black locust, sweet chestnut and black alder are the main species of tree found at colline to sub-montane altitudes. Coppice forests also play a major role in river-related ecosystems (e.g. grey alder coppice forests) and are particularly important elements of a biotope network here.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☑ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Coppice forests are important habitats for many rare species of flora and fauna, including Hazel Grouse and especially thermophilous (warmth-loving) species.
	☑ Element of ecol. connectivity	Use of coppice stands along linear structures (paths, roads, embankments) can form elements of a biotope network.
	☐ Other	
Impact	☐ Immediate ☑ Several months ☑ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: Relatively swift impact can be expected from the management of existing coppices; where new coppice forests are created, the related structures develop with increasing age of the stand.	
Implementation period	☑ Short (days) ☑ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: Relevant measures can be implemented fairly swiftly.	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: By linking measures to wider biotope network planning (e.g. connectivity with fallow land with bushes, and with hedges, oligotrophic grasslands, edges etc.), the impact can be increased.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☑ Forestry ☐ Hunting ☐ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Countryside management.	
Legal situation	Measures for the maintenance of coppice forest may be eligible for funding within the framework of contractual nature conservation programmes in the forestry sector (e.g. "Nature Conservation in Forests" programme in Switzerland).	
Economic/financial aspects	Costs of implementing the measure (€):	If wood from coppice forests is used for energy purposes, profits outweigh the costs of the relevant measures.
	Sources of financing:	☐ Private sector: sponsor(s) ☑ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Coppice forests can be used as renewable energy sources with corresponding economic value-added.
Evaluation	There are some examples of the integration of coppice forests into biotope networks. Various current research projects are under way to explore the potential for energy use of coppice forest stands.	
Information & contact	Information sources:	Project examples, e.g. at http://rohrhardsberg-life.de/artikel/niederwaelder or: http://www.baselland.ch/naturschutz_wald-htm.310132.0.html
	Contact:	

4.2.2 Extraction of timber: conserving stocks and soils

4. Forestry; 4.2 Resumption and continuation of old forms of use

Extraction of timber is a major intervention in forest stocks and inevitably causes disturbance to flora and fauna. Despite careful planning and implementation, it is impossible to avoid damage to the remaining stands. Known as skidding damage, this can have sometimes considerable negative impacts on individual trees and on forest stands. Furthermore, extraction often also involves the creation of forestry roads, which have a fragmenting effect. In terms of landscape permeability, alternative methods of extraction (e.g. cable logging, horse logging etc.) should be given preference. The use of horses, in particular, causes less damage to stands and regeneration areas, and protects the forest floor as it does not leave tracks or cause widespread compaction of soils or oil pollution etc. Horses can also be used on slopes, and if sledges are used, can continue in winter.

	☑ Appropriate habitat approach ☐ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☑ Large forested areas ☐ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Negative effects of timber extraction (including noise) are reduced by the deployment of less damaging extraction methods.
	☐ Element of ecol. connectivity	
	☑ Other	Less damaging timber extraction methods make a contribution to soil protection and water pollution control.
Impact	☑ Immediate ☐ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Positive effects are noticeable immediately.	
Implementation period	☑ Short (days) ☐ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: The measure can be integrated easily into timber extraction activities.	
Scope of implementation	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: The measure has a very localised impact in the direct timber extraction area. A large-scale approach increases the scope of impact accordingly.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☑ Forestry ☐ Hunting ☐ Local community ☐ Agriculture ☐ Nature conservation ☐ Spatial planning ☐ Transport	
	Other:	
Legal situation	Subsidies are available for the use of horses in the preliminary clearing activities required for regeneration, as well as in small-scale clear cutting activities to promote already existing natural regeneration.	
Economic/financial aspects	Costs of implementing the measure (€):	In Austria, depending on the forest's function, subsidies are available for up to 50-70% (at maximum extraction costs of €40 per solid cubic metre) of the costs when horses are used.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Depending on the conditions in the territory and the situation at the outset, the use of horses can be more economical, and financial aid may also be also available.
Evaluation	Currently, horses are only used infrequently for timber extraction, and the experiences are available from the state forestry administrations concerned.	
Information & contact	Information sources:	e.g. from the forestry authorities in question.
	Contact:	

4.3.1. Conservation of nest, hollow and biotope trees

4. Forestry; 4.3 Creation and maintenance of structures

In a commercial forest, besides the creation and maintenance of old-growth and deadwood islands, the conservation of specific individual trees (nest and hollow trees, trees with rotten sections or fungal infections, or bizarre trees) in the forest stand plays an important role. Between the old-growth and deadwood islands, these individual trees serve as stepping stones or transitional biotopes, especially for less mobile species of fauna in search of new habitats. These trees are particularly important in intensively used forest stands. They also help to safeguard, in the medium to long term, a sufficient high proportion of biotope trees in the forest. The definition of the number, distribution, species and characteristics of these trees must take place in line with local conditions.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☑ Large forested areas ☐ Densely populated areas ☑ Perimeters of protected areas ☐ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	The trees enhance the forest biotope and provide a habitat for flora, fungi and fauna (nesting places, deadwood for insects, etc.).
	☑ Element of ecol. connectivity	Between the old-growth and deadwood islands, these individual trees serve as stepping stones or transitional biotopes, especially for less mobile species of fauna in search of new habitats.
	☐ Other	
Impact	☑ Immediate ☐ Several months ☐ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: Depending on the age of the selected trees, they can take on this role immediately or over the long term. The processes of ageing and decay take many years.	
Implementation period	☑ Short (days) ☐ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: The selection of trees takes place as part of normal inventory work or during marking of trees for felling; no further work is involved afterwards.	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: With a sufficient number of trees, appropriately distributed, good local impacts can be achieved.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☑ Forestry ☐ Hunting ☐ Local community ☐ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Forest owners, hiking clubs.	
Legal situation	Safety obligations established in law must be complied with during site selection.	
Economic/financial aspects	Costs of implementing the measure (€):	Subsidies can amount to €40-80 per trunk/p.a. depending on species and number of trees.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Possible loss of revenue through non-use, but this can be compensated regionally from subsidies.
Evaluation	The positive impacts of old-growth and deadwood, including isolate trees, in the forest stand are scientifically proven and are thus an integral part of sustainable forestry and various certification procedures. They are one of the most important elements of ecoconnectivity in the forest.	
Information & contact	Information sources:	Information is available from: www.waldwissen.net and various forestry authorities.
	Contact:	

4.3.2. Conservation and development of old-growth and deadwood islands

4. Forestry; 4.3 Creation and maintenance of structures

In the normal commercial forest, trees are grown for optimum timber quality and are felled before they reach biological maturity. However, many species of flora and fauna are dependent on old, very old and even dead trees. In areas of woodland, groups of trees should therefore be preserved beyond the commercial cutting interval in order to create old-growth and deadwood habitats. These old-growth and deadwood islands also perform an important role in ecological connectivity.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☑ Large forested areas ☐ Densely populated areas ☐ Perimeters of protected areas ☐ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Old-growth forest and dead trees provide a habitat for a variety of insects and species of bird.
	☑ Element of ecol. connectivity	By designating old-growth forests rich in deadwood as part of a biotope network, important stepping stone biotopes can be created for rare species (e.g. Three-toed Woodpecker (Picoides tridactylus), various species of bat ...).
	☐ Other	
Impact	☐ Immediate ☐ Several months ☐ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: Old-growth and deadwood islands develop slowly as part of the development of stands. The associated fauna, too, only becomes established over the long term.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☐ Long (months) ☑ Very long (years)	
	Comments: Old-growth and deadwood islands must be planned and developed as part of the stand over the long term within the framework of forest management.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: A network of old-growth stands and deadwood islands with a mesh width of approx. 500 m should be developed at municipal or, if possible, at regional level in order to achieve genuine impacts as part of a biotope network.	
Stakeholders/sectors concerned	☑ Protected areas ☐ Tourism ☑ Forestry ☑ Hunting ☐ Local community ☐ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Private forest owners.	
Legal situation	As a rule, these are voluntary measures but may be mandatory in some certified forests.	
Economic/financial aspects	Costs of implementing the measure (€):	No costs. In some regions, financial support is provided for the conservation of old-growth and deadwood.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☐ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☐ Public: local
	Socio-economic impacts	Income loss due to delayed use or non-use of the affected trees.
Evaluation	In order to achieve a good impact as part of a biotope networking project, the measure must be implemented across a relatively large area with equal distribution of "island" spaces.	
Information & contact	Information sources:	A wealth of information is available on the Internet site: www.waldwissen.net, which covers a range of forest-related topics.
	Contact:	

4.3.3. Structurally rich forest edges

4. Forestry; 4.3 Creation and maintenance of structures

The edges of forests and woodland are often located next to agricultural areas, lakes or rivers, open meadows, pasturage or roads and railways. Together with other structural elements such as hedges, forest strips or riparian strips, they are an important element of a biotope network. Due to their function as transitional zones, they provide a place of refuge and particularly valuable habitats (e.g. for rarer species of deciduous tree or shrubs). They are also important as stepping stone biotopes, e.g. for wild bees, beetles, bats, birds and hedgehogs. Valuable forest edges comprise a shelterbelt, shrub belt and herbaceous fringe. These three components vary in age and are layered and irregular in structure. They require regular management measures.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☑ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Layered and structurally rich forest edges are valuable biotopes which provide a habitat for many rare species. They enhance the habitat of wild animals in particular.
	☑ Element of ecol. connectivity	Forest edges are an important element of the cultural landscape and due to their linear structure in transitional zones are important for networks of interlinked biotopes. They can also be enriched with dry stone walls.
	☑ Other	Stabilising impact on tree stands.
Impact	☐ Immediate ☑ Several months ☑ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: The desired structure will not develop until 5-10 years after the first targeted management measures to create a structurally rich forest margin.	
Implementation period	☑ Short (days) ☑ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: The duration of measures depends on the type and intensity of intervention.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☑ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: Relevant measures may also have an impact beyond the immediate locality.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☑ Forestry ☑ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Schools	
Legal situation	Enhancement of forest margins can be integrated into management planning by local forest enterprises and at higher level and take place within the framework of forest management. It can also be included in landscape planning and management.	
Economic/financial aspects	Costs of implementing the measure (€):	Subsidies are available for this type of forest management measure. The costs of managing forest margins amount to approx. € 2000/100 m (width 30 m).
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	An intact forest margin has positive impacts on forestry, as it reduces the risk of windthrow or breakage. Material resulting from management measures can be used for heat energy.
Evaluation	The importance of structurally rich forest margins for flora and fauna and as an element of the biotope network is substantiated and in some cases is already included in framework strategies for nature conservation in forests. Relevant examples can be provided by forestry agencies and enterprises and nature conservation organisations.	
Information & contact	Information sources:	e.g. Amt für Wald (Forestry Office) Graubünden, Switzerland http://www.wald.gr.ch/download/waldrand.pdf
	Contact:	

5.1.1. Measures for seasonal amphibian migration

5. Traffic; 5.1 Species conservation measures along transport routes

Most amphibians in Central Europe undertake various migrations during their lives, including the seasonal spring migrations to their spawning grounds. They invariably encounter numerous barriers which they must overcome, especially the dense transport network where millions of amphibians are killed by vehicles every year. There are many measures which could be taken to protect amphibians during migration and to help reduce the barrier effects; these include warning signs for drivers; mobile seasonal fences for amphibians; substitute spawning grounds; temporary road closures; and permanent protection systems (amphibian tunnels), etc.

	☐ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☑ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	The purpose of the measures is to reduce the fragmentation effects for amphibians during migration and facilitate habitat access.
	☑ Habitat improvement	Amphibians prefer suitable habitats for their migrations. Habitat improvement measures should therefore be carried out in parallel.
	☑ Element of ecol. connectivity	Most of the actions carried out are "short-term" elements of a biotope network, with human intervention substituting for a corridor. In most cases, however, the measures are simply a response to an acute danger, not a permanent solution.
	☐ Other	
Impact	☑ Immediate ☐ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: The actions last for the duration of the spring migrations. They must have immediate impact and mitigate the acute danger.	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: Speed limits, mobile fences, warning signs etc. are used for several weeks during the peak of the migration (usually 6 weeks).	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments:Amphibians do not have very large ranges. The measures are generally carried out at local/municipal level.	
Stakeholders/sectors concerned	☐ Protected areas ☑ Tourism ☑ Forestry ☐ Hunting ☑ Local community ☐ Agriculture ☑ Nature conservation ☐ Spatial planning ☑ Transport	
	Other: Highways department, various associations, municipalities.	
Legal situation	These are voluntary actions which must, however, respect general traffic safety provisions.	
Economic/financial aspects	Costs of implementing the measure (€):	Vary widely depending on the measure. Work is often carried out by volunteers.
	Sources of financing:	☑ Private sector: sponsor(s) ☑ Private sector: other ☐ Public: European ☐ Public: national ☑ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Possible prevention of traffic accidents. Often, sensitisation of the general public.
Evaluation	The measures described are generally not a permanent solution for improving connectivity. More permanent solutions are removal of trunk status from roads, decommissioning of roads, possible night-time road closures in spring and autumn or year round, or permanent protection systems such as underpasses for small animals.	
Information & contact	Information sources:	e.g. Swiss Centre for Amphibian and Reptile Conservation (KARCH)
	Contact:	Various nature conservation organisations.

5.1.2. Underpasses for small animals

5. Traffic; 5.1 Species conservation measures along transport routes

Underpasses for small animals are pipes made from concrete or steel which are incorporated into the road-body crossways or at angles as crossing aids for small mammals, amphibians, reptiles and invertebrates. Conduits obstruct animals' free access to the road and lead them to the underpasses. An uninterrupted link between the conduits and the underpasses is essential. The conduits should run parallel to the road, and should if possible be supplemented with guide structures placed at right-angles to the tunnel openings. These crossing aids for amphibians and small animals should be incorporated at an early stage during road-building and should be ready for operation before traffic is permitted to use the road. Retrofitting of these systems is rarely possible due to the high costs involved. The advantage of these permanent protection systems is that they work all year round and require very little management.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☑ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	If properly planned and implemented, underpasses for small animals can greatly reduce the fragmentation effects of linear infrastructure systems.
	☐ Habitat improvement	
	☐ Element of ecol. connectivity	
	☑ Other	The installations can greatly reduce the number of animals killed on the roads, especially during seasonal amphibian migrations, and thus have positive impacts on populations.
Impact	☑ Immediate ☐ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Immediate: as soon as the system is installed on the affected section of road, guide structures lead the animals to the underpasses.	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: Particularly sensitive sections of existing roads are generally well-known. When installing new systems, studies are required. Installation can take place fairly rapidly.	
Scope of implementation	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: As most of the target species have relatively small ranges, the impact is generally fairly localised.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☑ Forestry ☑ Hunting ☑ Local community ☐ Agriculture ☑ Nature conservation ☐ Spatial planning ☑ Transport	
	Other:	
Legal situation		
Economic/financial aspects	Costs of implementing the measure (€):	Relatively low costs if installed during road-building; retrofitting is very complex and expensive.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☐ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	None.
Evaluation	Thanks to the conduits and guide structures, the underpasses are generally very effective and are used by a wide variety of animal species.	
Information & contact	Information sources:	Nature conservation associations, especially those working with amphibians and involved in the seasonal amphibian migrations.
	Contact:	e.g. NABU, WWF, Pro Natura.

5.1.3. Warning systems for the prevention of accidents involving deer

5. Traffic; 5.1 Species conservation measures along transport routes

This involves the installation of warning systems for the prevention of accidents involving deer at known deer crossing points. A network of infrared sensors covers both sides of the road to a distance of around 300 m. If an animal enters this area, it is detected by the sensors. These send an impulse to a traffic warning signal which lights up and warns approaching drivers of the immediate danger.

	☐ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☑ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	Does not mitigate the barrier effect of a road. However, it is a very effective method of reducing the number of accidents involving deer at hazard hot-spots.
	☐ Habitat improvement	
	☐ Element of ecol. connectivity	
	☑ Other	The system aims to change the behaviour of car-drivers, not deer. Drivers are alerted to an acute, rather than a potential, hazard.
Impact	☑ Immediate ☐ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Impact starts as soon as the system comes into operation.	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: The system can be installed quickly once a decision has been taken on where it should be located (in consultation with hunters).	
Scope of implementation	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: This measure has a very localised impact on both sides of a section of road to a distance of around 300 m. If integrated into regionally significant wildlife corridors, however, it can also have impacts beyond the immediate locality.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☐ Forestry ☑ Hunting ☐ Local community ☐ Agriculture ☑ Nature conservation ☑ Spatial planning ☑ Transport	
	Other:	
Legal situation	Voluntary cooperation among stakeholders.	
Economic/financial aspects	Costs of implementing the measure (€):	Costs of this type of system amount to approx. € 60,000-100,000. More compact and flexible solutions are also available (e.g. mobile systems).
	Sources of financing:	☑ Private sector: sponsor(s) ☑ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Prevents damage to vehicles, physical injury to individuals and loss of game animals.
Evaluation	A pilot project involving Calstrom-type warning systems carried out from 1995-1997 in Switzerland had very positive effects.	
Information & contact	Information sources:	Wildtier Schweiz http://www.wild.uzh.ch/
	Contact:	Expert: Roman Kistler, Fishing and Hunting Administration of Thurgau Canton (CH) Expert: Paul Marchesi, DROSERA - écologie appliquée SA, Sion (CH)

5.1.4. Green bridges/wildlife crossings

5. Traffic; 5.1 Species conservation measures along transport routes

A wildlife crossing, or green bridge, is intended to serve as an aid to wild animals, enabling them to cross busy transport routes such as motorways, highways and even railway lines safely and thus mitigating the impacts of increasing landscape fragmentation. The position of these crossings is particularly important: wildlife crossings should be located at known animal crossing points or specific "conflict points" in the transregional transport network. In order to screen the view of the transport routes to be crossed, the edges of the bridge are often planted with hedgerows, with much of the rest of the surface of the bridge being covered in vegetation as well. There are now numerous studies which provide information about required dimensions, vegetation, technical construction details etc.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☑ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	Green bridges are a suitable method of mitigating the fragmentation effects of roads, connecting habitats across roads and safeguarding regional and transregional migration routes.
	☑ Habitat improvement	The bridges are particularly effective if they do not appear to be foreign bodies or separate biotopes but are designed as habitats and thus meet the habitat requirements of smaller vertebrate or invertebrate species as well.
	☑ Element of ecol. connectivity	If integrated into a biotope networking strategy, the crossing aids become important sections of corridors.
	☑ Other	From a nature conservation perspective, key aspects such as fragmentation of species' partial habitats, impediments to large-scale annual migrations, impediments to the (re-) dispersion of animal species and thus the new colonisation or recolonisation of habitats by species which had previously been eliminated or had died out should also be taken into consideration during planning.
Impact	☐ Immediate ☑ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Once built, the bridge can be used immediately. Guide structures leading to it facilitate animals' acceptance.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: Planning and construction of these crossing aids are very costly and time-consuming.	
Scope of implementation	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☐ National	
	Comments: Depending on the species and the importance of the crossing point, the impact can range from local to transregional.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☑ Forestry ☑ Hunting ☐ Local community ☐ Agriculture ☑ Nature conservation ☑ Spatial planning ☑ Transport	
	Other: Associations (e.g. ADAC), motorway companies, local authorities.	
Legal situation	Legal provisions exist indirectly via the European and national level relating to the spatial linkage of protected areas.	
Economic/financial aspects	Costs of implementing the measure (€):	Building costs of a green bridge amount to € 1-5 million. Ongoing maintenance costs must also be considered.
	Sources of financing:	☑ Private sector: sponsor(s) ☑ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Reduction in number of accidents involving deer (physical damage, loss of game, personal injury ...)
Evaluation	Studies on the biological effectiveness of green bridges have shown that they make a major contribution to habitat connectivity. They are not only used by large animals but also by invertebrates such as butterflies, spiders and beetles. Green bridges do not only have a connecting function, they also help to reduce the number of accidents involving deer.	
Information & contact	Information sources:	Detailed recommendations in core study: VÖLK, F.; GLITZNER, I. & WÖSS, M. (2001): Kostenreduktion bei Grünbrücken durch deren rationellen Einsatz. Kriterien – Indikatoren – Mindeststandards. Straßenforschung, Heft 513. Bundesministerium für Verkehr, Innovation und Technologie, Wien. » http://www.fsv.at
	Contact:	A wealth of key information, literature, links and case studies is available from Austrian Federal Environment Agency (www.umweltbundesamt.at)

5.2.1. Use of indigenous seeds and plants

5. Traffic; 5.1 Species conservation measures along transport routes

During renaturation measures and other construction projects (construction of roads, railways and watercourses, and landscaping), but also in gardens and city parks, it is important not only to select site-appropriate species but also to use indigenous seeds and plants of local origin. The use of non-local seed may result in locally specific adaptations and regional biotopes being squeezed out or impaired, which may have a negative impact on other organisms, such as nectar-collecting and pollinating insects. Furthermore, some individual species may behave in an invasive manner. The use of indigenous seeds also helps to safeguard biotope-specific species diversity and promote native wild plants, thus contributing to the biotope network and the preservation of genetic diversity in line with the Convention on Biological Diversity (CBD).

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Some insect species depend on native species of plant. By using specific species and with appropriate management, the habitat is enhanced, especially on spaces along transport routes.
	☑ Element of ecol. connectivity	Species-rich areas along transport routes can act as stepping stone biotopes in the biotope network. Indigenous species are particularly valuable.
	☑ Other	Preservation of genetic diversity (Convention on Biological Diversity)
Impact	☐ Immediate ☑ Several months ☐ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: Some months will elapse from the time of the preparatory measures to the development of the full impact during the vegetation period.	
Implementation period	☑ Short (days) ☐ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: Can be well-integrated into conventional landscaping measures. In "greening" measures, appropriate seeds must be used.	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☐ National	
	Comments: The use of indigenous seeds should be promoted transregionally in order to increase the impact of individual measures.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☐ Forestry ☐ Hunting ☐ Local community ☑ Agriculture ☑ Nature conservation ☑ Spatial planning ☑ Transport	
	Other: Planning offices, water resources management.	
Legal situation	According to the Nature Conservation Act, the use of alien plants may be prohibited, so the use of indigenous plants and seed should be appropriately regulated by the relevant nature conservation authorities.	
Economic/financial aspects	Costs of implementing the measure (€):	The use of indigenous seeds and plants may result in higher costs in some cases.
	Sources of financing:	☐ Private sector: sponsor(s) ☑ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Seed production of indigenous wild species can offer alternative income generation opportunities for farmers in the region (domestic value-added instead of seed imports).
Evaluation	In Bavaria, technical recommendations have been developed on the use of indigenous plants and seeds, which should serve as guidelines for nature conservation authorities. As EU rules on the marketing of seeds and seed mixtures exist, amendment of national legislation may be required.	
Information & contact	Information sources:	Further information at: http://www.stmugv.bayern.de/umwelt/naturschutz/autochthon/index.htm
	Contact:	

5.2.2. *Site-appropriate "greening" in road and watercourse construction and landscaping*

5. Traffic; 5.2 Upgrading of associated infrastructural areas

When creating green areas during the construction of roads, railways and watercourses and landscaping projects, seed assortments are often used which, due to their species poverty, are not suitable for ecologically valuable "greening" or are not site-appropriate and therefore result in biologically impoverished landscape areas. The result is a large number of seriously eroded sites at higher altitudes, vegetation-free embankments, and river banks which are far from being in a natural state. If, on the other hand, site-appropriate seed mixtures are used, with adapted species which are suitable for elevated sites, for example, the green spaces can become valuable elements of a biotope network.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Embankments which are designed to be as near-natural as possible and spaces adjacent to infrastructure can provide habitats for rare species.
	☑ Element of ecol. connectivity	These spaces can form stepping stones in the biotope network. The impact can be increased through integration into a broader strategy.
	☑ Other	Spaces with near-natural growth contribute to soil protection and guard against erosion.
Impact	☐ Immediate ☑ Several months ☑ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Some months elapse from the time the preparatory measures are carried out until the full impact occurs during the vegetation period.	
Implementation period	☑ Short (days) ☐ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: "Greening" measures do not take much time and can be well-integrated into conventional landscaping schemes.	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: If linked with broader biotope network planning (e.g. linkage with fallow areas with scrub, extensive grassland, hedges, oligotrophic grasslands, edges), the impact is increased.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☐ Forestry ☐ Hunting ☐ Local community ☑ Agriculture ☐ Nature conservation ☑ Spatial planning ☑ Transport	
	Other: Planning authorities, water resources management, building authorities.	
Legal situation	In Upper Austria, framework guidelines have been developed for the performance, ecological supervision and approval of site-appropriate "greening" schemes.	
Economic/financial aspects	Costs of implementing the measure (€):	The additional costs which may be associated with the measure can be set against improved economic viability as there is no longer any need to bring in topsoil, costs of remediation are also reduced, and less maintenance is involved.
	Sources of financing:	☐ Private sector: sponsor(s) ☑ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Production of seed of site-appropriate species can offer alternative income generation opportunities for farmers in the region (domestic value-added instead of seed imports).
Evaluation	The Austrian Grassland Federation (ÖAG) has developed guidelines on site-appropriate greening which can provide guidance. Various seed mixtures have also been developed ("natural meadow seed" project).	
Information & contact	Information sources:	Further information on seed mixtures: http://www.wildblumensaatgut.at/Resources/Regelwerk.pdf http://www.saatbau.at/deutsch/saatgut/renatura/produktvorstellung/begruenungsmischungen.html
	Contact:	Working Group on Site-Appropriate Greening: Head - Dr. Bernhard Krautzer

5.2.3. Managed mowing of roadside verges

5. Traffic; 5.2 Upgrading of associated infrastructural areas

Delaying mowing gives plants the opportunity to bloom and form fruits and seeds. In this way, they can provide food and cover for insects and other small animals. The habitat quality of green strips and roadside verges depends on various factors, and mowing is one of the factors which are easiest to influence. By delaying mowing of verges until late summer, or by using mosaic-type mowing techniques, which involves mowing only a small area at a time, habitat conditions can be improved, e.g. for butterflies and various other species.

	☑ Appropriate habitat approach ☐ Appropriate species approach	
Main type of area	☐ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☐ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	As these are roadside verges, they form a network of green spaces which can facilitate migration of plants and animals and, if structured in an environmentally compatible way, can help to mitigate fragmentation.
	☑ Habitat improvement	Delaying mowing gives plants the opportunity to bloom and form fruits and seeds and thus provide habitats for more fauna, especially insects.
	☑ Element of ecol. connectivity	If the managed spaces are integrated into a broader biotope networking strategy, they can act as corridors along roads between core areas. However, it is important to consider the potential risk of neophyte encroachment.
	☐ Other	
Impact	☐ Immediate ☑ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: The impact develops mainly during the vegetation period.	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: Ideally, this measure should be implemented at municipal or even at regional level so that it can develop its full impact, especially in terms of ecoconnectivity.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: The measure mainly benefits insects and plants and so its impact is mainly local.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☐ Forestry ☐ Hunting ☐ Local community ☐ Agriculture ☑ Nature conservation ☐ Spatial planning ☑ Transport	
	Other: Highways department, traffic authorities.	
Legal situation	Traffic safety prescribed by law must be adhered to.	
Economic/financial aspects	Costs of implementing the measure (€):	No additional costs arise as a result of the measure compared with conventional mowing management.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☐ Public: European ☐ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Better planning of working time and use of resources and a reduced workload can all help to cut costs.
Evaluation	In the Département Isère, the highways department and the administration of the Département (Conseil Général), in partnership with the nature conservation organisation GENTIANA, have been running a project since 2004 entitled "Managed mowing of roadside verges: protecting nature", which focusses on the roadside verges and green strips in the road network. Signs at strategically and ecologically important sections of the highway network draw attention to the scheme and inform the public. The project's positive impacts on flora and fauna have already been demonstrated.	
Information & contact	Information sources:	Information on "managed mowing", together with checklists and examples, are available on the GENTIANA website: www.gentiana.org
	Contact:	Contact person for these projects at Gentiana: Pierre Salen

6.1.1 Revitalisation of flowing waters

6. Water resources management; 6.1 Creating natural structures

Flowing water systems, from source to mouth, form linear connecting elements and, together with their associated ecosystems (riparian forests, woodland), form important corridors for the migration and dispersion of flora and fauna. Very often, the space and dynamics left to most of the rivers in the Alpine region are severely limited. At the same time, flowing waters are highly conducive to cross-border cooperation as they generally flow through several countries and often form natural boundaries which may also constitute national borders. To improve flowing water functions, a range of measures can be adopted to return flowing waters to a natural unimpeded state, at least in part, thus enabling them to develop in a near-natural manner (restoration or revitalisation measures). Possible measures range from the introduction of deadwood to comprehensive rehabilitation measures and expansion.

	☑ Appropriate habitat approach ☐ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☑ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	Waters that flow continuously can link biotopes and landscape elements which are a great distance apart.
	☑ Habitat improvement	The different design possibilities improve the habitat quality of various species of flora and fauna, diverse structures are created and the dynamics of the waters increase.
	☑ Element of ecol. connectivity	Natural systems of flowing waters form valuable elements of a biotope network and provide corridors for the migration and dispersion of flora and fauna.
	☑ Other	The restoration of the continuity of watercourses is an integral element of the EU Water Framework Directive (WFD) and therefore a mandatory task in terms of water resources management. Flood protection.
Impact	☐ Immediate ☑ Several months ☑ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: The scope of impact achieved depends on the type and scope of the measures and the state of the section of the watercourse at the outset.	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☑ Long (months) ☑ Very long (years)	
	Comments: Dependent on the type and scope of the measures and the state of the section of the watercourse at the outset.	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: The flowing waters contained in the catchment area, adjacent biotopes and the entire flood plain must be included.	
Stakeholders/sectors concerned	☐ Protected areas ☑ Tourism ☑ Forestry ☐ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☑ Spatial planning ☐ Transport	
	Other: Water resources management, building authorities, voluntary nature conservation, fisheries, countryside management	
Legal situation	River restoration and revitalisation measures are part of landscape planning, but can, on a smaller scale, also be carried out by voluntary nature conservation.	
Economic/financial aspects	Costs of implementing the measure (€):	The costs depend on the type and scope of the measures to be implemented and range from around €2000 up to > €150,000 per 100 m of watercourse.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Revitalisation measures, by means of effective flood protection, can have positive economic effects despite the high costs.
Evaluation	Numerous river revitalisation measures have already been carried out successfully, and the importance of intact and natural river systems has been proven by several studies. Near-natural flowing waters are also of relevance to tourism and flood protection and are helping to implement the EU Water Framework Directive.	
Information & contact	Information sources:	Projects from various initiatives have been implemented: e.g. Wild River Landscape of the Tyrolean Lech, Lifeline Upper Drava, rehabilitation of the lower Salzach, Donau-Auen national park, RECORD at the Swiss Federal Institute of Technology.
	Contact:	http://www.tiroler-lech.at, http://www.life-drau.at, http://www.sanierung-salzach.info, http://www.swiss-experiment.ch/images/6/6f/RECORD_Beschreibung_deutsch.pdf, http://www.donauauen.at

6.1.2 Management and maintenance of flowing waters

6. Water resources management; 6.1 Creating natural structures

Near-natural flowing water systems are important connecting elements which make a substantial contribution to reducing fragmentation. In many cases, however, the space and financial resources required for the comprehensive revitalisation of obstructed rivers are not available. However, upgrading can be achieved with near-natural, differentiated management concepts which can be integrated into the legally prescribed management work along water bodies (flood protection). As part of this process, a holistic view should be taken of the embankments, riparian zones and water bodies, and adjacent green spaces (biotope network) should also be included. Appropriate maintenance measures include management of meadows, woodland (bank stabilisation), and regeneration in the areas of erosion. An individual management plan should be produced for each body of water, clearly defining the development goals.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☐ Priority areas for biodiversity ☑ River systems ☐ Large forested areas ☐ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	Richly structured near-natural flowing waters are important landscape elements with a high connectivity potential.
	☑ Habitat improvement	Appropriate maintenance measures improve the habitat quality of various species of flora and fauna, diverse structures are created and the dynamics of the watercourses increase.
	☑ Element of ecol. connectivity	Near-natural flowing water systems with a high degree of structural diversity form valuable elements of a biotope network and provide corridors for the migration and dispersion of flora and fauna.
	☑ Other	The increase in natural habitats by flowing waters, achieved through revitalisation measures, promotes the attainment of 'good ecological status' for the bodies of water as defined in the EU Water Framework Directive.
Impact	☑ Immediate ☑ Several months ☑ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: The impact either becomes apparent immediately or only appears after a few years, depending on the measure.	
Implementation period	☑ Short (days) ☑ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: Maintenance measures should be planned in advance and take place in partial interventions throughout the whole year, however only in riparian zone sections that are actually in need of maintenance.	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: Watercourse management measures are carried out locally but can be of importance at regional level.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☐ Forestry ☐ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Water resources management, voluntary nature conservation, fisheries	
Legal situation	Maintenance measures on bodies of water can form part of flood protection measures but, on a smaller scale, can be implemented by voluntary nature conservation or the local population.	
Economic/financial aspects	Costs of implementing the measure (€):	The costs are dependent on the type and scope of the measures to be implemented and, depending on the measure, can be financed through countryside management programmes.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☑ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Flood protection measures can have positive economic effects.
Evaluation	Watercourse management measures are being implemented everywhere and form part of flood protection measures. In addition, an example of an initiative to involve local municipalities and organisations exists in Switzerland in the form of an action day to maintain and upgrade water bodies. Maintenance and management measures on flowing waters are also implemented by nature conservation organisations.	
Information & contact	Information sources:	From the relevant water management authorities and voluntary nature conservation organisations.
	Contact:	e.g. http://wasser.umweltschutz.ch/download/merkblatt_g3.pdf oder http://wasser.umweltschutz.ch/download/leitfaden_aktionstag_03.pdf

6.1.3 Creation of riparian strips and woodland

6. Water resources management; 6.1 Creating natural structures

Riparian strips, as the transition between water surfaces and land, are of particular ecological significance for water quality and are an important connecting element in the biotope network. These riparian strips play a key role in intensively used landscapes in terms of maintaining water functions (filter/buffer functions, protection of embankments, prevention of erosion). The restoration, or the development and maintenance, of existing riparian strips is thus a key priority in the active protection of the aquatic environment. The riparian zone also creates habitats, provides food and serves as a protective and resting space, and also provides nesting and breeding places. Riparian strips should therefore be equipped with site-appropriate near-natural vegetation and typical tree species, and, depending on the body of water, be at least 5-15 m wide.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☐ Priority areas for biodiversity ☑ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	Richly structured near-natural flowing waters are important landscape elements with a high connectivity potential.
	☑ Habitat improvement	The habitat quality for various species of flora and fauna is improved and diverse structures are created along the watercourse.
	☑ Element of ecol. connectivity	Near-natural flowing water systems form valuable elements of a biotope network and provide important corridors for the migration and dispersion of flora and fauna.
	☑ Other	Typical tree species for the area can help protect against floods. The increase in natural habitats by flowing waters also helps to increase the quality of the water, and thus to achieve a 'good ecological status' for the body of water as defined in the EU Water Framework Directive.
Impact	☑ Immediate ☑ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Riparian strips created in a near-natural way develop their positive impacts after a few months (first vegetation period).	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: Depending on the condition at the outset, the planning process takes a long period of time; in most cases individual measures can be implemented within a short period of time .	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: Comprehensive planning increases the degree of impact. Ideally, in addition to the riparian zones, structures typical for river meadows such as backwaters, wetlands and meanders should be included.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☐ Forestry ☐ Hunting ☐ Local community ☑ Agriculture ☑ Nature conservation ☑ Spatial planning ☐ Transport	
	Other: Water resources management	
Legal situation	In most cases, statutory regulations govern the establishment of riparian strips (around 10 m), but their design is not established precisely. Some standards can be drawn from the EU Water Framework Directive (WFD).	
Economic/financial aspects	Costs of implementing the measure (€):	Renunciation of use in the case of extensive use of riparian strips, compensation payments by countryside management programmes of between €289/ha per year and €715/ha per year.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Expenditure can be reduced through the development of watercourses through their own dynamics. The appearance of the landscape is enhanced.
Evaluation	The positive impact of riparian strips and, due to their linear structure, their substantial importance for the biotope network, have already been recognised. To date there have only been a few examples in which riparian strips and woodland have been specifically included in the planning of biotope networks.	
Information & contact	Information sources:	Further information on the relevant terms and conditions governing support for riparian strips and woodland can be obtained from the nature conservation authorities concerned, the countryside management programmes and the water resources management authorities.
	Contact:	

6.1.4 Conservation of riparian forests

6. Water resources management; 6.1 Creating natural structures

Riparian forests are the natural type of vegetation along streams and rivers, and are strongly influenced by flooding and high groundwater levels. Due to their small-scale mosaic of different site conditions, riparian forests count among Europe's most species-rich habitats. Due to their preference for river meadows as their habitat, near-natural riparian forests have virtually disappeared from Central Europe, however, as many riparian forests have been cleared and transformed into pasturage. Riparian forests have high recreational value, store water and improve groundwater quality. Depending on their size and condition, they can also contribute to flood protection. As ecosystems associated with flowing waters, they are extremely important for ecological connectivity. Measures to maintain and develop the riparian forests may include, for example, planting of typical tree species, near-natural management, securing of existing areas and maintaining structures associated with the riparian forests (e.g. small water bodies).

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☑ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Riparian forests constitute valuable habitats for many rare species, including white dryas (Dryas octopetala), the European tree-frog (Hyla arborea), the natterjack toad (Bufo calamita) and the Lady's Slipper.
	☑ Element of ecol. connectivity	Near-natural flowing water systems with their associated structures constitute valuable elements of a biotope network. They provide corridors for the migration and dispersion of many flora and fauna.
	☑ Other	Intact riparian forests help to improve surface water, stabilise the hydrological regime (EU-WFD) and protect against floods.
Impact	☐ Immediate ☑ Several months ☑ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Depending on the situation at the outset and the measures required, the impact is either immediate, is revealed after some months or only appears over the long term.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☑ Long (months) ☑ Very long (years)	
	Comments: The duration of the measures depends, in particular, on the situation at the outset. Comprehensive planning is required In the case of large-scale strategies that take account of the numerous interactions between the river meadows and the flowing waters.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: To increase the impact, other accompanying structures should also be included in an appropriate strategy (such as, inter alia, standing water bodies, humid forests, headwaters).	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☑ Forestry ☐ Hunting ☐ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Water resources management	
Legal situation	Conflicts of objectives regarding other functions may occur. Riparian forests in Europe have a special protected status, inter alia, through the Habitats Directive.	
Economic/financial aspects	Costs of implementing the measure (€):	Costs vary greatly depending on the measure. In most cases, conservation does not require comprehensive maintenance measures; renunciations of use can incur costs.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Subsidies for the protection of the aquatic environment and for flood protection (e.g. cultural landscape programme) are possible.
Evaluation	The significant importance, in nature conservation terms, of riparian forests is demonstrated, inter alia, by their high protected status. Information on suitable measures and subsidies can be obtained from the nature conservation authority concerned.	
Information & contact	Information sources:	From the relevant nature conservation authorities and organisations. Further information also available under: www.waldwissen.net.
	Contact:	

6.2.1 Creation of fish passes and other fish migration aids

6. Water resources management; 6.2 Removal of barriers

Obstructions such as river bottom steps, weirs, retention basins etc. can be found along many Alpine streams and rivers. These constitute insurmountable obstacles to the migration of fish and other organisms in flowing waters. Fish migration aids (also known as fish ladders or fish passes) are installed in flowing waters in order to give fish, in particular, the opportunity to overcome these artificial obstacles. There are numerous versions of these aids (river bottom slides, fish ramps, fish passes, bypass flume(s) …), which can be deployed to suit the target species, the obstacle to be overcome, and local conditions.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☐ Priority areas for biodiversity ☑ River systems ☐ Large forested areas ☐ Densely populated areas ☐ Perimeters of protected areas ☐ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	Weirs and other installations in streams constitute insurmountable obstacles to almost all organisms living in water, and divide streams into many small sections. Fish passes provide a connection between the sections.
	☐ Habitat improvement	
	☑ Element of ecol. connectivity	Should acidification or water pollution cause a species of fish to die out in one section, an isolated section cannot be repopulated. Fish ladders take over the role of corridors here.
	☑ Other	The migration aids can lessen the impact of the changed ecological conditions (silt and sludge deposits, higher temperatures, lower oxygen concentrations) caused by the alternation between fast-flowing areas to practically stagnant stretches of water at weirs and similar installations.
Impact	☑ Immediate ☐ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: The migration aids can be used by fish and other living organisms in flowing waters as soon as they have been installed.	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: Many of the migration aids addressed are complex structures which, on top of the planning process, also take some time to build.	
Scope of implementation	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: The impact is primarily of importance in the flowing waters in question and, in this case, in the affected section in particular. However, in larger bodies of water or on major fish migration routes, the measure can gain regional importance.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☐ Forestry ☐ Hunting ☐ Local community ☐ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Representatives of fisheries, water resources management authorities, energy companies, companies that extract water.	
Legal situation	The need for fish migration aids is regulated by law throughout Europe by, inter alia, the EU Water Framework Directive.	
Economic/financial aspects	Costs of implementing the measure (€):	Fish migration aids are very expensive installations. Depending on the structure, the costs can range from 100,000 to several millions of euros.
	Sources of financing:	☑ Private sector: sponsor(s) ☑ Private sector: other ☑ Public: European ☑ Public: national ☑ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Increased fish stocks, improved water quality in the flowing waters
Evaluation	The technical know-how for the construction of fish migration aids has improved significantly and the new opportunities and variants enable suitable solutions to be proposed for every obstacle or situation. The ecological importance and impact of the migration aids have been shown in numerous scientific studies.	
Information & contact	Information sources:	e.g.: Salzburger Fischpass-Fibel: Erfahrungen zu Bau und Betrieb von Fischaufstiegshilfen (2002). Land Salzburg, Abt. Naturschutz, Referat Gewässerschutz. 152 S.
	Contact:	

7.1.1. Sports competitions

7. Public relations work and sensitisation; 7.1 Communications		
Sports competitions can help raise public awareness of biotope networks. In particular, the importance of wildlife corridors can be conveyed very effectively through the selection of a high-profile species of fauna. Organising races at local level (e.g. wildcat runs in Thuringia, Bavaria and Hesse) can encourage hikers, walkers and runners and draw attention to the need to network habitats of specific species. Besides the sports competition, information can be provided, e.g. through an appropriate flanking programme and exhibitions which raise awareness of how the animals live and the obstacles to their migration. Additional funds (e.g. for the purchase of areas to create a biotope network) can also be sought in this way. This raises awareness of rare species of fauna and sensitises the public to the issue of landscape fragmentation.		
	☐ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☑ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☐ Habitat improvement	
	☐ Element of ecol. connectivity	
	☑ Other	A direct ecological impact can only be achieved through embedding in an overall concept, e.g. through donations at the event for the purchase or exchange of areas.
Impact	☑ Immediate ☑ Several months ☑ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: Public awareness is raised immediately, but direct ecological impacts only arise after some years with adoption of more comprehensive measures (see above).	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: Organising an event is very time-consuming if it is to appeal to the general public and generate effective publicity.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☐ National	
	Comments: Events can be organised at various levels, but individual events should be embedded in a transregional concept.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☑ Forestry ☑ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Voluntary nature conservation, sports associations; NB: as many stakeholders as possible should be involved in order to reach a wide public and increase the impact.	
Legal situation		
Economic/financial aspects	Costs of implementing the measure (€):	Depending on the size of the event and accompanying actions, at least € 2000 will be required.
	Sources of financing:	☑ Private sector: sponsor(s) ☐ Private sector: other ☐ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	By increasing public awareness, positive impacts (donations, volunteers) can be expected. The events may also be of interest to the tourism sector.
Evaluation	The "Running Wild" - "race for life" for the European wildcat (Felis silvestris silvestris) has already taken place three times (2006, twice in 2008) at the initiative of BUND Deutschland (Friends of the Earth Germany) to publicise the planned migration corridor for wildcats between Hainich National Park and the Thuringian Forest (Thüringer Wald) (Hesse, Bavaria, Thuringia in Germany).	
Information & contact	Information sources:	Further information about the "race for life" for the European wildcat is available at: http://wildkatzet3.bund.net/index.php?id=79
	Contact:	

7.1.2. Information campaigns in towns and municipalities

7. Public relations work and sensitisation; 7.1 Communications

Settlements are among those areas which may contribute to the fragmentation of the landscape and whose development may contribute to habitat decline. However, it may be possible to mitigate these effects with measures adopted in the gardens and green spaces of towns and villages. The permeability of the areas and, above all, of the spatial restrictions can be increased, habitats can be created or made more environmentally compatible, and the use of pesticides and herbicides can be dispensed with, etc. By means of information campaigns and brochures sent out along with building permits, for example, the public can be encouraged to adopt these measures. Possible measures include: creation of near-natural hedges from local timber, permeability of fencing around properties, “insect hotels”, bee forage etc.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☐ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☐ Perimeters of protected areas ☐ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	Simple methods such as small recesses in walls, wider meshes in fences, etc. can greatly increase the mobility of insects, small mammals, amphibians, etc. in residential areas.
	☑ Habitat improvement	Insect hotels, near-natural hedges, nesting boxes, dead branches and piles of leaves, stones and "wild corners" in gardens increase the diversity, quality and supply of habitats in settlements.
	☑ Element of ecol. connectivity	Appropriately designed and managed parks and gardens can form significant stepping stone biotopes.
	☑ Other	More nature in settlements has positive effects on the hydrological regime, climate and human health.
Impact	☑ Immediate ☑ Several months ☑ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: Depending on the measure, the impact may commence immediately (e.g. creation of an opening in a boundary wall) or only after several years (creation of hedges, tree-planting, restoration of water bodies).	
Implementation period	☑ Short (days) ☑ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: Most of the measures listed can be implemented relatively quickly and with little expense or work.	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: In order to achieve a good impact, it is important to work at community level and involve as many local residents as possible!	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☐ Forestry ☐ Hunting ☑ Local community ☐ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Municipalities, politicians, local associations	
Legal situation	Implementation of the measures takes place on a voluntary basis	
Economic/financial aspects	Costs of implementing the measure (€):	Most of the examples listed are not very cost-intensive. The work can be carried out as part of local projects, often with volunteers.
	Sources of financing:	☑ Private sector: sponsor(s) ☑ Private sector: other ☐ Public: European ☐ Public: national ☐ Public: other ☐ Public: regional ☑ Public: local
	Socio-economic impacts	More attractive living environment, more "nature" in settlements
Evaluation	Experience has shown that citizens are often unaware or have little information about these issues and respond very positively to ideas and suggestions. If the municipalities contribute to the costs of a new near-natural hedge, for example, a great many volunteers can be recruited very quickly.	
Information & contact	Information sources:	Departement Isère has published numerous brochures on this theme and runs regular information campaigns: http://www.isere-environnement.fr/pages/index/id/6416
	Contact:	Conseil général de l'Isère (www.cg38.fr)

7.1.3. Guided tours and information events

7. Public relations work and sensitisation; 7.1 Communications

In the implementation of measures and thus the realisation of biotope network projects at local level, spatial and landscape planners and municipal administrations have a role to play as key actors alongside the nature conservation organisations, which are often the driving forces behind biotope network projects. Local information events and guided tours are a good way of informing these actors (as well as other stakeholders such as farmers, hunters etc.) about the issue of biotope networks and ecological connectivity and ways of realising them in practice. What is important, to ensure the success of these initiatives, is to prepare summary documentation (e.g. a manual with decision-making aids) and to present the benefits and value-added which such projects can generate at local level (multifunctionality of corridors which are significant not only in ecological terms but also perform key social functions as spaces for leisure and recreation as well as economic functions, e.g. through the sustainable management of roadside grass verges).

	☐ Appropriate habitat approach ☐ Appropriate species approach	
Main type of area	☐ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☐ Densely populated areas ☐ Perimeters of protected areas ☐ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☐ Habitat improvement	
	☐ Element of ecol. connectivity	
	☑ Other	Indirect through training and sensitisation of decison-makers and local stakeholders.
Impact	☑ Immediate ☐ Several months ☐ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: Participants must be motivated to take account of connectivity issues in their decisions, ideally starting straight away. Results can be expected in the long term.	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: Training and guided tours take some time to prepare, but delivery can take place in a standardised format.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: Depends on audience. Cooperation between municipalities at regional level should be proposed.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☑ Forestry ☑ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☑ Spatial planning ☑ Transport	
	Other: Politicians, local authorities	
Legal situation	Voluntary information events	
Economic/financial aspects	Costs of implementing the measure (€):	Cost are incurred due to the working time taken in preparing and delivering training and preparing information material.
	Sources of financing:	☑ Private sector: sponsor(s) ☐ Private sector: other ☐ Public: European ☐ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Sensitisation of the public
Evaluation	This measure cannot be expected to produce direct ecological impacts. However, the good cooperation and extremely high level of interest shown at the well-attended daytime and evening events for decision-makers in the municipalities and administrations, such as those held by nature conservation association FRAPNA, demonstrate the high level of interest in these measures and are thus likely to have an indirect positive ecological impact.	
Information & contact	Information sources:	Experience already gained in some pilot regions in the Alps (Engadine, Gesäuse, Isère).
	Contact:	e.g. Arnaud Callec, Conseil général de l'Isère

7.1.4. Management competitions

7. Public relations work and sensitisation; 7.1 Communications

A particular commitment to nature and species conservation and the preservation of valuable regional cultural landscapes, also within the framework of biotope network initiatives, can be rewarded through competitions. At the same time, the public can be informed about farmers' commitment, thus increasing the acceptance of biotope networking measures. In this way, the services provided by agriculture for the preservation of the cultural landscape or networks of interlinked biotopes can be rewarded, while raising awareness of measures adopted within the framework of regional cultural landscape programmes. For farmers, the provision of public information and the ensuing recognition of their work create incentives to manage their areas in a manner conducive to biotope connectivity.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☐ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Competitions can offer incentives for habitat improvement, thus creating habitats for rare species of animal and plant (e.g. extensive grassland).
	☑ Element of ecol. connectivity	Appropriate competition design facilitates a focus on aspects of ecological connectivity.
	☑ Other	Overall concepts (e.g. for a local biotope network) can be planned and implemented as part of a competition.
Impact	☐ Immediate ☑ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: The impact depends on the focus of the competition but manageable time frames should be aimed for.	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: Competitions can be implemented within very short periods of time.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: The impact can be enhanced with comprehensive planning and embedding in an overall concept.	
Stakeholders/sectors concerned	☐ Protected areas ☑ Tourism ☑ Forestry ☐ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other:	
Legal situation		
Economic/financial aspects	Costs of implementing the measure (€):	Costs are associated with the prizes awarded, the inspection of sites, PR work, and organisation. Depending on size, at least € 2000 will be required.
	Sources of financing:	☑ Private sector: sponsor(s) ☐ Private sector: other ☐ Public: European ☐ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	If marketed appropriately, competitions can serve to attract tourists.
Evaluation	In the Eifel, Germany, a meadow management competition took place in 2007 in which dry, fertilised and wet meadows were scored according to nature conservation criteria, management method, status from an agricultural perspective, and the farmer's publicity work.	
Information & contact	Information sources:	e.g. http://www.wiesenmeisterschaft-eifel.de
	Contact:	

7.2.1. Educational pathways

7. Public relations work and sensitisation; 7.2 Environmental education

The purpose of an educational pathway is to impart and increase knowledge while offering an experience of nature, recreation and raising environmental awareness. Pathways also offer a good opportunity to bring the issue of biotope networks closer to the public and thus publicise a local or regional project. The "Green Light for Ecological Corridors" educational pathway, for example, was developed as part of a transnational Interreg III A project by three nature conservation organisations: Pro Natura Genève, Appollon 74 and FRAPNA Haute-Savoie. Along the pathway, there are numerous information boards which explain the significance of ecological corridors. The boards were designed in conjunction with school classes from the local area. As part of this collaboration, teachers and students explored the topic of habitat connectivity in great detail. 20 classes were involved in total. In addition, various other educational tools, such as a brochure and a touring exhibition, were developed as part of the project.

	☐ Appropriate habitat approach ☐ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☐ Habitat improvement	
	☐ Element of ecol. connectivity	
	☑ Other	Indirect ecological impact via environmental education and public information.
Impact	☐ Immediate ☐ Several months ☐ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: In view of the costs, an educational pathway should be long-term in focus. In this way, it can also demonstrate the effect of a variety of measures to promote connectivity.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: If properly thought out, the planning, development and implementation of an educational pathway can involve quite a considerable workload.	
Scope of implementation	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☐ National	
	Comments: Depending on the location of the educational pathway, it may also attract tourists and visitors from other areas.	
Stakeholders/sectors concerned	☐ Protected areas ☑ Tourism ☐ Forestry ☐ Hunting ☑ Local community ☐ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Educational authorities, schools, municipalities, hiking clubs.	
Legal situation		
Economic/financial aspects	Costs of implementing the measure (€):	Depending on scope (length of educational pathway, terrain, use of existing pathways, number of stops) an educational pathway may entail costs running into several tens of thousands of euros.
	Sources of financing:	☑ Private sector: sponsor(s) ☑ Private sector: other ☑ Public: European ☐ Public: national ☑ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	May attract visitors. Environmental education.
Evaluation	This measure cannot be expected to produce direct ecological impacts. However, the good cooperation and extremely high level of interest on the part of the many school classes participating in the above-mentioned project demonstrate the effect of these measures and are thus likely to have an indirect positive ecological impact.	
Information & contact	Information sources:	Brochure on the project and further details: http://www.pronatura.ch/ge/index.php?lang=3&mz=5 http://www.frapna.org/hsavoie/
	Contact:	Contact at FRAPNA Haute-Savoie: Damien Hiribarrondo

7.2.2. *Development and provision of educational materials on biotope networks and ecological connectivity*

7. Public relations work and sensitisation; 7.2 Environmental education

The description of this measure is based on the “Nature sans frontières” (Nature without Frontiers) games kit from the French nature conservation organisation FRAPNA. Children are the adults of tomorrow – and will be responsible for decision-making and action. For that reason, it is important to teach them about ecological relationships and the key functions of natural systems. This can be achieved simply and effectively through play. That is the aim of this educational games kit. It is a practical tool which enables children and young people to learn about the mobility needs of various sample species, recognise possible barriers and identify simple solutions to overcome them. The easily accessible games are ideally suited to the classroom and excursions into the local environment. The kit comprises a theoretical guide with explanations of the issues, suggested action and solutions (80 pages); an activity book with instructions for observations, 12 experiments and various activities (60 pages), and several games (card games, board games, identification sets etc.).

	☐ Appropriate habitat approach ☐ Appropriate species approach	
Main type of area	☐ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☐ Densely populated areas ☐ Perimeters of protected areas ☐ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☐ Habitat improvement	
	☐ Element of ecol. connectivity	
	☑ Other	Indirectly through environmental education.
Impact	☑ Immediate ☐ Several months ☐ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: Sensitising children to this issue is an important aspect of publicity work. As a rule, children are very receptive to the topic and are keen to take action immediately. To ensure a more lasting sensitisation impact, however, the issue must be addressed in detail over a longer period.	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: The longer the sensitisation period and the greater the detail, the more effective the message. This also allows specific activities and projects to be carried out with children, including in the field.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: The educational tool is being distributed throughout the region and presented to classes in schools.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☐ Forestry ☐ Hunting ☑ Local community ☐ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: School classes, schools' field centres, kindergartens, education authorities	
Legal situation	Voluntary education offer	
Economic/financial aspects	Costs of implementing the measure (€):	Presentation of the games in the classes and facilitation are undertaken by volunteers. The games kit itself costs € 40.00.
	Sources of financing:	☑ Private sector: sponsor(s) ☑ Private sector: other ☑ Public: European ☐ Public: national ☐ Public: other ☑ Public: regional ☐ Public: local
	Socio-economic impacts	None
Evaluation	The kit is proving very popular with children and the experience reported by volunteers and staff from the nature conservation organisation is very positive. No data are available on the long-term impacts on the current and future behaviour of the children.	
Information & contact	Information sources:	The games kit was developed in 2005-2008 as part of an environmental education campaign on ecological corridors: http://www.frapna.org/~nsf/index.htm
	Contact:	www.frapna.org

7.2.3. Visitor information

7. Public relations work and sensitisation; 7.2 Environmental education

Information boards can be used to sensitise the public to the issue of biotope networks and inform them about relevant measures, e.g. in a nature conservation area. Visitors can also be channelled through a specific area by the information boards. In this way, usage can be shifted towards less sensitive areas, while efforts are made to preserve the tranquillity of, and reduce the burden on, areas in special need of protection and quiet zones. Information points are a good way of providing information and supporting active learning processes and "light-footprint" observation opportunities. Depending on the area, cultural and historical information can also form part of the pathway.

	☐ Appropriate habitat approach ☐ Appropriate species approach	
Main type of area	☐ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	In combination with strategies to channel visitors, habitat improvements can be achieved (e.g. by creating a quieter environment in some areas).
	☐ Element of ecol. connectivity	
	☑ Other	Information systems cannot be expected to produce direct ecological impacts, but in the long term, public awareness is increased and there is greater acceptance of the relevant measures.
Impact	☑ Immediate ☑ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Visitor information boards can start to have an impact as soon as they are in place. During the planning process, however, it is important to ensure that no additional disturbance will be caused.	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: Planning and implementation of information strategies take time, depending on the size of the area.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: Educational pathways and information strategies can also be implemented on a larger scale. In general, however, they should only be considered for habitats which will not suffer any impairment as a result of the placement of information boards.	
Stakeholders/sectors concerned	☐ Protected areas ☑ Tourism ☑ Forestry ☐ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Educational institutions	
Legal situation		
Economic/financial aspects	Costs of implementing the measure (€):	Costs can vary considerably depending on the materials used, scale and design. At least € 1000 in material costs must be assumed for each information board.
	Sources of financing:	☐ Private sector: sponsor(s) ☑ Private sector: other ☐ Public: European ☐ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Attractive information offers may be beneficial to tourism.
Evaluation	A wealth of information offers is available, which often also serve to channel visitors. In Switzerland, since 1996, near-natural areas and a networked system of natural habitats for flora and fauna have been developed in the Grosses Moos biotope network. In this context, an information strategy was developed with interactive elements, explaining the individual elements of the biotope network.	
Information & contact	Information sources:	Information programme in Grosses Moos (Switzerland): http://www.echanges.ch/exchange02/pdf/atelier_moos.pdf
	Contact:	

7.3.1 Volunteer programmes

7. Public relations work and sensitisation; 7.3 Stakeholder participation

Some providers offer various target groups, e.g. families, companies, schools and private individuals, the opportunity to undertake voluntary work in the ecological sphere (e.g. in woodlands). Participants thus make an active contribution to forest, climate and species protection while gaining a very intensive experience of the ecosystem at the same time. The purpose of the volunteering is to improve habitat quality at specific project sites. Relevant programmes also inform the volunteers about connections within the various habitats and make a contribution to sensitisation and awareness-raising. Focussing measures on the creation of a biotope network is an option in this context. Cooperation through current "corporate social responsibility" initiatives also helps to raise environmental awareness and increase knowledge of the importance of connectivity measures in an up-to-date way while drawing attention to the problems arising in this context.

	☐ Appropriate habitat approach ☐ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	As a result of the volunteer work, and depending on the location and the measures undertaken, habitat quality can be improved.
	☑ Element of ecol. connectivity	By gearing projects towards ecological connectivity, activities focus on relevant elements.
	☑ Other	Volunteering raises awareness of nature conservation and, depending on the thematic focus, of the importance of connectivity measures.
Impact	☑ Immediate ☑ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Depends on the specific measures being carried out. To increase participants' motivation, it is beneficial to achieve rapidly visible results.	
Implementation period	☑ Short (days) ☑ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: Often, assignments last one week, but may only last for a few days. Several groups may contribute to the implementation of Individual measures.	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: Assignments are carried out at local level. The impact increases with appropriate large-scale planning.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☑ Forestry ☑ Hunting ☐ Local community ☐ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Companies, families	
Legal situation	Relevant organisations cooperate closely with forestry or nature conservation.	
Economic/financial aspects	Costs of implementing the measure (€):	Tools and vehicles must be available, as well as experts to explain and manage the projects; publicity work
	Sources of financing:	☑ Private sector: sponsor(s) ☐ Private sector: other ☐ Public: European ☐ Public: national ☑ Public: other ☐ Public: regional ☐ Public: local
	Socio-economic impacts	Relevant initiatives may also be attractive to tourists, and positive regional economic effects can be achieved.
Evaluation	The Bergwald Project has worked since 1987 to preserve the mountain forest with a main focus on Austria, Switzerland and Germany and, since 2006/7, Ukraine and Catalonia. WWF Switzerland also offers volunteering opportunities for companies with a focus on dry meadows in Lower Engadine (ECONNECT pilot region Inn-Etsch).	
Information & contact	Information sources:	http://www.bergwaldprojekt.ch http://www.bergwaldprojekt.de http://www.wwf.ch/de/tun/aktivwerden/freiwillig/umwelteinsatz/index.cfm
	Contact:	

7.3.2. Countryside management measures

7. Public relations work and sensitisation; 7.3 Stakeholder participation

Countryside management measures can involve joint action between various stakeholders (nature conservation bodies, hunters, fishermen, farmers etc.) and the local community. Within the framework of these events, measures of relevance to ecological connectivity can also be implemented. They include, for example, maintaining richly structured, semi-open areas through the removal of wood, meadow management, or promotion of near-natural structures along watercourses. Activities can be undertaken at local or regional level at various intervals. The implementation of measures also increases the acceptance of the biotope network and raises public awareness at the same time.

☑ Appropriate habitat approach ☑ Appropriate species approach

Main type of area

☑ Priority areas for biodiversity ☑ River systems ☑ Large forested areas
☑ Densely populated areas ☑ Perimeters of protected areas
☑ Areas under high pressure from agriculture, tourism etc.

Ecological impact

☐ Reduction of fragmentation	
☑ Habitat improvement	As a result of the activities carried out as part of "countryside management days", and depending on the location and the measures undertaken, habitat quality can be improved.
☑ Element of ecol. connectivity	By gearing projects towards ecological connectivity, activities focus on relevant elements.
☑ Other	Acceptance in the local community is increased, perhaps leading to more measures to promote ecological connectivity.

Impact

☑ Immediate ☑ Several months ☐ 1 - 2 years ☑ Long-term (3 years+)

Comments: The impact depends on the measures carried out.

Implementation period

☑ Short (days) ☑ Medium (weeks) ☐ Long (months) ☐ Very long (years)

Comments: For smaller-scale activities, 1-day assignments are generally sufficient; several actions can also take place consecutively.

Scope of implementation

☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National

Scope of impact

☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National

Comments: Implementation of the measures is generally localised.

Stakeholders/sectors concerned

☐ Protected areas ☐ Tourism ☑ Forestry
☑ Hunting ☑ Local community ☑ Agriculture
☑ Nature conservation ☐ Spatial planning ☐ Transport

Other: Fishing, municipalities.

Legal situation

None.

Economic/financial aspects

Costs of implementing the measure (€):	The requisite tools must be available,and it is customary to provide food for the helpers; costs can generally be kept low.
Sources of financing:	☑ Private sector: sponsor(s) ☐ Private sector: other ☐ Public: European ☐ Public: national ☐ Public: other ☐ Public: regional ☑ Public: local
Socio-economic impacts	Important tasks can be undertaken, reducing the overall costs of biotope networking measures.

Evaluation

There are numerous initiatives, albeit without a specific focus on biotope connectivity so far. Often, nature conservation organisations initiate countryside management days and can provide further information.

Information & contact

Information sources:	Information about existing initiatives is available , for example, at: http://rohrhardsberg-life.de/artikel/landschaftspflege http://wasser.umweltschutz.ch/download/leitfaden_aktionstag_03.pdf
Contact:	

7.3.3. Monitoring by farmers

7. Public relations work and sensitisation; 7.3 Stakeholder participation

Farmers, with their areas distributed through the landscape, are key elements of transregional networks of interlinked biotopes and are therefore important partners in the implementation of relevant measures. They also possess extensive knowledge and many years of experience which they can contribute to the planning and implementation of biotope networking measures. It is therefore extremely important to involve farmers as stakeholders. They can also perform a key function by monitoring the development of endangered and/or rare species on their own farmland. This observation process raises awareness and also improves their understanding of the purpose of certain management requirements (e.g. areas of extensive use, set-aside etc.). For the monitoring of the biotope network, appropriate and effective indicator systems must be defined.

	☐ Appropriate habitat approach ☐ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☐ Habitat improvement	
	☐ Element of ecol. connectivity	
	☑ Other	Direct ecological impacts only arise as a result of the measures which are the focus of monitoring. Monitoring systems are appropriate, for example, to measure the impact of actions for the extensivisation of agriculture. Indicators can include the presence of specific rare plant species, for example.
Impact	☐ Immediate ☑ Several months ☑ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Biotope networking measures must be carried out before monitoring takes place.	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: Appropriate training must be provided for farmers before monitoring commences.	
Scope of implementation	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: Monitoring takes place on individual plots. The impact can be increased if entire regions participate in relevant programmes.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☐ Forestry ☐ Hunting ☐ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other:	
Legal situation		
Economic/financial aspects	Costs of implementing the measure (€):	Preparation, training for participants, processing of results. A monitoring subsidy could also be paid to participants.
	Sources of financing:	☑ Private sector: sponsor(s) ☐ Private sector: other ☐ Public: European ☐ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Compensation (payment of a subsidy) is possible to offset the moderate additional expenses incurred by farmers in conjunction with monitoring.
Evaluation	In Vorarlberg, experience has been gathered with a programme to involve farmers in biodiversity monitoring ("Biodiversity Monitoring with Farmers" (BDMWF)). Similar approaches are being pursued in the Species-Rich Grassland Programme.	
Information & contact	Information sources:	Information is available, for example, at: http://www.vorarlberg.at/vorarlberg/umwelt_zukunft/umwelt/natur-undumweltschutz/foerderungen/oepul2007/naturschutzmassnahmenimoe.htm http://www.oekl.at/stories/storyReader$698
	Contact:	

8.1.1. Hunting ban areas, game protection areas, quiet zones, game reserves

8. Hunting

These various types of areas are intended to protect flora and fauna from disturbance or pressure from hunting. They are subject to different regulations, depending on the country or region: in Switzerland's "quiet zones" for game, for example, tourists, sportspersons and visitors may not leave the paths at specific times or enter the habitats of sensitive and rare species of fauna. Other activities such as skiing, snowshoeing, camping or organised sports events are also governed by specific rules. Alpine farming and agricultural/forest management are not affected by restrictions in the quiet zones, and hunting is also permitted. In France, on the other hand, hunting is strictly prohibited in the game reserves, as it is in Switzerland's hunting ban areas and game protection areas.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☑ Large forested areas ☐ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Designation of these areas is often accompanied by habitat improvement measures (in France, this is mandatory for game reserves under hunting legislation).
	☑ Element of ecol. connectivity	Depending on the size of the designated spaces, these areas can act as core zones or stepping stone biotopes in a biotope network, especially for sensitive species of bird and ungulates.
	☐ Other	
Impact	☑ Immediate ☐ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: A change in the behaviour of red deer, for example, in quiet zones can be observed within a short period (diurnal activity, confidence).	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☐ Long (months) ☐ Very long (years)	
	Comments: The administrative process involved in designation of a new area may take some time. In France, for example, the reserves are confirmed by the prefect by decree.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: Depending on species, the measure can have substantial local and regional impacts by reducing damage to agriculture and forestry; this is mainly dependent on the size of the designated zone.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☑ Forestry ☑ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other:	
Legal situation	The establishment of these areas is regulated by national and regional forest and hunting legislation. In France, 10% of the area of a communal hunting association (ACCA) must be designated a game reserve.	
Economic/financial aspects	Costs of implementing the measure (€):	Costs arise solely in relation to the administrative process (planning, designation) and possibly publicity/signage.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☐ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	May help to prevent damage to agriculture and forestry in some regions.
Evaluation	Experience in Switzerland has shown that the game reserves enjoy wide acceptance among the local communities and sportspersons if appropriate information is provided. Hunters generally also respect the hunting bans in these areas.	
Information & contact	Information sources:	Association of French Hunters: www.chasseurdefrance.com; Swiss cantonal administrations (hunting departments), e.g. Obwalden Canton
	Contact:	

9.1.1. *Taking account of the elements of ecological networks in planning tools (land-use plans, landscape development strategies etc.)*

9. Spatial planning

The consideration of central elements of a biotope network in spatial planning is extremely important for the long-term and sustainable creation of a biotope network. This is the only way to ensure long-term connectivity. Planning must, however, be flexible enough to take account of the dynamic character of the biotope network. Depending on the type and significance of the elements, they should be taken into account in different tools and at different levels (at local level, areas for a small-scale network; at regional level, key migration corridors and solutions for major conflict points). There are already a number of examples in existence, notably in Switzerland with the creation of the REN in guidance planning (Richtplanung) or in France, where individual municipalities have incorporated elements of the local biotope network in their land-use planning.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	The consideration of the biotope network in spatial planning helps to avoid fragmentation in future.
	☐ Habitat improvement	
	☑ Element of ecol. connectivity	The key elements of the biotope network are safeguarded for the long term.
	☐ Other	
Impact	☑ Immediate ☐ Several months ☐ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: Spatial planning of key sites and structures avoids incorrect use and safeguards the long-term functionality of the network.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: Consideration in planning tools requires a very precise concept of the biotope network, mapping and coordination with other stakeholders - a lengthy process.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☑ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☐ National	
	Comments: Depending on the planning tool and the biotope network plan, may vary widely.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☑ Forestry ☑ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☑ Spatial planning ☑ Transport	
	Other: Landscape planners, politicians, land owners.	
Legal situation	Local, regional, state planning instruments.	
Economic/financial aspects	Costs of implementing the measure (€):	Cannot be specified precisely. Planning is, however, very time-consuming and labour-intensive.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☑ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Numerous and diverse impacts on all stakeholders affected by the biotope network.
Evaluation	Inclusion of the elements of a biotope network in land-use planning is relatively new and much experimentation is under way. Questions about the best approach are still unresolved, especially as the network elements should have a dynamic character and no new "strictly protected areas" should be created.	
Information & contact	Information sources:	e.g. in the French Region Rhône-Alpes, municipality of St. Martin d'Uriage, or Fribourg Canton in Switzerland.
	Contact:	

9.1.2. Wildlife/ecological spatial planning

9. Spatial planning

Wildlife/ecological spatial planning (WÖRP) is an instrument developed in Austria and is used in a number of Austrian states, as well as the canton of Graubünden in Switzerland and Liechtenstein. The aim of this concept is better long-term incorporation of native species of wildlife into the cultural landscape. In this context, the protection and sustainable use of wildlife populations and the avoidance of damage to wildlife in agriculture and forestry are of key importance. An integrated planning approach aims to harmonise the creation of biotope networks with studies on game stocks and the carrying capacity of biotopes. WÖRP can be applied, in principle, to all wildlife species. It includes large-scale spatial planning (nationwide basic planning) related to the spatial distribution of wildlife populations and detailed regional planning.

	☐ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☑ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	The aim of WÖRP is the conservation of species-appropriate coherent habitats for wildlife. Habitat connectivity is an essential part of habitat conservation.
	☑ Habitat improvement	It includes habitat conservation and improvement measures, overwintering concepts for hoofed game, and minimisation of use-related conflicts.
	☑ Element of ecol. connectivity	Building on the results of WÖRP, appropriate connectivity measures are adopted, including the construction of green bridges.
	☑ Other	In infrastructural projects, WÖRP helps to provide an initial pointer to the significance of the habitat for wildlife, which can then be taken into account during planning.
Impact	☐ Immediate ☐ Several months ☐ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: Implementation of WÖRP is a long-term process which must constantly be adapted to changing conditions.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: As WÖRP is a complex planning tool requiring substantial information, the process takes time.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☑ National	
	Comments: The regulations governing WÖRP divide the countryside into wildlife spaces, wildlife regions and wildlife zones. It involves regional planning across a wide area, which is intended to provide a basis for detailed local plans.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☑ Forestry ☑ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☑ Spatial planning ☑ Transport	
	Other: Sportspersons, holiday-makers ...	
Legal situation	In Austria, specific regulations (WÖRP-Verordnung) governing WÖRP are in place. In some federal states in Austria, WÖRP is established in hunting legislation.	
Economic/financial aspects	Costs of implementing the measure (€):	Dependent on many different factors (size of area, detail of plans, etc.) so varies widely from case to case.
	Sources of financing:	☐ Private sector: sponsor(s) ☑ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☐ Public: local
	Socio-economic impacts	May have considerable impacts on spatial planning, farming, hunting etc.
Evaluation	Complex but successful planning tool which has also proved its worth in an international context (along the tri-border area between Austria, Switzerland and Liechtenstein). At international level, in conjunction with Natura 2000 and protected areas, WÖRP has found solutions to problems arising between protected and non-protected areas.	
Information & contact	Information sources:	The Austrian states of Vorarlberg, Salzburg, Carinthia, and Liechtenstein, Graubünden (CH), and Austria's National Parks (Kalkalpen, Donau-Auen).
	Contact:	Salzburg federal state: Dipl.-Ing. Rupert Haupolter; Research Institute of Wildlife Ecology, University of Veterinary Medicine, Vienna: Prof. Dr. Friedrich Reimoser

10.1.1 Tourist marketing of the biotope network

10. Tourism and leisure; 10.1 Creating synergies with tourism

Valuable habitats of different species of fauna and flora also have high recreational value which, with appropriate sustainability strategies, can generate synergies between nature conservation and tourism strategies. On the one hand, appropriate tourist offers can inform visitors and guests about the biotope network. On the other, tourism can contribute to the conservation and protection of habitats. Corresponding effects can be achieved through an integrated marketing strategy in which the biotope network is actively promoted via the marketing and imparted through appropriate guided tours, for example. The focus should be on particularly attractive biotopes which also increase regional value-added (e.g. mixed orchards). In this way, sustainable agriculture, crafts and commerce in the region can be promoted and the biotope network will be increasingly appreciated in the long term by locals and visitors alike due to its positive economic effects.

	☐ Appropriate habitat approach ☐ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☑ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☐ Habitat improvement	
	☐ Element of ecol. connectivity	
	☑ Other	The increased acceptance of biotope network measures is expected to create positive ecological impacts over the long term and more measures may be implemented on this basis.
Impact	☐ Immediate ☑ Several months ☑ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: A long period of time is required to develop and implement suitable strategies and, similarly, it takes a long time for the impact to appear. However, acceptance can already be increased during the planning phase.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☐ Long (months) ☑ Very long (years)	
	Comments: It can be assumed that the implementation of the strategies will take a long time.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: Marketing strategies should preferably be implemented at regional level but a biotope network can be promoted at local level.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☑ Forestry ☐ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: It is useful to involve as many stakeholders as possible to enable exceptionally high synergy effects to be achieved.	
Legal situation		
Economic/financial aspects	Costs of implementing the measure (€):	The costs for the planning process and for creating the appropriate structures are expected to be high, but can be integrated into existing planning processes.
	Sources of financing:	☐ Private sector: sponsor(s) ☑ Private sector: other ☐ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☐ Public: local
	Socio-economic impacts	Positive economic effects should be achieved if sound marketing strategies are developed.
Evaluation	The "Experience the Green Belt" project in Germany is promoting the former inner-German border for tourism. It is combining nature conservation with 'soft' tourism to publicise this unique biotope network and draw attention to its importance for nature conservation.	
Information & contact	Information sources:	Information from the Federal Agency for Nature Conservation: http://www.bfn.de/0311_gruenes_band.htm Project website: http:/www.erlebnisgruenesbnad.de/
	Contact:	

10.1.2 Trails to connect protected areas

10. Tourism and leisure; 10.1 Creating synergies with tourism

In Switzerland (Haute-Engadine, Haut-Valais, southern Tessin), the WWF, together with regional tourism offices, has created three transboundary Emerald Trails with a total of 50 stages. The stages and their attractions, as well as accommodation options, are described in detail on the Internet. The trails link various protected areas, Natura 2000 sites and emerald areas and can thus draw attention to aspects of ecological connectivity.

	☐ Appropriate habitat approach ☐ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☑ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☐ Habitat improvement	
	☐ Element of ecol. connectivity	
	☑ Other	No direct ecological impacts are achieved, but information placed along the trails can raise awareness. Acceptance of biotope network measures is also increased in the long term.
Impact	☑ Immediate ☑ Several months ☑ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: The use of good communication methods increases awareness of the issue immediately; acceptance within the general public only emerges after visible positive results.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☑ Long (months) ☑ Very long (years)	
	Comments: The development and promotion of the trails require a long planning phase.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☐ National	
	Comments: The scope of implementation and impact are heavily dependent on the conditions in the regions and habitats concerned.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☐ Forestry ☐ Hunting ☑ Local community ☐ Agriculture ☑ Nature conservation ☑ Spatial planning ☐ Transport	
	Other:	
Legal situation		
Economic/financial aspects	Costs of implementing the measure (€):	The costs for planning, signage and advertising are expected to be high and will depend on the situation at the outset.
	Sources of financing:	☑ Private sector: sponsor(s) ☐ Private sector: other ☐ Public: European ☐ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	On the basis that the region is being made more attractive, positive economic impacts are expected.
Evaluation	Tourist marketing initiatives can be combined with other measures (e.g. publicity events, volunteer programmes). In addition to the example in Switzerland, Germany and Austria also have similar initiatives relating to Natura 2000 sites (NaturaTrails of the Friends of Nature).	
Information & contact	Information sources:	http://www.wwf.ch/de/derwwf/themen/alpen/wanderwege/index.cfm http://www.naturfreunde-natura2000.de/ http://www.naturatrails.at
	Contact:	

10.2.1 Guidance for winter sportspeople

10. Tourism and leisure; 10.2 Leisure

Ski touring and snowshoeing have become increasingly popular winter sports in recent years, offering an experience of the winter landscape off the pathways and pistes. However, they take sportspersons into the refuge areas of wild animals, which are highly sensitive to disturbance in winter. For critically sensitive zones, the German Alpine Association (DAV) publishes information for touring skiers regarding recommended routes (this includes demarcation of sensitive areas, waymarking, and information boards and maps at car parks). Efforts are also being made to promote cooperation with the authors and publishers of guidebooks.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☑ Large forested areas ☐ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Disturbance in sensitive areas is avoided during the winter.
	☑ Element of ecol. connectivity	Demarcating quiet zones for game in winter creates important refuge areas which thus become winter core zones in a biotope network.
	☑ Other	In areas with emerging young forest stands, this measure can also help protect the young trees.
Impact	☑ Immediate ☐ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Disturbance created by just a single winter sportsperson can have fatal consequences for sensitive species. Marking alternative routes prevents the animals from being disturbed.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: Determining the sensitive routes or sections of routes, formulating alternatives, preparing the information campaigns and signage along the new routes require some preparatory work.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☑ National	
	Comments: In the case of a regional or national initiative (e.g. by the German Alpine Association - DAV), or when a rare species of animal is involved (e.g. wood grouse - capercaillie), the impact can have a regional or even a national significance.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☑ Forestry ☑ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Rural county offices, municipalities, mountain rescue, ski association	
Legal situation	Voluntary collaboration of stakeholders	
Economic/financial aspects	Costs of implementing the measure (€):	Costs vary greatly depending on the project; besides labour, the main expenditure relates to publicity materials.
	Sources of financing:	☑ Private sector: sponsor(s) ☑ Private sector: other ☐ Public: European ☐ Public: national ☑ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	none
Evaluation	There has been a very positive response and acceptance of the measures among ski tourers. Positive impacts, especially on grouse populations, have been demonstrated in various areas, including the German uplands. Information campaigns have been carried out in many different regions (especially protected areas); however, actual demarcation of alternative routes is less common.	
Information & contact	Information sources:	Information on the "Environment-friendly Ski Touring" project is available from the German Alpine Association at: http://www.alpenverein.de (keyword Environment-friendly ski touring)
	Contact:	Information on the projects in Berchtesgaden National Park: http://www.nationalpark-berchtesgaden.bayern.de/english/ national_park/management/ skitour/index.htm (en)

10.2.2 *Agreements on environmentally compatible practice of sports with sportspersons and associations*

10. Tourism and leisure; 10.2 Leisure

Many of the sports carried out in the natural environment can cause major disturbance and even the destruction of habitats. Mountain biking, paragliding, canyoning and climbing are just a few examples. In order to guarantee that sports are practised in a more environmentally compatible manner, agreements for sensitive areas can be reached with sports groups and associations. One example is the climbing strategy adopted by the German Alpine Association (DAV). Many rocky crags and rockfaces provide refuge for rare and protected species of flora and fauna. To ensure that these unique biotopes are not damaged by climbers, strategies for environmentally compatible climbing are both useful and necessary. The package of measures adopted by the German Alpine Association (DAV) on eco-friendly climbing involves working with public authorities and nature conservation organisations to develop climbing strategies. The DAV is relying on a wide variety of solutions to identify, at micro level, those areas where environmentally compatible climbing is possible and those where no climbing should take place in the interests of nature conservation. Uniform marking of crags, temporary closure of crags or sections of them, and local wardens wi

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☑ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Many different plants and animals find their niche at close quarters between the foot of the rock walls and the top of the crags (lichens, peregrine falcon (Falco peregrinus), Eurasian Eagle Owl (Bubo bubo) and many types of insects). The temporary closure of crags or sections of them will prevent damage and
	☑ Element of ecol. connectivity	In areas with few key crags or on those which are used widely for tourism, the implementation of this measure plays a key role, particularly within a biotope network.
	☐ Other	
Impact	☑ Immediate ☐ Several months ☐ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: To protect rocky crags and rockfaces which are breeding places, it is particularly important that the impact is immediate and that no disturbance occurs. Gaining the long-term acceptance of sportspersons and implementing a broad-based standard procedure will take longer.	
Implementation period	☑ Short (days) ☐ Medium (weeks) ☑ Long (months) ☑ Very long (years)	
	Comments: Signage and closures can be set up quickly. Training and 'educating' the sportspersons, establishing a standard marking system etc. are long-term goals.	
Scope of implementation	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☑ National	
Scope of impact	☑ Very localised (plot) ☐ Local (municipality) ☑ Regional ☑ Transregional ☐ National	
	Comments: The impact occurs directly on the rocky crags and rockfaces concerned. However it can have a regional or transregional significance, such as in the case of the successful breeding of a rare and sensitive species.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☐ Forestry ☑ Hunting ☑ Local community ☐ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: sports associations, sportspersons	
Legal situation	Voluntary collaboration with sportspersons and sports associations	
Economic/financial aspects	Costs of implementing the measure (€):	The work involved in implementing this strategy is mainly carried out by volunteers (local wardens with responsibility for crags). Costs for information materials and signage are incurred.
	Sources of financing:	☑ Private sector: sponsor(s) ☑ Private sector: other ☐ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	none
Evaluation	Through a contractual (voluntary) agreement, acceptance of the requisite measures among stakeholders is very high. The easing of burdens on the authorities and the ensuing cost savings, as well as the high degree of flexibility, also testifies to the usefulness of this approach. If monitoring of the scheme's success brings new scientific knowledge to light, the arrangements can be adapted without major organisational or financial effort.	
Information & contact	Information sources:	Comprehensive information about the climbing strategies and environmentally compatible climbing is available from the rock information system: http://www.dav-felsinfo.de (de)
	Contact:	DAV contact person on the subject of climbing and nature conservation: Jörg Ruckriegel.

10.2.3 Flight bans over sensitive areas

10. Tourism and leisure; 10.2 Leisure

Many near-natural landscapes and landscapes which are valuable from a nature conservation perspective are very attractive recreational spaces, for besides offering ideal conditions for sports and leisure, they also offer very special experiences of nature. With the increasing pressure of use, however, conflicts can emerge between the interests of "nature consumers" and nature conservation objectives. These may affect areas which constitute important habitats for rare and sensitive species and which are of major importance for the biotope network. Various types of sport (kite-flying, paragliding, gliding) may also have a negative impact. With the development of quiet zones and the simultaneous creation of alternative offers for sportspersons and holiday-makers in areas which are relatively tolerant of disturbance, incentives can be created for sportspersons to abandon those areas which are highly sensitive to disturbance. The provision of attractive substitute sites is intended to create "win-win situations".

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☐ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Calming measures for individual areas particularly sensitive to disturbance lead to an improvement in the habitat quality of sensitive species (e.g. black grouse).
	☑ Element of ecol. connectivity	Depending on the quality of the areas and on the species occuring in them, valuable areas from a nature conservation perspective constitute important elements of an ecological network.
	☐ Other	
Impact	☑ Immediate ☐ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: The positive impacts of suitable strategies are noticeable immediately after implementation; long-term acceptance, however, will probably only emerge over time.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☑ Long (months) ☑ Very long (years)	
	Comments: The procedure should be based on intensive participation by all stakeholder groups to enable feasible solutions, with majority support, to be developed for the conflict situation.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: Strategies should be planned with a broader spatial perspective, otherwise conflicts will merely be shifted into neighbouring areas.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☐ Forestry ☐ Hunting ☑ Local community ☐ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Sports/flying associations	
Legal situation	Voluntary agreement	
Economic/financial aspects	Costs of implementing the measure (€):	The planning process, which is based on the involvement of all stakeholders, requires a long period of time, and scientific studies must be produced.
	Sources of financing:	☑ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	No negative impacts are expected if alternative flight areas are provided.
Evaluation	In the Upper Rhön region (Bavaria, Germany), as part of a close cooperation between aviation sport and nature conservation representatives, an agreement was formulated between 1998 and 2003 which was supported by the Federal Agency for Nature Conservation (BfN). The agreement between the Society for the Promotion of Gliding on the Wasserkuppe and the Biosphere Reserve Authority contains clear and tried-and-tested regulations.	
Information & contact	Information sources:	A project report published in the BfN-Skripten series is available on the internet and contains information on the entire planning process: http://www.bfn.de/fileadmin/MDB/documents/skript83_text.pdf
	Contact:	Expert support at the Federal Agency for Nature Conservation : Michael Pütsch

11.1.1 Connectivity measures with support from church-owned land

11. Other

The churches are important owners of land and farmland which are also suitable for the creation of a network of interlinked biotopes, and can thus serve as an important partner in the planning of biotope network measures. If the church backs the development of a biotope network and works actively to ensure that appropriate measures are implemented on its property, the tenants can also be sensitised to the importance of the biotope network, and the tenancies are then linked to the implementation of relevant measures. In order to increase acceptance of the biotope network and plan appropriate measures, the planning process should involve as many different stakeholders as possible (besides church workers, this should include nature conservation experts, local community representatives, farmers etc.). Appropriate public relations work can be used to encourage similar initiatives in other regions.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☐ Priority areas for biodiversity ☑ River systems ☑ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	Depending on the measures and habitats concerned, the quality of individual habitats is improved.
	☑ Element of ecol. connectivity	With appropriate planning, church land can form elements of an ecological network, perhaps even on a transregional basis.
	☐ Other	
Impact	☑ Immediate ☑ Several months ☑ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: The impacts depend heavily on the measures and ecosystems concerned.	
Implementation period	☐ Short (days) ☑ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: Here, too, the duration of the measures to be implemented is dependent on the measures involved, and the preparation and planning will also take time.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: Integrating the measure into an overall strategy increases its impact accordingly.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☑ Forestry ☐ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☐ Spatial planning ☐ Transport	
	Other: Churches, voluntary nature conservation	
Legal situation	Suitable measures can be promoted by cultural landscape and countryside management programmes.	
Economic/financial aspects	Costs of implementing the measure (€):	Many different measures can be planned and implemented depending on the situation at the outset and the conditions of the land involved.
	Sources of financing:	☑ Private sector: sponsor(s) ☐ Private sector: other ☐ Public: European ☐ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	Subsidies can increase the incomes of the farmers involved or can offset any additional costs incurred.
Evaluation	Two such initiatives have already been implemented in Germany which have been very successful and are to be continued (a biotope network with church land in Bavaria and a biotope network with the help of church land in Saxony-Anhalt).	
Information & contact	Information sources:	http://www.pan-partnerschaft.de/faltblatt/naila.pdf https://www.dbu.de/projekt_18212/_db_1036.html orr http://www.kfh-wb.de/projekte/biot.htm
	Contact:	Information from the Association for the Protection of Nature in Bavaria (BN), Hof group, contact person: Klaus Schaumberg

11.1.2 Environmentally compatible design of power lines

11. Other

Power lines have been a feature of the landscape for almost 100 years. At present, there is virtually no alternative to them when it comes to Europe's extra high voltage sector. Wide aisles of low-growing woodland emerge, particularly when the conductor cables cross large forest areas at the normal height. Nonetheless, there are still interesting options to promote ecoconnectivity in this cultural landscape, even in areas with encroaching woodland growth due to lack of agricultural use. With well-thought-out and systematic biotope management planning, these areas can become important habitats, connecting routes, stepping stones and corridors in the biotope network.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☑ River systems ☑ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☐ Reduction of fragmentation	
	☑ Habitat improvement	With well-thought-out and sensible biotope management planning, various habitats and biotopes can be created in the aisles beneath power lines.
	☑ Element of ecol. connectivity	With appropriate design, there are good opportunities for these routes to become corridors and newly created or maintained biotopes can become stepping stones or even core areas.
	☐ Other	
Impact	☐ Immediate ☐ Several months ☐ 1 - 2 years ☑ Long-term (3 years+)	
	Comments: The development of their impact as elements of a biotope network requires careful planning and a long-term design and maintenance process.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: The overhead power line network is very large. Individual measures like creating special new biotopes happen relatively quickly, but action on a broader basis is a task that will take many years.	
Scope of implementation	☐ Very localised (plot) ☐ Local (municipality) ☑ Regional ☑ Transregional ☑ National	
Scope of impact	☑ Very localised (plot) ☐ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
	Comments: A regional strategy is imperative, but the impact will generally have local significance only.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☑ Forestry ☑ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☑ Spatial planning ☑ Transport	
	Other: Energy suppliers, landscape planners	
Legal situation		
Economic/financial aspects	Costs of implementing the measure (€):	Costs vary depending on the project being planned. The maintenance measures in the aisles must, however, take place regularly, involving continuous labour costs.
	Sources of financing:	☐ Private sector: sponsor(s) ☑ Private sector: other ☐ Public: European ☑ Public: national ☑ Public: other ☑ Public: regional ☐ Public: local
	Socio-economic impacts	The landscape is upgraded, especially areas with overhead power lines, which are generally viewed in negative terms.
Evaluation	Individual examples with committed energy suppliers and well-thought-out strategies can produce very good results, particularly in terms of connectivity. However, there are areas where overhead cables should definitely be removed and laid underground.	
Information & contact	Information sources:	Information on biotope management in power line routes can be obtained from energy supplier RWE, for example.
	Contact:	Expert at the Swiss Federal Institute of Technology, Zurich: Dr. Thomas Coch, nature and landscape conservation

11.1.3 Light pollution/light smog audits

11. Other

The term “light pollution” denotes the brightening of the night sky caused by artificial light sources whose light is dispersed into the atmosphere. This can have various effects: the growth cycle of plants, for example, may be influenced by an artificially brightened environment. The sensory organs of nocturnal animals are specially adapted to night-time conditions, which makes them particularly sensitive to artificial light. Animals therefore attempt to avoid sources of light, so a well-lit street can therefore constitute a major barrier and contribute to habitat fragmentation. A large proportion of light pollution comes from poorly constructed or poorly installed light sources and can be avoided without any negative impacts, e.g. on road safety. An audit of public lighting can help to identify problem areas and offer appropriate solutions.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☐ River systems ☐ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☐ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	Brightly lit roads and residential areas, but also ski slopes, natural and cultural monuments, and floodlights from nightclubs can have substantial barrier effects at night.
	☑ Habitat improvement	Bright lighting affects all nocturnal animals. Intensive lighting can also disturb the growth of plants. Reducing the intensity of lights can therefore help to improve their habitats.
	☐ Element of ecol. connectivity	
	☐ Other	
Impact	☑ Immediate ☐ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Reducing light intensity creates positive effects immediately.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☑ Long (months) ☐ Very long (years)	
	Comments: Carrying out the audit can take a relatively long time, depending on the data. The proposed improvements will be implemented over the long term and will depend on the budget and decisions made.	
Scope of implementation	☐ Very localised (plot) ☑ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
Scope of impact	☐ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☐ National	
	Comments: In sensitive areas, e.g. the migration routes of birds or bats, the measures taken locally to improve the lighting situation can have transregional significance.	
Stakeholders/sectors concerned	☐ Protected areas ☑ Tourism ☐ Forestry ☐ Hunting ☑ Local community ☐ Agriculture ☑ Nature conservation ☑ Spatial planning ☑ Transport	
	Other:	
Legal situation		
Economic/financial aspects	Costs of implementing the measure (€):	This type of audit will cost between €2,000 and 10,000, depending on the size of the municipality, the number of light sources, and the availability of data. Subsidies from the public purse may be available up to around 80% of the costs.
	Sources of financing:	☑ Private sector: sponsor(s) ☐ Private sector: other ☑ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☑ Public: local
	Socio-economic impacts	After such an audit, It is estimated that municipalities can cut their energy costs by 20-40% through targeted investment.
Evaluation	Besides the positive impacts on nocturnal animals, the scheme also has positive effects on human health, not to forget the cost savings through better thought-out lighting.	
Information & contact	Information sources:	Comprehensive information on the issue of light pollution is available from the International Dark-Sky Association http://www.darksky.org (en)
	Contact:	e.g. ADEME (French Environment and Energy Management Agency) in France http://www2.ademe.fr (fr, en)

11.1.4 Safety measures on electricity masts and cables

11. Other

In the Alps, too, the energy supply is generally reliant on a dense network of overground cables. For birds, especially migratory species, these cables – and to an even greater extent, dangerously constructed electricity masts – pose a major hazard. Masts are a popular roosting and resting place for many species of bird. The type of mast construction determines whether these are safe places for birds. On many masts in the mid-voltage network, for example, the arrival or departure of a bird in flight may trigger an earth fault or short circuit which kills the bird. For large species of bird in particular, such as white and black storks, the Eurasian Eagle Owl (Bubo bubo), Lesser Spotted Eagle (Aquila pomarina) and Griffon Vulture (Gyps fulvus), electrocution by power lines is now one of the main causes of population decline. In areas which birds regularly fly over in large numbers at low altitude (e.g. topographical bottlenecks in valleys), the cables should be laid underground or the areas bypassed altogether. If this is not possible, safety measures should be applied to cables and masts.

	☐ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☑ River systems ☑ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	Safety measures for cables are a priority, particularly In EU bird protection areas, near the breeding places of endangered species, in rubbish dumps, water bodies and wetlands.
	☑ Habitat improvement	Safeguards roosting and resting places for both migrating and sedentary birds.
	☐ Element of ecol. connectivity	
	☐ Other	
Impact	☑ Immediate ☐ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: Once the safety measures have been completed, the birds are no longer in danger.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☐ Long (months) ☑ Very long (years)	
	Comments: The application of safety measures to masts and other technical structures over a wide area depends on the number of masts and the density of the supply network, and can be very time-consuming.	
Scope of implementation	☐ Very localised (plot) ☐ Local (municipality) ☑ Regional ☑ Transregional ☑ National	
Scope of impact	☑ Very localised (plot) ☐ Local (municipality) ☐ Regional ☐ Transregional ☐ National	
	Comments: Although the direct impact of the measure is local, entire populations can be affected in terms of the number of birds killed.	
Stakeholders/sectors concerned	☐ Protected areas ☐ Tourism ☐ Forestry ☐ Hunting ☐ Local community ☐ Agriculture ☑ Nature conservation ☑ Spatial planning ☐ Transport	
	Other: Energy supply companies, politicians, ornithologists	
Legal situation	The application of safety measures to masts and other technical structures associated with overhead energy cables is already established in law in many countries, eg in the German Federal Nature Conservation Act.	
Economic/financial aspects	Costs of implementing the measure (€):	Applying safety measures to masts and cables over a wide area will incur very high costs (up to several millions of euros).
	Sources of financing:	☐ Private sector: sponsor(s) ☑ Private sector: other ☐ Public: European ☑ Public: national ☐ Public: other ☑ Public: regional ☐ Public: local
	Socio-economic impacts	None
Evaluation	Numerous international and national ornithological and nature conservation societies, along with research institutions and nature protection authorities have produced comprehensive investigations and studies, which present in detail the technology for bird-friendly cable construction and the ways of making dangerous masts safe. The decline in mortality on refurbished masts has been proved scientifically.	
Information & contact	Information sources:	Nature Conservation and Biodiversity Union (NABU) brochure: Vorsicht Stromschlag! - recommendations for protecting birds on overhead power cables. Europarat / Conseil de l'Europe (2006) : Lignes à haute tension - comment protéger les oiseaux. Sauvegarde de la
	Contact:	NABU – Federal working group on birds and powerlines. www.birdsandpowerlines.org BirdLife International

11.1.5 Corridor contracts

11. Other

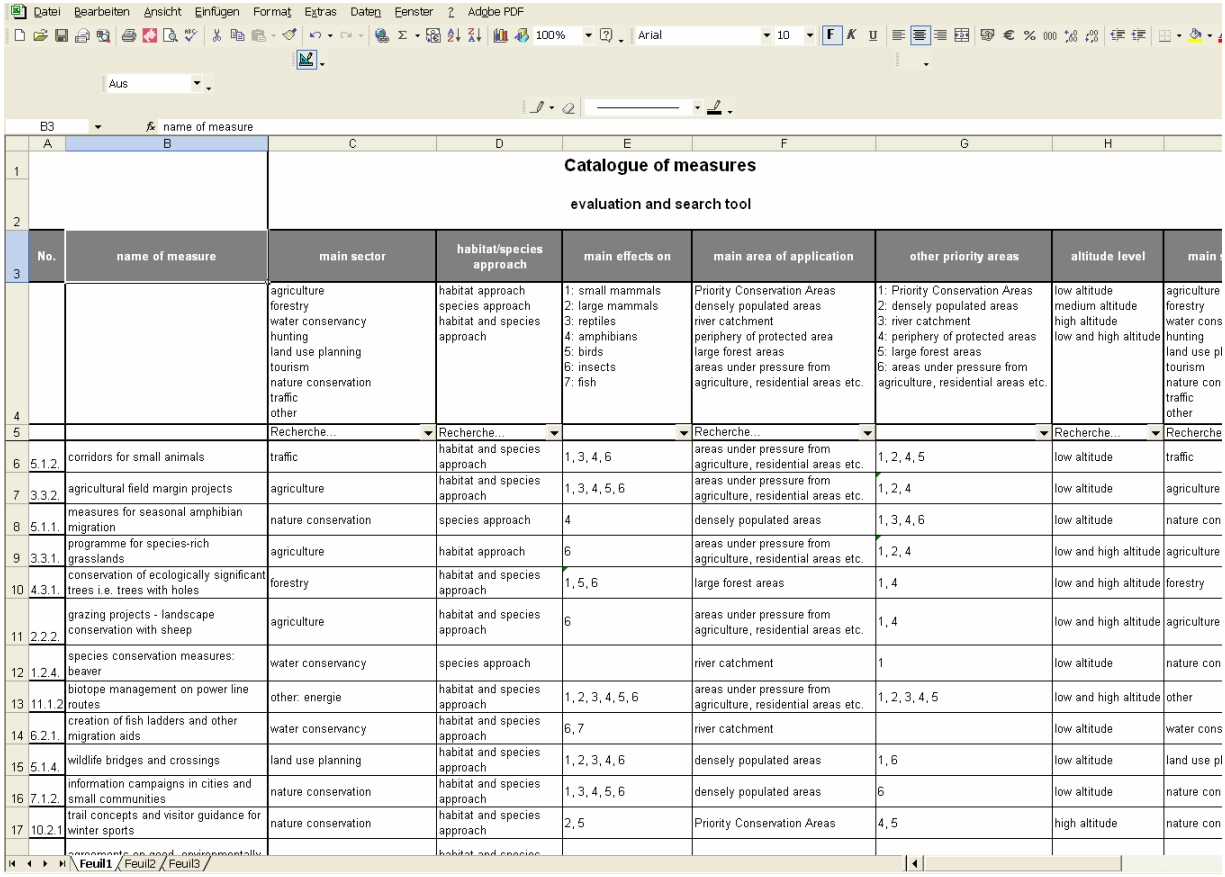
In 2008, the French region of Rhône-Alpes completed the mapping of its regional ecological network. In order to support projects and initiatives which contribute to maintaining or improving ecological connectivity, the region offers so-called “corridor contracts”. Ideally, projects receiving support should involve several local authorities. Contracts are awarded for a period of five years. Support is provided for schemes which directly help to maintain or improve connectivity, as well as to schemes which aim to safeguard the elements of a biotope network in the long term via planning tools, environmental education and public relations work. A guide has been produced for prospective stakeholders which contains detailed information on the regional scheme and the contractual process.

	☑ Appropriate habitat approach ☑ Appropriate species approach	
Main type of area	☑ Priority areas for biodiversity ☑ River systems ☑ Large forested areas ☑ Densely populated areas ☑ Perimeters of protected areas ☑ Areas under high pressure from agriculture, tourism etc.	
Ecological impact	☑ Reduction of fragmentation	Measures to reduce fragmentation are being promoted.
	☑ Habitat improvement	Measures to improve habitats are being promoted.
	☑ Element of ecol. connectivity	Measures to create elements and structures of a biotope network are being promoted.
	☑ Other	Measures regarding environmental education, public relations work etc. are being promoted.
Impact	☑ Immediate ☐ Several months ☐ 1 - 2 years ☐ Long-term (3 years+)	
	Comments: The support becomes available immediately after the contract is approved and for a period of 5 years.	
Implementation period	☐ Short (days) ☐ Medium (weeks) ☐ Long (months) ☑ Very long (years)	
	Comments: The contracts are concluded for a period of 5 years.	
Scope of implementation	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☐ Transregional ☐ National	
Scope of impact	☑ Very localised (plot) ☑ Local (municipality) ☑ Regional ☑ Transregional ☐ National	
	Comments: The scope of impact and implementation can differ greatly depending on the project being promoted, however, as a rule, several local authorities should be involved.	
Stakeholders/sectors concerned	☑ Protected areas ☑ Tourism ☑ Forestry ☑ Hunting ☑ Local community ☑ Agriculture ☑ Nature conservation ☑ Spatial planning ☑ Transport	
	Other: Local authorities	
Legal situation	A 5-year contract between one or several local authorities and the region.	
Economic/financial aspects	Costs of implementing the measure (€):	On average, support is available for 50% of the costs of the project. The highest subsidy rate is €1 million per contract or €200,000 per year. The overall budget for the region is set once the pilot projects have been evaluated.
	Sources of financing:	☐ Private sector: sponsor(s) ☐ Private sector: other ☐ Public: European ☐ Public: national ☐ Public: other ☑ Public: regional ☐ Public: local
	Socio-economic impacts	Dependent on the project being supported.
Evaluation	The first contract, for the Gresivaudan Valley in the Département Isère, France, was signed in February 2009, so an evaluation of the tool has not yet been possible.	
Information & contact	Information sources:	Rhône-Alpes region http://biodiversite.rhonealpes.fr/spip.php?rubrique2 http://www.rhone-alpes.ecologie.gouv.fr/
	Contact:	Person responsible in the Rhône-Alpes region: Hélèn Guilloy

V TABLE

The table is a very comprehensive document which should primarily be used as a digital version. When printed out in its entirety, the table is somewhat unwieldy and its contents are difficult to navigate unless queries are carried out. Therefore in this document, in order to explain how it works, the table is only shown in sections, e.g. by means of sample queries.

The table is essentially structured in line with the layout of the profiles. The categories are set out as columns and are shown in the header of the table. On the whole, the table is self-explanatory and requires no additional clarification. Figure 1 shows an image of the table in Excel format.



Catalogue of measures

evaluation and search tool

No.	name of measure	main sector	habitat/species approach	main effects on	main area of application	other priority areas	altitude level	main
		agriculture forestry water conservancy hunting land use planning tourism nature conservation traffic other	habitat approach species approach habitat and species approach	1: small mammals 2: large mammals 3: reptiles 4: amphibians 5: birds 6: insects 7: fish	Priority Conservation Areas densely populated areas river catchment periphery of protected area large forest areas areas under pressure from agriculture, residential areas etc.	1: Priority Conservation Areas 2: densely populated areas 3: river catchment 4: periphery of protected areas 5: large forest areas 6: areas under pressure from agriculture, residential areas etc.	low altitude medium altitude high altitude low and high altitude	agriculture forestry water cons hunting land use pl tourism nature con traffic other
		Recherche...	Recherche...		Recherche...		Recherche...	Recherche
5.1.2.	corridors for small animals	traffic	habitat and species approach	1, 3, 4, 6	areas under pressure from agriculture, residential areas etc.	1, 2, 4, 5	low altitude	traffic
3.3.2.	agricultural field margin projects	agriculture	habitat and species approach	1, 3, 4, 5, 6	areas under pressure from agriculture, residential areas etc.	1, 2, 4	low altitude	agriculture
5.1.1.	measures for seasonal amphibian migration	nature conservation	species approach	4	densely populated areas	1, 3, 4, 6	low altitude	nature con
3.3.1.	programme for species-rich grasslands	agriculture	habitat approach	6	areas under pressure from agriculture, residential areas etc.	1, 2, 4	low and high altitude	agriculture
4.3.1.	conservation of ecologically significant trees i.e. trees with holes	forestry	habitat and species approach	1, 5, 6	large forest areas	1, 4	low and high altitude	forestry
2.2.2.	grazing projects - landscape conservation with sheep	agriculture	habitat and species approach	6	areas under pressure from agriculture, residential areas etc.	1, 4	low and high altitude	agriculture
1.2.4.	species conservation measures: beaver	water conservancy	species approach		river catchment	1	low altitude	nature con
11.1.2	biotope management on power line routes	other: energie	habitat and species approach	1, 2, 3, 4, 5, 6	areas under pressure from agriculture, residential areas etc.	1, 2, 3, 4, 5	low and high altitude	other
6.2.1.	creation of fish ladders and other migration aids	water conservancy	habitat and species approach	6, 7	river catchment		low altitude	water cons
5.1.4.	wildlife bridges and crossings	land use planning	habitat and species approach	1, 2, 3, 4, 6	densely populated areas	1, 6	low altitude	land use pl
7.1.2.	information campaigns in cities and small communities	nature conservation	habitat and species approach	1, 3, 4, 5, 6	densely populated areas	6	low altitude	nature con
10.2.1	trail concepts and visitor guidance for winter sports	nature conservation	habitat and species approach	2, 5	Priority Conservation Areas	4, 5	high altitude	nature con

Figure 1: Table relating to the catalogue of measures

1. Sample evaluations

1.1 Stakeholders

A total of eight stakeholders have been identified for this catalogue as initiators of ecological network measures, and some six different stakeholder groups have also been included under “other”. Nature conservation and agriculture appear to be the most important stakeholders for the majority of measures, and many measures can also be implemented with the

involvement of forestry as the main stakeholder. Figure 2 gives an overview of the main stakeholders for biotope network measures as well as the number of measures falling to each different stakeholder.

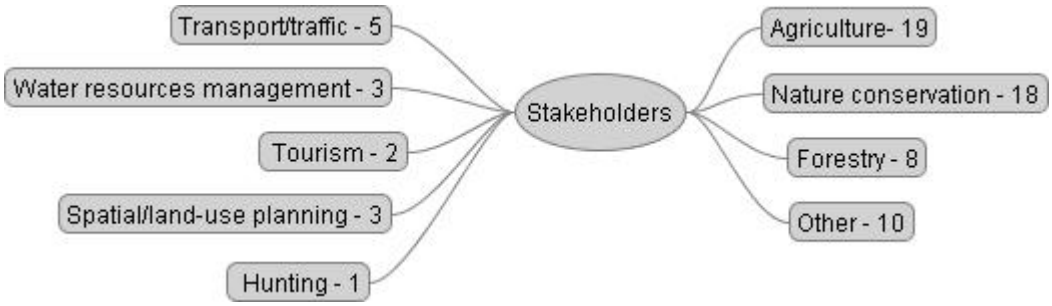


Figure 2: Main stakeholders for implementing ecological network measures

In addition to the main stakeholders, however, numerous other stakeholders are also invariably important and are likewise in a position to support and promote ecological network measures. Indeed, in some cases, they play a critical role in terms of implementation and should certainly be involved in the planning process.

Figure 3 shows how many different stakeholders are involved in the measures contained in the catalogue.

Figure 3: Number of stakeholders involved

Positive effects can often be achieved by involving as many stakeholders as possible – even when this is not absolutely critical to the implementation of the measure – as this can increase the acceptance of individual measures. However, the workload involved in planning and coordination also increases at the same time.

Involving as many stakeholders as possible is also particularly important when planning and implementing an overall concept that affects many different areas and aims to promote

measures in various ecosystems. Only a few stakeholders may be relevant to the individual measures, but many different actors are required overall. Liaison at the earliest possible stage can reveal interfaces and promote cooperation.

Table 1 and Table 2 show sample queries in the table, and the criteria selected as filters are shown in bold type in each case. The different filters set demonstrate that the agricultural measures contained in the catalogue can largely be implemented with the involvement of 1-3 different stakeholders.

Table 1: Agricultural measures involving 3-5 stakeholders

Name of measure	Main stakeholders	Other stakeholders	Number of particip-ating stake-holders	Impacts on agriculture
	Agriculture forestry water resources management hunting spatial/land-use planning tourism nature conservation transport/traffic other	1: agriculture 2: forestry 3: water resources management 4: hunting 5:spatial/ land-use planning 6: tourism 7: nature conservation 8: transport/traffic 8: other	1 - 3 **3 - 5** 5 - 10 > 10	0: none 1: profit cuts/overtime compensated by financial aid 2: profit cuts/ overtime not compensated 3: positive effect on soils 4: positive effect on water supply
Grazing projects - landscape conservation with sheep	agriculture	1, 6, 7, 9: conservation organisations, local authorities	3 – 5	3
Maintenance and preservation of mixed orchards	agriculture	6, 7, 9: local authorities	3 – 5	1, 3, 4
Encouragement of unpaved paths	agriculture	2, 5, 6, 7, 8	3 – 5	1
Establishment of riverside margins with site-specific/typical riparian vegetation	agriculture	3, 5, 7	3 – 5	1, 4

The table's filter function allows the sample queries shown here – concerning stakeholder type and number – to be performed with the other criteria according to the same principle. Different criteria combinations lead to different query results, and searches can thus be adapted to the individual situations in the pilot regions.

Table 2: Agricultural measures involving 1-3 stakeholders

Name of measure	Main stakeholders	Other stakeholders	Number of participating stakeholders	Impacts on agriculture
	Agriculture forestry water resources management hunting spatial/land-use planning tourism nature conservation transport/traffic other	1: agriculture 2: forestry 3: water resources management 4: hunting 5: spatial/land-use planning 6: tourism 7: nature conservation 8:transport/ traffic 8: other	**1 - 3** 3 - 5 5 - 10 > 10	0: none 1: profit cuts/overtime compensated by financial aid 2: profit cuts/ overtime not compensated 3: positive effect on soils 4: positive effect on water supply
Agricultural field margin projects	agriculture	6, 7	1 – 3	1, 3, 4
Programme for species-rich grasslands	agriculture	6, 7, 9: protected areas	1 – 3	1, 3, 4
Tree maintenance and preservation of pollarded trees	agriculture	3, 7, 9: local community	1 – 3	1
Creation, maintenance and preservation of rock fragment piles	agriculture	4, 7, 9: local community	1 – 3	1
Reduction or targeted use of fertiliser, pesticides and herbicides in agriculture	agriculture	3, 7	1 – 3	1, 3, 4
Preservation, maintenance and replanting of hedges	agriculture	3, 4, 5, 6, 7	1 – 3	1, 3, 4
Species-rich seeding on agricultural fields	agriculture	4, 7, 9: apiculturist, conservationist	1 – 3	1, 3, 4
Land set aside	agriculture	7	1 – 3	2, 3, 4
Extensive use of grasslands	agriculture	4, 7	1 – 3	1, 3, 4
Extensive agriculture	agriculture	7	1 – 3	1, 3, 4
Encouraging organic land use	agriculture		1 – 3	2, 3, 4
Planting of individual trees or tree groups	agriculture	5, 7, 8	1 – 3	1
Preservation and encouragement of dry stone walls	agriculture	5, 7, 9: local community	1 – 3	1
Monitoring by farmers	agriculture	7	1 – 3	1

2. General notes

One fundamental aspect, which plays an essential role in the planning of networks of interlinked biotopes, is the integration of individual measures into an overall concept. Suitable overarching and interdisciplinary planning approaches are vital for this. Most of the measures are implemented at very local or local level, yet many can achieve a greater impact if they form elements of a larger-scale and appropriately planned ecological network which is also adapted to the relevant regional needs. Individual measures are not very conducive to a network of interlinked biotopes if they are carried out with no consideration of the situation as a whole.

It is always important, too, to include both the local and the broader contexts in the planning process when implementing measures in the individual pilot regions. Measures relating to the cultural landscape, in particular, should be geared towards and suit the typical elements of the region. In some pilot regions, therefore, it may make sense to repair dry stone walls whereas in another region, rebuilding them may not be appropriate to its cultural history. Even if, as a result of a query in the table, a measure is defined as appropriate to the conditions, it must still be reviewed carefully before it is actually implemented.

There are also cross-linkages between individual measures which could not always be shown in the profiles or the table. These include the connectivity of various elements of the biotope network, e.g. structured forest edges can be enhanced by dry stone walls, and the impact of rock fragment piles is increased considerably when connected to a hedge system or small bodies or water. As a general principle, however, it should be borne in mind that indigenous and site-specific seeds and plants should be given preference in all measures associated with introducing plants. This is listed as an individual measure e.g. in the re-establishment of vegetation along roads, but can also be important in other measures, such as agricultural field margin projects, among others. Combining individual measures is possible as well, such dry stone wall building and support for voluntary programmes.

The catalogue is a compilation of biotope network measures from the entire Alpine region. This creates the problem that the costs and the relevant support programmes in the individual countries can vary widely, and even within the countries there may be pronounced regional differences. The evaluations carried out in the table therefore only provide a very rough indication of the scale of possible costs and support options. The specific conditions in the countries must then be reviewed by stakeholders in the pilot region.

Key aspects involved in the selection and planning of measures

- Developing an overall concept
- Taking account of regional, cultural and historical characteristics
- Considering links between individual measures
- Adapting to the support options available in the region

VI THE CATALOGUE OF MEASURES AS A KEY TOOL FOR THE WORK IN THE PILOT REGIONS

1. Options for developing the tool further

The catalogue of measures has been designed and developed as a key tool for the work in the pilot regions. The measures listed are intended to provide local decision-makers with examples and ideas, and present an overview of the wide range of sectors, measures and stakeholders that can be involved in implementing a regional or even an international biotope network in line with locally defined plans and objectives.

The following points are especially relevant to any application of the tool in pilot regions by project partners and local stakeholders:

- **The number of measures listed**: in order to obtain the best possible overview of the diversity of the sectors, actors and measures which may be considered, the number of measures is significant.
- **The quality of description of the measures**: here, the number, accuracy and details of the individual measures described are key.
- **User-friendliness**: besides the quality of the descriptions, user-friendliness is the key criterion for long-term use of the tool. The scenarios listed below for the further development of the catalogue will take particular account of this point.

With around 70 measures, the present catalogue already provides a good overview of the various sectors in which projects to improve ecological connectivity can be carried out. It also facilitates evaluation of the various stakeholders who may be involved in these activities, and of the measures' impacts from an ecological and socio-economic perspective. Furthermore, it offers an impression of the many possible ways to approach the subject of ecological networks – from educational tools to the technical construction of features such as wildlife crossings.

The catalogue has intentionally been structured as an "open-ended" tool to which further measures, also from other sectors, can be added at any time. The long-term goal is to expand the catalogue further by adding more measures, and to involve project partners in the pilot regions, the experts from the Ecological Network Platform established within the framework of the Alpine Convention, and the various local stakeholders.

The decision to describe and characterise the individual measures in the current way (a one A4-page profile) was primarily made in order to guarantee comparability between the various measures and achieve a standardised form of presentation. This is especially important in view of the large number of measures described, allowing an overview to be retained and the wealth of information to be encapsulated as quickly as possible.

This solution is also advantageous for adding further measures at a later date as the descriptions provided by different authors will not diverge too widely. With a good knowledge

of the measure to be described, it will take little work for a profile to be produced in a relatively short space of time.

Nevertheless, the chosen solution also has some disadvantages. Since the measures are very different, the preset categories and fields may not be suitable for describing the measure, or there may not be enough space to include the required level of detail. Due to the "neutral" form of description, in which individual project examples are summarised in a generalised way, completing some fields may lead to difficulties in the evaluation as the situations are often very different. For example, very precise costs can only very seldom be stated as these depend on the country, the region or the local conditions, (e.g. in contractual nature conservation programmes, the subsidy rates are established locally or regionally, but these can differ greatly depending on the region and also the country; for example, the costs of fish migration aids can range from some tens of thousands to several millions of euros depending on their size, importance, the local context and, above all, the construction technique used).

This problem can be overcome by producing additional detailed descriptions, written in full text, with the aid of a specific example. Relevant examples may be found in the Annex of the catalogue. However, this kind of detailed description requires far more time and effort to compile, compared with a profile.

Other aspects are also important for the tool:

- **Search functions**: the possibility of searching by several criteria at the same time, and the presentation of the results, are of particular importance here.
- **Further details**: this enables the measures to be made accessible to a wider public (e.g. the geographical localisation of the examples described, a detailed list of links and references, etc.)

These points are also dealt with in more detail in the following scenarios.

The catalogue of measures in this present form should be regarded as a prototype, which can be expanded in line with requirements or developed further on the basis of the scenarios portrayed. The possibilities afforded by the tool in its current form as an Excel table are only limited, particularly with regard to the query options and the clarity of the document.

1.1 Possible ways of expanding and developing the tool further – five scenarios

1.1.1 Scenario 1: expanding the existing Excel table

Not much effort is required to add further measures to the present Excel table. If use of the tool in the pilot regions reveals the need for new or modified search criteria, these can also be integrated into the existing table without a great deal of work.

However, certain aspects limit the user-friendliness of the table and make it difficult to expand in its current form:

- It is not possible to do a quick search by several criteria; the search must be narrowed down gradually (e.g. if the results are firstly limited by stakeholder, it is only possible to search by cost or impact criteria within the measures returned by this selection). Designing better search facilities and graphics for the existing Excel document requires more extensive programming knowledge (Visual Basic).
- The fact that additions to the table, in its current form, can only be implemented centrally – therefore necessitating a redistribution after each update (via a download or on a CD) – is a problem if the aim is to motivate the pilot regions and other stakeholders to play an active part in the tool. This is the main reason why the current solution does not appear to be the best option for such a tool.
- Another aspect that does not make this solution especially user-friendly is the fact that continued use of the table in an Excel format would require users to work with two different documents – the Excel table for the search function and the Word or PDF document for the more detailed description of the measures (profiles). This problem could be overcome by using hyperlinks in the Excel table, where the profiles can either be linked to a PDF in a separate folder, or inserted directly into the table document as additional Excel sheets.

1.1.2 Scenario 2: a traditional database

Transferring the measures into a “traditional database” would also be conceivable. A suitable database management system would make it easier to search within the measures – by means of an “and/or” system or possibly even by several criteria at the same time.

This method would also allow the detailed description of the measure to be integrated into the database, with the option of calling it up immediately after the results are displayed.

This type of database could, just like the existing Excel table, either be burned onto a CD and distributed, or made available for download on the Internet. However, the same observations apply here as for Scenario 1: the database can only be expanded and edited centrally, making it difficult to ensure that all users are working with the most up-to-date version.

1.1.3 Scenario 3: a simple online database

One step further would be to develop a database that is accessible online; this would allow a direct online search within the catalogue (e.g. as with the project and expert searches on www.alpine-ecological-network.org).

The advantages of this option are that the data would be more easily accessible and it would be simpler to update and distribute the latest version. However, in this case too, the database would still have to be maintained from a central office.

1.1.4 Scenario 4: a more elaborate interactive online database

An interactive online database, e.g. a wiki-type database (a wiki is a hypertext system whose content is not only read by its users but can also be amended online) would enable the pilot

regions and other stakeholders to play an interactive role. This would allow the catalogue to be expanded decentrally by other people. The database can be made generally accessible to enable amendments to be made, or access can be password-protected.

This type of relatively simple and interactive solution would suit the dynamic character of the tool. Other interesting or useful categories, which come to light as the tool is used, may also be added if required. In order to ensure a meaningful search within the measures, however, a standard format would have to be created for their descriptions.

Such a tool could, for example, be integrated into the new ALPARC website. This already has a database (the database of protected areas) which allows third parties to actively make amendments.

Depending on the structure, it could also be possible to cross-reference/link the individual measures to each other. This could prove very interesting as many of the measures are connected either directly or indirectly (e.g. the effect of rock fragment piles in connection with a hedge system or small bodies of water will significantly increase the impact of the measure).

1.1.5 Scenario 5: a more sophisticated online database with suitable graphic processing

The solution described in Scenario 4 can be developed even further to make the information both accessible and interesting to a wider public as well. This method sees the tool becoming a kind of portal, which not only lists and describes the individual measures and allows detailed, multi-criteria searches, but can also serve as publicity for both the individual projects in the pilot regions and the Alpine approach. However, the database should definitely be integrated into one of the existing websites to avoid any multiplication of many different sources of information.

In addition to the individual measures, the content here could be extended to include “lessons learned” reports from the pilot regions, evaluations of the individual measures (e.g. also for the development of an evaluation tool), or a link to a GIS for cartographic representations, etc. This would, however, be a very time-consuming and expensive option.

2. Conclusion

All the above scenarios have their advantages and disadvantages. The development costs of the tool (planning, implementation; entering and expanding the measures), in relation to the amount of usage, will be the deciding factor when choosing between the different options presented.

In addition to the pure development costs associated with designing and planning the database and integrating new measures, account must also be taken of the long-term expense of managing and maintaining the tool. An elaborately designed, interactive online platform, in particular, will take time and effort to update regularly with new measures, add “lessons learned” reports and oversee third-party input.

Certain key questions therefore need to be answered before deciding on one of the options presented here:

- Will the tool, in its current form, be used in planning and decision-making within the local biotope network initiatives?
- Does its content meet the needs in the pilot regions?
- Does its structure meet the needs in the pilot regions?
- Should it be developed further on the basis of one of the scenarios described above?
- Are the partners in the pilot regions, the local stakeholders, the experts from the Alpine Convention platform etc. prepared to participate in expanding the tool by adding new measures and evaluating those that they implement? Questions should not only be asked about their willingness in general: their actual readiness and capacity to implement this in practice should also be tested and taken into account.
- Should the catalogue also have the capacity to be used as an evaluation tool?
- Should the catalogue also have the capacity to store “lessons learned” reports for future pilot regions?
- Are the required human and financial resources available to manage this type of tool in the long term?

The authors therefore propose the following procedure:

The catalogue of measures in its current form should be “test run” in the pilot regions of the ECONNECT project. To this end, questionnaires or surveys should be produced which can supply the answers to the above questions and thus provide a basis for making a decision. An initial questionnaire or survey should be conducted when the tool is launched – this could draw more attention to the tool and also “forces” users to make more effort to become familiar with the document so that they can answer the questions raised. The user therefore receives an initial introduction to the tool which increases the chances of it being used during a future planning or decision-making phase in the regional biotope network project. A further survey should be conducted at a later date (after implementation of initial measures in the regions, if possible), and a comparison with the first survey results will allow conclusions to be drawn about the actual usage and user-friendliness of the tool.

ANNEX

1. Nature Conservation

1.1 Biotope protection measures

1.1.1 Wetland restoration in the Bavarian Alps: the *Allgäuer Moorallianz*

The peat bog and litter meadow landscapes of the Bavarian Alps count among the richest and most significant wetland landscapes in Germany. The transition between the peat bogs in the Alpine region and the pre-Alpine lowlands is very well-preserved here. Furthermore, the large traditional grazing areas ("*Allmende*") of Eastern Allgäu are a significant locus of near-natural peat meadows. The area is also home to numerous indigenous peatland fauna such as the Moorland Clouded Yellow butterfly (*Colias palaeno*) and the Azure Hawker dragonfly (*Aeshna caerulea*), including more than 90 species which are critically endangered or at risk of extinction (including the Violet Copper butterfly (*Lycaena helle*), the Pygmy Damselfly (*Nehalennia speciosa*) and the common European adder (*Vipera berus*)).

In order to safeguard this important natural heritage, a number of authorities, municipalities and associations have joined together to form the *Allgäuer Moorallianz* (i.e. Allgäu Wetland Alliance). The Alliance aims to preserve and restore the wetlands of the Bavarian Alps (Allgäu). It involves a wide range of stakeholders, including farmers, authorities, schools and countryside management associations, tourism initiatives and nature conservation bodies. In many areas, the wet meadows and litter meadows which accompany peat bogs have been drained, intensified and replaced with grassland. On the farmed areas, dairy farming predominates, while at higher altitudes, Alpine farming plays an important role. In all, more than 90% of Bavaria's peat bogs are seriously degraded or damaged in some other way. Only 5-10% can now be regarded as being near-natural, and only 1%, at most, are still in a natural state.

The aim of the "*Allgäuer Moorallianz*" project is therefore to safeguard and develop the most important core zones of the Bavarian wetlands by means of an intact hydrological regime and appropriate use. This involves measures such as rewetting of high and transitional peat bogs, blocking of drainage ditches, and near-natural restructuring of streams. A further aim is to manage the grassland belt around the peat bogs in an environmentally compatible manner, using adapted forms of use such as haymaking and grazing management techniques. Particularly valuable areas such as step-sensitive wetland water bodies and headwaters require particular protection, and species-rich dry meadows should be re-established. Through appropriate forest thinning measures, the development of structurally rich forest/open land transitions is being encouraged as habitats for black grouse and wood grouse (capercaillie).

Besides pursuing numerous nature conservation objectives, the *Allgäuer Moorallianz* also focusses on a broad range of socio-economic issues. These include sensitising and informing the public and political decision-makers. A further aim is to develop suitable areas

for local recreation and tourism with a view to developing “peat bog tourism”. Marketing strategies for the agricultural products produced as part of the management measures also form part of the project, including the marketing of litter from litter meadows via a litter exchange. In order to enhance the region’s tourism appeal, various pathways will be laid out to attract and channel tourists and enhance their experience of this natural area. A comprehensive environmental education programme offers guided walks, excursions and project days, e.g. for schools, and is specifically targeted at the local population. Besides placing emphasis on nature conservation issues, these educational measures also underline the importance of wetlands for climate and flood protection.

Summary

The “*Allgäuer Moorallianz*” project brings together a range of different actors and makes a major contribution to the biotope network. It promotes the peat bog landscape on a targeted basis within the framework of a regional strategy. With its comprehensive objectives, which link nature conservation aspects with socio-economic objectives and practical ideas for implementation, it pursues an innovative approach to the valorisation of the biotope’s potential. The project was one of the winners in the first group of the “*Idee Natur: Zukunftspreis Naturschutz*” competition run by the Federal Agency for Nature Conservation and will possibly receive support as a large-scale nature conservation project.

Contacts and further information

- “*Idee Natur*” competition run by the Federal Agency for Nature Conservation
  http://www.idee-natur.de/allgaeu1.html (de)
- Information from the Association for the Protection of Nature in Bavaria (BN)
  http://www.kempten.bund-naturschutz.de/index.php?id=6263 (de)

1.2 Species conservation measures

1.2.1 Habitat connectivity for bats in the Alpine region

Within the framework of the Interreg III B Project “Living Space Network”, cross-border concepts and measures for protecting bat populations in the Alps were developed. These provide a basis on which to generate valuable impetus for measures to maintain and connect habitats of relevance to bats.

Because of its near-natural state and landscape diversity, the Alpine area is characterised by a fauna rich in bat species. Due to the high demands that bats make on their habitat, they are particularly important for the biotope network. Bats are reliant on highly diverse and networked structures. Depending on the time of day and the season, they use a wide variety of habitats, which may be located several hundred kilometres apart. On the one hand, they

need roosts; on the other, they need spaces that are suitable as hunting grounds, including near-natural forests and structurally rich cultivated landscapes.

A key outcome of the bat protection project is the production of comprehensive *Guidelines for the Renovation of Buildings*, which identify the roosting requirements of around 20 different bat species that make use of buildings for their roosting places. Many species of bat are heavily dependent on buildings for their roosts because natural hiding places have become rare in woodlands as a result of intensive forms of cultivation. During the restoration or renovation of old buildings, disturbances to the bats and their roosting places can therefore easily occur. The Guidelines draw on more than 230 case studies relating to the renovation of buildings, for the most part from the Alpine area. The Guidelines provide information about the ecology of the roosting places of the various species, including seasonal and spatial use and the key characteristics of the roosts. Drawing on experience, the bats' reaction to disturbance and changes at the roost are described, and guidance for the renovation of buildings with roosting places is provided for each species.

Moreover, as part of the project, targeted measures have been taken to support the hunting grounds of the Lesser Mouse-Eared Bat (*Myotis blythii*). With this objective in mind, a cross-border concept was developed for the conservation of near-natural grassland. Through the targeted improvement of habitats, the aim is to increase the range of potential hunting grounds and the food supply and thus achieve a positive development in bat stocks. Depending on the region and conditions, a wide range of measures may be required to support the bats' hunting grounds. In landscape which is mainly subject to intensive use, extensivisation of agricultural areas or the creation of meadows for extensive use can have a positive impact. In this context, the cutting dates and frequency of mowing play an important role, and it is also essential to refrain from using fertiliser. In other regions, however, a shift away from agriculture, and the resulting bush encroachment and reforestation, may pose a threat to potential hunting grounds, so other measures and tools must be developed for these areas. Furthermore, support for the hunting grounds of bats cannot be viewed in isolation from measures to protect their nurseries. A comprehensive strategy should therefore be developed which takes account of bats' various habitat requirements.

Alongside other pilot projects for targeted bat conservation in the Alps, various publicity events and campaigns have been carried out within the framework of the "Living Space Network" Project, including an international conference and flanking measures to raise public awareness of bat conservation.

Summary

Within the framework of the INTERREG project, a range of highly diverse approaches has been developed which can help to protect bat populations in the Alps. The *Guidelines for the Renovation of Buildings* are an outstanding tool for bat-friendly renovation and restoration of buildings. However, the concepts devised can only be successful if they are applied in practice and continuously developed.

The project outcomes can provide a valuable basis for the planning of bat-friendly measures in the biotope network and offer a range of ideas at many different levels.

Contacts and further information

- INTERREG III B "Living Space Network", Pilot Project Bats, and the *Guidelines for the Renovation of Buildings*:

  http://www.alpinespace.org/temp-results125.html?&L=82377 (de, it)

  http://www.fledermausschutz.at/downloads/GuidelinesfortheRenovationofbuildings.pdf (en)

2. Agriculture

2.1 Species-rich Grassland Programme

2.1.1 Project in the Regional Natural Park (PNR) of the Massif des Bauges, France

The species inventory of a grassland reflects the way in which it is managed and its location. If the management method remains unchanged, the species composition will generally remain unchanged as well. This correlation opens up the opportunity to link subsidies for extensive grassland to the occurrence of key species of flora. In order to implement this innovative, results-oriented approach, a list of meadow flowers serves as a simple tool for reliable identification of extensive species-rich grassland.

As part of the Species-rich Grassland Programme, subsidies are paid according to the occurrence of certain easily identifiable plant species (indicator plants). Compliance with the commitments is monitored using a specially developed control method on site. During the period before the first growing crop is used (which, depending on altitude and phenological course, takes place between mid-May and mid-June), the farmers inspect their areas using a prescribed methodology and note the indicator plants found there. Subsidies are paid if a certain number of the various indicator species is found on the areas concerned.

Participation in the scheme is voluntary. Participating farmers undertake to preserve the species richness of their grasslands (meadows and pasturage). Farmers retain the choice of practices and resources to be used, so that biodiversity is not seen as a constraint: it calls upon their technical skills and sense of responsibility. They are also sensitised to issues such as nature conservation and biodiversity. In order to publicise the scheme more widely, a competition to reward farmers with the most attractive flowering meadows is held every year.

The project was launched in the Regional Natural Park (PNR) of the Massif des Bauges in 2006. In May 2008, 70 farmers with a total area of 1000 hectares were participating in the project. Funding amounts to € 89/ha on all participating areas.

Summary

The experience gained in the Regional Natural Park (PNR) of the Massif des Bauges is very positive. The new results-oriented subsidies for species-rich meadows and pastures are achieving high acceptance among farmers, as they are rewarded for their work on a results-oriented basis without having to deal with extra red tape, while being respected for their experience and professional knowledge. The staff at the Natural Park, who accompany the scheme, also view it in positive terms: they are no longer required to act as inspectors but provide advice and support to farmers, resulting in a new form of communication and cooperation.

This is still a relatively new scheme at the Regional Natural Park (PNR) of the Massif des Bauges. In Baden-Württemberg (Germany), a similar scheme has been under way since 2002 and has proved very successful. Here, more than 10,000 farmers have participated in the scheme, which is funded by the MEKA II and III programmes. In France, a total of eight natural parks are experimenting with similar programmes to promote species-rich grassland.

Positive ecological impacts have been demonstrated in Germany based on multiannual monitoring. It is still too early for any such ecological assessment in the Regional Natural Park (PNR) of the Massif des Bauges.

Contact

- Parc naturel régional du Massif des Bauges

  (Regional Natural Park (PNR) of the Massif des Bauges), contact: Philippe Mestelan

  http://www.parcdesbauges.com/agriculture/agri-environnement/ (fr)

Further information

- Ministry of Food and Rural Areas of the Federal State of Baden-Wuerttemberg (MLR): information about the Species-rich Grassland Programme (under the MEKA programme) in Baden-Württemberg

  http://www.landwirtschaft-mlr.baden-wuerttemberg.de/servlet/PB/menu/1040915_l1/index1215700849246.html (de)

- Comprehensive report on a study visit focussing on species-rich grassland, organised by the Regional Natural Park (PNR) of the Massif des Bauges and INRA Avignon and containing many details of the schemes in Baden-Württemberg and the Regional Natural Park (PNR) of the Massif des Bauges

  http://www.alparc.org/content/download/21418/199283/version/1/file/Rapport_voyage_MEKA_Juillet07.pdf (fr)

- Oppermann R., Gujer H.U. (Hrsg.) (2003): Artenreiches Grünland Bewerten und fördern - MEKA und ÖQV in der Praxis. Ulmer, 199 p.

2.2 Species-rich Seeding on Agricultural Fields – "The Biotope Network in the Cultural Landscape"

2.2.1 An example from Würzburg district, Germany

Within the framework of a pilot project entitled "The Biotope Network in the Cultural Landscape" ("*Mit Biotopverbund in die Kulturlandschaft*"), the aim is to establish a comprehensive network of interlinked biotopes in two municipalities in Würzburg district, Germany, within five years. At the same time, a further aim is to reduce the potential for conflict between different types of land use, including farming and forestry, hunting, nature conservation and recreation. To this end, various species-rich seed mixtures, containing wild and cultivated plants, were developed and were mainly sown on set-aside areas. During project implementation, existing tools for structural development in the agricultural sector – including agri-environmental measures, parcel exchange and set-aside – should be deployed, combined with new measures and developed further. An interdisciplinary team, whose members include biologists, forest scientists and countryside managers, was established to run the project, and a number of different authorities were involved, including agriculture and forestry offices and landscape management associations. Farmers, hunters and local community representatives were also invited to participate.

As a first step, local people were asked to give their views on what kind of farmland they wished to see. Surveys were carried out, and it became apparent that most people in the region would like to see more waysides with flowering plants, hedges and patches of woodland, stretches of water and mixed orchards.

Efforts were therefore made to identify ways of taking local people's wishes into account in the creation of a biotope network. However, it became apparent that establishing permanent landscape structures (hedges, patches of woodland) on this generally very fertile farmland was likely to pose major problems and could only be achieved in combination with compensation and substitution measures. A key aspect of the biotope network was therefore to encourage the growth of flowering plants on cropland. To this end, species-rich seeding was undertaken on set-aside areas, whose composition was developed further during the course of the project and geared towards the needs of various species of fauna. Various types of seed mix were developed, such as a flower mixture which proved particularly suitable for outlying and fallow land in the locality. A key criterion was that the seed mixes should have no negative implications for agriculture and that conventional production could be resumed on these areas at any time. Local species were also deliberately selected for seeding.

Summary

The areas which have undergone species-rich sowing provide food and cover for a wide range of species on farmland which is otherwise lacking in structure. The importance of the sown areas for species protection was demonstrated by numerous scientific studies which monitored the impacts on birds and invertebrates (ground beetles, spiders, butterflies).

Impacts on hedge dwellers were also demonstrated (e.g. the Red-Backed Shrike (*Lanius collurio*)).

A further survey conducted at the end of the project term found that the flowering areas met with great acceptance among farmers, hunters and the local community alike. In total, 3.56% of the municipality, i.e. 8% of the agricultural production area, was "greened" as part of the project. Funding for relevant areas can be covered by agri-environmental measures. As an innovative funding option, one possibility that could be considered is to obtain a financial contribution from hunters and the municipalities, given that they benefit from the measure. Overall, the project showed that in an intensively used landscape in particular, species-rich seeding with wild flowers offers a good opportunity to create attractive and ecologically effective biotope network structures.

The seeding of areas with an assortment of wild-flower species, e.g. in the form of agricultural field margin projects, forms part of many agri-environmental programmes. The "Biotope Network in the Cultural Landscape" ("*Mit Biotopverbund in die Kulturlandschaft*") project specifically investigated the importance of habitat creation on set-aside areas for the implementation of biotope network projects. Similar results were achieved in the DBU-funded project "*Lebensraum Brache*" ("Habitat Fallow Land" project) which explores ways of making fallow land more hospitable to wild fauna using agricultural market policy instruments (set-aside) in Germany.

Contact

- Bavarian State Institute for Viticulture and Horticulture (LWG), Countryside Management Department, contact: Martin Degenbeck

  http://www.lwg.bayern.de/landespflege/landschaftspflege/25786/ (de)

Further information

- Bayerische Landesanstalt für Weinbau und Gartenpflege, Abteilung Landespflege (2007): Mit Biotopverbund in die Kulturlandschaft. Artenreiche Ansaaten auf Ackerflächen als neues Hauptinstrument des Naturschutzes – Ergebnisse eines Pilotprojektes im Landkreis Würzburg

  (Bavarian State Institute for Viticulture and Horticulture (LWG), Countryside Management Department: The Biotope Network in the Cultural Landscape" ("*Mit Biotopverbund in die Kulturlandschaft*"), Species-rich Seeding on Agricultural Fields as an important new instrument in nature conservation – outcomes of a pilot project in Würzburg district)

  http://www.lwg.bayern.de/landespflege/landschaftspflege/25786/ansaat_pilotpro.pdf (de)

- Projekt „Lebensraum Brache" der Deutschen Wildtierstiftung, gefördert durch die Deutsche Bundesstiftung Umwelt (DBU). Endbericht „Wer Vielfalt sät, schafft Lebensräume! – Von monotonen Ackerbrachen und Stilllegungsflächen zu wertvollen Habitaten"

- http://www.lebensraum-brache.de/_downloads/service/downloads/eigene/2007_Endbericht_Lebensraum_Brache.pdf (de)

  "Habitat Fallow Land" Project of the German Wildlife Foundation, financed by the German Federal Foundation for the Environment (DBU). Final report of the project: "Creating habitats by sowing a wide variety of plant species: From monotonous set-asides to valuable wildlife habitats habitats"

  http://www.cic-wildlife.org/uploads/media/Lebensraum_Brache_web_EN.pdf

  (en)

3. Tourism and Leisure

3.1 Creating synergies with tourism

3.1.1 Project example: "Experience the Green Belt" in Germany

Due to its wealth of species and habitats, many of them endangered, and its key role in the biotope network, the Green Belt has particularly high value for nature conservation. Located at the former inner-German border, nature was able to develop undisturbed for decades. The Green Belt also connects valuable areas and cleared, intensively used agricultural landscapes such as the fertile plains along its borders and offers the only remaining refuge for a wealth of species of flora and fauna which are sensitive to disturbance and/or are endangered.

To assure the preservation of the Green Belt in the long term, the Federal Agency for Nature Conservation (BfN) has supported a project entitled "Experience the Green Belt" since 2007. It is intended to increase awareness of the importance of the Green Belt in the region and beyond, and improve its visibility, thus making it possible for visitors and holiday-makers to experience its landscapes with their specific history. The project includes specific measures for landscape management, the provision of uniform waymarks and signage, the creation of bicycle and hiking routes, exhibitions, and development and marketing of tourist and nature conservation offers.

Three model regions along the Green Belt have been identified for the development of appropriate marketing strategies, each focussing on a different overarching theme. A key element here is the region's history as the former inner-German border. For each region, appropriate tourist offers have been developed, with local tourism businesses being encouraged to participate. The involvement of local crafts and other historical aspects of the region are also important.

Transboundary cooperation is also being supported in each model region. This extends not only to overcoming administrative (e.g. county or state) borders, but also borders between

different disciplines such as nature conservation, agriculture, and tourism, and between the persons responsible for managing historic sites. The aim is therefore to pursue an integrative approach which makes a valuable contribution to environmentally compatible regional development in the long term.

The various stakeholders in the model regions are given professional and scientific support. General project evaluation is important here, as is the development of a uniform brand image, specialist advice and central marketing.

Summary

A wide range of offers has already been developed; these are being marketed jointly on the Internet and in brochures with “Erlebnis Grünes Band/Experience Green Belt” branding.

Further information

- Information from the Federal Agency for Nature Conservation

  http://www.bfn.de/0311_gruenes_band.html (de)

- Erlebnis Grünes Band / Experience the Green Belt website

  http://www.erlebnisgruenesband.de/ (de)

  http://www.erlebnisgruenesband.de/fileadmin/dateien/wb/Broschuere_-_Erlebnis_Gruenes_Band_Informationen_englisch.pdf (en)

3.2 Climbing strategies: an environmentally friendly approach to climbing

Many rocky crags and rockfaces provide refuge for rare and protected species of flora and fauna. Ferns and mosses flourish in the damp and shady conditions at the foot of rock walls, while adaptation to drought and temperature extremes is required if species are to survive in the intense sunshine at the mountain top. And between these two extremes, many different plants find their niche at close quarters: lichens grow on smooth rock surfaces, flowering plants find a habitat in small cavities, clumps of vegetation proliferate on rocky ledges, while heathers can be found at the summit. Highly specialised fauna also have their habitat among the rocks: the Peregrine Falcon (*Falco peregrinus*) and Eurasian Eagle Owl (*Bubo bubo*) are just two of the species of bird which are highly dependent on rocky biotopes. Some extremely specialised and rare species of insect can be found here as well, while the highly endangered mammals living in rocky habitats include various species of bat which overwinter in caves and often have their summer roosts in rock fissures. To ensure that these unique biotopes are not damaged by climbers, strategies for environmentally compatible climbing are both useful and necessary.

3.2.1 Measures adopted by the German Alpine Association (DAV)

The package of measures adopted by the German Alpine Association (DAV) on eco-friendly climbing involves working with public authorities and nature conservation organisations to develop climbing strategies. The DAV is relying on a wide variety of solutions to identify, at micro level, those areas where environmentally compatible climbing is possible and those where no climbing should take place in the interests of nature conservation. Approaches and sections of rock which are closed to climbers are marked with symbols which have been standardised on a nationwide basis. During the breeding season of protected species of bird, such as the peregrine falcon, rocky areas, or sections of them, will temporarily be declared no-go areas.

Local wardens with responsibility for crags are a key element of this strategy. Together with the other German climbing associations (e.g. the German Climbing Association (*Bundesverband IG Klettern e.V.*) and Pfalz Climbers Association (*Vereinigung der Pfälzer Kletterer*)), the DAV has created a structure for the management of Germany‘s non-Alpine climbing areas which encompasses the highest body at federal level to the state and regional committees down to local wardens and safeguards the continued existence of Germany’s climbing areas in an intact natural environment. The wardens coordinate activities such as environmentally compatible renovation of routes, creation of access pathways, and active participation in peregrine monitoring.

Standardised nationwide signage of crags facilitates communication with climbers. Vegetation on rocky areas is often a colourful mosaic, with vegetation-free zones intermingling with patches of vegetation growth. In order to take account of this diversity, micro-scale rock zoning often forms part of the climbing strategies. The “cross and arrow” symbols ensure clarity and mark out the border between those areas of rock which are off-limits and those to which there is free access. They also indicate the optimal approach route in sensitive areas.

Furthermore, a unique rock information system has been created as an Internet portal which provides in-depth information about Germany’s climbing areas. It includes a detailed crag search facility, interactive maps, background information on regional biotopes, national and regional news, and useful tools for wardens.

Summary

Through a contractual (voluntary) agreement, acceptance of the requisite measures among stakeholders is very high. The easing of burdens on the authorities and the ensuing cost savings, as well as the high degree of flexibility, also testifies to the usefulness of this approach. If monitoring of the scheme’s success brings new scientific knowledge to light, the arrangements can be adapted without major organisational or financial effort.

The strategy presented is based on clear agreements with users (climbers) and active participation by volunteers. It is flanked by PR work which also offers a simple but effective opportunity to engage in dialogue with climbers and raise their awareness of nature conservation issues within the framework of their leisure activities.

Further information

- Comprehensive information about the climbing strategies and environmentally compatible climbing is available from the rock information system:

  http://www.dav-felsinfo.de (de)

3.3 Environment-friendly ski touring

Ski touring and snowshoeing have become increasingly popular winter sports in recent years, offering an experience of the winter landscape off the pathways and pistes. However, they take sportspersons into the refuge areas of wild animals, which are highly sensitive to disturbance in winter.

3.3.1 Example from Berchtesgaden National Park, Germany

In Berchtesgaden National Park, in consultation with the Alpine associations, the National Park administration clears six traditional ski tour routes through the woods on a regular basis as guidance for winter sportspeople. The aim is to prevent any extension of ski touring in terms of area, the number of hours per day or in intensity. In order to concentrate the spatial use of the protected area and to protect the tranquillity of the wildlife's rest and retreat areas, only the routes described in pertinent guide literature should be taken.

In addition, the German Alpine Association's (DAV) project "Environmentally Friendly Ski Touring" was also applied to the National Park region. The project's goal is to implement ski touring in a compatible and sustainable way with nature. Thanks to the routing, sensitive wildlife habitats - in particular that of the grouse – should be affected as little as possible.

For critically sensitive zones, the German Alpine Association publishes information for touring skiers regarding recommended routes (this includes demarcation of sensitive areas, waymarking, and information boards and maps at car parks). Efforts are also being made to promote cooperation with the authors and publishers of guidebooks. All the relevant authorities and associations (forestry offices and rural county offices, mountain rescue services, the Association for the Protection of Nature in Bavaria (BN), the Bavarian Society for the Protection of Birds (LBV), the German Ski Association (DSV), the Bavarian Hunting Association, the Bavarian Farmers' Association, the Association for the Protection of Mountains (*Verein zum Schutz der Bergwelt*), International Friends of Nature, etc.) are involved in this joint initiative, which is also accompanied by scientific studies on the topic "Disturbance of wild fauna by winter sportspersons".

Summary

There has been a very positive response and acceptance of the measures among ski tourers, especially around the protected area. Positive impacts, especially on grouse populations, have been demonstrated in various areas, including the German uplands.

Further information

- Information on the "Environment-friendly Ski Touring" project is available from the German Alpine Association at:

  http://www.alpenverein.de/template_loader.php?tplpage_id=51 (de)

- Information on the projects in Berchtesgaden National Park:

  http://www.nationalpark-berchtesgaden.bayern.de/nationalpark/management/skibergsteigen/index.htm (de)

  http://www.nationalpark-berchtesgaden.bayern.de/english/national_park/management/skitour/index.htm (en)

4. Public Relations Work

4.1 Educational material – a tool for teachers

4.1.1 "*Nature sans frontières*" (Nature without Frontiers) games kit from the French nature conservation organisational FRAPNA

Children are the adults of tomorrow – and will be responsible for decision-making and action. For that reason, it is important to teach them about ecological relationships and the key functions of natural systems. This can be achieved simply and effectively through play. The "*Nature sans frontières*" (Nature without Frontiers) games kit from the French nature conservation organisational FRAPNA is a very useful teaching tool in this context.

All living creatures depend on being able to move around their environment in order to find food and partners for reproduction and reach their seasonal habitats – in other words, to access the resources which are vital for life. However, numerous barriers obstruct the mobility of many species, forcing them to cross obstacles such as roads, fences and railway lines, for example. These barriers interrupt the natural connecting elements between the various habitats. However, there are ways of overcoming these obstacles.

The games kit is a practical tool which enables children and young people to learn about the mobility needs of various sample species, recognise possible barriers and identify simple solutions to overcome them. The easily accessible games are ideally suited to the classroom and excursions into the local environment.

The kit comprises a theoretical guide with explanations of the issues, suggested action and solutions (80 pages); an activity book with instructions for observations, experiments and various activities (60 pages) and several games (card games, board games, identification sets and bird silhouettes). An interactive game for children is also available on the Internet.

The kit was developed in 2005-2008 as part of an environmental education campaign on the issue of ecological corridors. A "*Nature sans frontières*" children's club was also established as a forum where school classes and groups can share their observations and experiences.

The club also publishes a magazine at regular intervals (3 issues a year). There is also a website which provides up-to-date news and information about the campaign.

Further information

- Website of the environmental education campaign:

  http://www.frapna.org/~nsf/index.htm (de)

4.2 "Green Light for Ecological Corridors" educational pathway

4.2.1 Example from the French-Swiss border in the Geneva Basin area

The "Green Light for Ecological Corridors" educational pathway was developed within the framework of a transnational Interreg III A project by three nature conservation organisations: Pro Natura Genève, Appollon 74 and FRAPNA Haute-Savoie. It runs from the Arve river in Switzerland to the higher altitudes of the Salève. Along the pathway, there are numerous information boards which explain the significance of ecological corridors. The boards were designed in conjunction with school classes from the local area. As part of this collaboration, teachers and students explored the topic of habitat connectivity in great detail. 20 classes were involved in total.

The pathway is structured along two main themes. On the one hand, it aims to underscore the importance of protecting existing habitats. On the other, it outlines various opportunities to reduce landscape fragmentation and thus facilitate the mobility of fauna. In addition, various other educational tools, such as a brochure and a touring exhibition, were developed as part of the project.

In parallel to this project, an information campaign was targeted specifically at persons in positions of responsibility in the field of spatial planning and in the local administrations. A manual with decision-making aids was designed especially for this group, and information events were organised. One of the main objectives of these events was to present the multifunctionality of corridors which are significant not only in ecological terms but which also perform key social functions (as spaces for leisure and recreation) and economic functions (e.g. through sustainable management of roadside verges).

Summary

This measure cannot be expected to produce direct ecological impacts. However, the good cooperation and extremely high level of interest on the part of the many participating school classes, as well as the well-attended daytime and evening events for decision-makers in the municipalities and administrations, demonstrate the high level of interest in the measure and are thus likely to have an indirect positive ecological impact.

Contact

- Contact at FRAPNA Haute-Savoie: Damien Hiribarrondo

http://www.frapna.org/hsavoie/ (fr)

Further information

- A brochure about the project and further details can be accessed at:

  http://www.pronatura.ch/ge/index.php?lang=3&mz=5 (fr)

4.3 Sports competitions

4.3.1 "Running Wild" – the wildcat run

In September 2006, BUND Deutschland (Friends of the Earth Germany), in cooperation with the Sports Federation of Thuringia, organised a "race for life" for the European wildcat (*Felis silvestris silvestris*) for the first time. Called "Running Wild", the event was intended to highlight the fact that the forests in Thuringia, Bavaria and Hesse need to be reconnected so that wildcats have large areas in which to roam. One aim of the "Running Wild" project was to publicise the planned migration corridor for wildcats between Hainich National Park and the Thuringian Forest (Thüringer Wald).

The run was organised by various stakeholders in the region, including sportspersons, conservation and environmental organisations, public authorities and members of the business community. A well-known female sports personality from the region agreed to be the project's patron.

The wildcat run is part of the "Wildcat Rescue Network" project organised by Friends of the Earth Germany (BUND), which aims to develop a network comprising some 20,000 kilometres of migration corridor for endangered forest species, including the wildcat but also the badger and European Pine Marten (*Martes martes*). Nature conservation organisations and volunteers have drawn up a plan for a network of wildcat migration corridors, which is intended, in future, to support environmentally compatible planning of transport routes, housing and industrial sites.

Within the project framework, studies found that some small wildcat populations are living in geographically separate areas. A comprehensive analysis of the impediments to their dispersion was also undertaken. The aim is to reconnect these very isolated populations once again and thus help to safeguard the wildcat's long-term future. To this end, corridors – around 50 m wide and 20 km in length – consisting of vegetation and trees will be created to facilitate the wildcat's dispersion from Hainich National Park to the Thuringian Forest. In the long term, other corridors will also be created in order to connect forested areas in Thuringia, Bavaria, Hesse, Lower Saxony and Baden-Württemberg.

The wildcat run is an important aspect of the project. It supported the publicity work and was used as an instrument to present the planned corridor and inform the general public about the wildcat, its significance and needs. Besides the main runs over various distances, an extensive framework programme was also organised in order raise awareness of biological diversity and the importance of ecological connectivity in the landscape.

Summary

The first “Running Wild” race in Thuringia in September 2006 involved some 250 runners and was attended by around 2000 visitors. The event was a major success, and as a result, two further wildcat runs took place in 2008, one in Thuringia and the other in Hesse.

The run which took place in June 2008 was organised by BUND Waldeck Frankenberg and covered a route from Rothaargebirge towards Burgwald-Kellerwald. It was intended to publicise the planned wildcat corridor between these two areas. The event was awarded the MUNA Environmental Prize by the German Wildlife Foundation (DBU) in the “environmental communication” class. This biotope networking project makes a valuable contribution to species and nature conservation, and the wildcat run is an outstanding communication tool to raise awareness of the problem of landscape fragmentation. The organisation of wildcat runs at local level sensitises the public to the issue, and offers an opportunity to provide comprehensive information and generate additional funds for wildcat conservation. BUND Thüringen (Friends of the Earth Thuringia) also offers wildcat sponsorships as a way of encouraging interest in the Wildcat Rescue Network in Thuringia.

Further information

- “Running Wild” – the wildcat race for life

  http://wildkatzet3.bund.net/index.php?id=79 (de)

5. Traffic

5.1 Managed mowing of roadside verges

Delaying mowing gives plants the opportunity to bloom and form fruits and seeds. In this way, they can provide food and cover for insects and other small animals.

The habitat quality of green strips and roadside verges depends on various factors, and mowing is one of the factors which are easiest to influence. By delaying mowing of verges until late summer, or by using mosaic-type mowing techniques, which involves mowing only a small area at a time, habitat conditions can be improved, e.g. for butterflies and various other species.

5.1.1 Example: Département Isère, France

In the Département Isère, the highways department and the administration of the Département (Conseil Général), in partnership with the nature conservation organisation GENTIANA, have been running a project entitled “Managed mowing of roadside verges: protecting nature”, which focusses on the roadside verges and green strips in the road network. By abandoning the use of pesticides and adopting a properly thought-out and planned approach to mowing, the aim is to protect biodiversity. The range of species of flora and fauna occurring in the roadside verges in the Département was previously recorded in a

comprehensive survey undertaken by GENTIANA. Mowing is now undertaken in line with the principle: “As much mowing as necessary and as little as possible”. Particular consideration is given to the safety of road users in this context, but no mowing takes place until the majority of flowering plants have bloomed and seeds have formed.

Summary

Signs at strategically and ecologically important sections of the highway network draw attention to the scheme and inform the public. The project’s positive impacts on flora and fauna have already been demonstrated. In addition, better planning of working time and use of resources, as well as a reduced workload, has helped to cut costs.

Further information

- Information on the project, together with checklists and examples, are available on the GENTIANA website.

  http://www.gentiana.org/site:gestion (fr)

6. Water Resources Management

6.1 Revitalisation of flowing waters

6.1.1. LIFE Project: Wild River Landscape of the Tyrolean Lech, Austria

Running waters are key elements of ecological connectivity. They form natural linear elements of a network many kilometres long, and with their associated ecosystems, are important corridors enabling flora and fauna alike to migrate and multiply. Very often, however, they are no longer able to fulfil this natural function in full as the space and dynamics left to most of the rivers are severely limited. This applies to numerous rivers in the Alpine region. At the same time, flowing waters are highly conducive to cross-border cooperation as they generally flow through several countries and often form natural boundaries which may also constitute national borders. Furthermore, measures adopted along watercourses also contribute to the implementation of the EU Water Framework Directive (WFD) as the restoration of the continuity of watercourses is an integral element of the WFD and a mandatory task for the member states.

Measures relating to flowing waters, especially for their revitalisation, are often very wide-ranging in scope as they involve many actors with very different interests. These measures are also very cost-intensive.

In the Lech valley of Tyrol, which is part of the Natura 2000 network, the LIFE Project: Wild River Landscape of the Tyrolean Lech was carried out in 2001-2006. It included protective hydro-engineering, revitalisation and nature conservation measures. The project was aimed, inter alia, at the conservation and restoration of the near-natural dynamic river habitats and

the improvement of flood protection. It also aimed to promote significant species of fauna and flora which are sensitive to disturbance and endangered, and to sensitise the public to nature conservation issues. As part of this process, it was essential to bring together as many organisations with highly diverse interests as possible.

A range of measures were implemented as part of the project, the key ones being:

- River extension and the restoration of near-natural habitats by removing several building constructions.
- Step-by-step removal of bed load protection at the river feeders to ensure unobstructed bed load transport and thus raise the river bed, the aim being to prevent further deepening of the bed and a drop in groundwater.
- Through various smaller measures, revitalization of the river's side waters and linking up to their parent river.
- For selected target species, preservation and resettlement projects were carried out. The target species included Bilek's azure damselfly, the German tamarisk (*Myricaria germanica*), the Lady's Slipper, Little Ringed Plover (*Charadrius dubius*), a species of grasshopper typical of Northern Alpine regions (*Bryodemella tuberculata*) and the Bullhead (*Cottus gobio*).
- The setting-up of observation platforms and adventure paths, such as the viewing tower as part of the "experience birdlife" path, was intended to encourage a positive drive for environmentally sustainable tourism. At the same time, target species, such as the Lady's Slipper, were protected through management elements of the project.
- An information centre acts as a starting point for excursions and events to raise awareness. Information is also provided about the project and the Lech habitat.

Summary

The LIFE project has provided the impetus for a range of cooperation measures between various partners on issues such as flood protection, revitalisation and tourism. For example, the Tyrolean Lech Valley Nature Park was established in 2005. What's more, the INTERREG Pilot Project "Running Waters" took the LIFE project as its starting point. Building on existing structures, targeted measures to take forward the ecological network were carried out, including the development of a conservation strategy for gravel-breeders at Halblech and comprehensive publicity work focussing on the importance of various landscape elements. These include, in particular, the "*Aktion Lechfloss 2005*" ("Lechfloss 2005" programme). As part of the INTERREG project, proposals were also developed for other transnational watercourses which could be applied to other similar projects as well.

Further information

- Information about the LIFE project in the Tyrolean Lech can be accessed at:

  http://www.tiroler-lech.at (de)

- Information on the INTERREG III B Project ("Living Space Network"), Pilot Project "Running Waters":

  http://www.lsn.tirol.gv.at/de/index.htm (de, en, it)
  http://www.lsn.tirol.gv.at/de/doc/fliessgewaesser.pdf (de),
  http://www.lsn.tirol.gv.at/it/doc/fliessgewaesser_it.pdf (it).

7. Other

7.1 Light pollution/light smog audits

The term “light pollution” denotes the brightening of the night sky caused by artificial lighting whose light is dispersed into the atmosphere. This can have various effects: the growth cycle of plants, for example, may be influenced by an artificially brightened environment. The widespread presence of white light sources with a high proportion of blue in the spectrum can pose serious problems for the navigation or orientation of nocturnal insects as well as for migrating birds.

The sensory organs of nocturnal animals are specially adapted to night-time conditions, which makes them particularly sensitive to artificial light. This is one reason for the large number of night-time accidents involving wildlife. Animals therefore attempt to avoid sources of light, so a well-lit street can therefore constitute a major barrier and contribute to habitat fragmentation.

In recent years, artificial light sources have greatly increased in number, as various statistics bear out: in the Swiss Alps, for example, the illuminated area doubled in the period from 1992 to 2000, with the intensity of lighting increasing in parallel. In France, the number of light sources has increased by 30% in the past 10 years, and the period of illumination has doubled in municipalities with less than 5000 residents.

7.1.1 Example from Département Isère, France

A large proportion of light pollution comes from poorly constructed or poorly installed light sources and can be avoided without any negative impacts, e.g. on road safety.

The administration of Département Isère supports municipalities which carry out an audit of their public lighting. This involves the use of a prescribed check sheet to ensure the quality of the audit. Around 12 of these audits have been carried out since 2004. The costs amount to between € 2,000 – 10,000, depending on the size of the municipality, the number of light sources, and the availability of data. Subsidies from the public purse may be available up to around 80% of the costs. It is estimated that municipalities can cut their energy costs by 20-40% through targeted investment.

Among other things, the audit involves an analysis of the type and amount of public lighting, mapping of larger light spots, and the development of solutions for problem areas (e.g. illumination of tourist attractions, ski pistes, night clubs, and natural monuments).

Summary

Besides the positive impacts on nocturnal animals, the scheme also has positive effects on human health and achieves cost savings through better thought-out lighting and the avoidance of unnecessary light sources.

Contact and further information

- Contact: ADEME (French Environment and Energy Management Agency)

  http://www2.ademe.fr (fr, en)

- Comprehensive information on the issue of light pollution is available from the International Dark-Sky Association

  http://www.darksky.org (en)

7.2 Marking of power lines and appropriate design of electricity pylons

7.2.1 Description of the measure

Collision with power lines and electrocution kill hundreds of birds every year. Furthermore, major above-ground power lines fragment open landscapes and thus reduce the number of large open spaces used by birds during migration.

Accidents of this type can be avoided or at least reduced through good cooperation between bird protection and nature conservation organisations and power line operators.

To determine the regional situation, any dead birds found must be documented, collected and analysed as a basis for the adoption of appropriate measures. These include:

- encouraging underground location of cables in high-risk areas;
- removing particularly dangerous masts (e.g. models which are open at the top, which can become a death-trap for hollow-breeders);
- encouraging underground location of new 20,000 volt cables; alternatively, if this is not possible, incorporating appropriate safety features to protect birds;
- taking account of biotopes in the planning and implementation of work to clear routes for power lines (nesting periods etc.)
- making routes as environmentally compatible and sensitive as possible.
- visual marking of particularly dangerous power lines (e.g. using red warning balls)

Further information

- Council of Europe/Conseil de l'Europe (2006): Lignes à haute tension - comment protéger les oiseaux/Protecting birds from powerlines Sauvegarde de la nature/Nature and environment n°140. Strasbourg, 76 p.

http://book.coe.int/FR/ficheouvrage.php?PAGEID=36&lang=FR&produit_aliasid=1827 (fr)
http://book.coe.int/EN/ficheouvrage.php?PAGEID=36&lang=EN&produit_aliasid=1827 (en)

PHOTOGRAPHS

Photo 1: Targeted and expert "controlled burning" can help to preserve an open landscape (see Measure 3.2.3)

Photo 2: Riparian strips, at least 3-5 m wide, along flowing waters act as buffers and form linear connecting elements (see Measure 7.1.3)

Photo 3: Signage, information boards and waymarking can channel visitors in sensitive areas and thus create quiet zones for flora and fauna (see Measures 11.2 and 4.1.2)

Photo 4: Mixed orchards are extremely species-rich habitats which require regular maintenance (see Measure 3.1.5)

Photo 5: In French game reserves, hunting is strictly prohibited. Habitat improvements should also be carried out (see Measure 9.1.1)

Photo 6: Willow rods are still used for various purposes today, e.g. as lattice fencing (see Measure 3.2.4)

Photo 7: Mixed orchards act as stepping stone biotopes, especially if other landscape structures such as hedges are located nearby (see Measure 3.1.5)

Photo 8: A freshly pollarded willow (see Measure 3.2.4)

Photo 9: In some wine-growing regions, as here in French Savoie, viticulturalists traditionally tie up their vines with strips of willow (see Measure 3.2.4)

Photo 10: Unpaved, greened paths have a greatly reduced barrier effect (see Measure 3.1.6)

Photo 11: Hedges are linear connecting elements of the biotope network (see Measure 3.1.1)

Photo 12: In agricultural landscapes, individual trees or tree groups act as stepping stones and transit routes, e.g. for birds and bats (see Measure 3.1.2)

Photo 13: Walls made from rock fragments are important structural elements of the landscape (see Measure 3.1.3)

Photo 14: Rock fragment piles are important structural elements of the cultural landscape in some regions (see Measure 3.1.4)

Photo15: Agreements with sportspeople can prevent disturbances in sensitive areas, e.g. on crags (see Measure 11.2.2)

Photo 16: Small-scale parcels with various types of use form a diverse mosaic which creates an interesting landscape and promotes species richness.