

# Initiative

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# Continuum écologique

## CATALOGUE DE MESURES SUSCEPTIBLES D'AMELIORER LA CONNECTIVITE ECOLOGIQUE DANS L'ESPACE ALPIN



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La publication offre le même contenu que le « catalogue de mesures » en ligne : [www.alpine-ecological-network.org/cataloguedemesures](http://www.alpine-ecological-network.org/cataloguedemesures). La version en ligne étant régulièrement étoffée et retravaillée, la publication sera aussi mise à jour de temps en temps.

### **L'Initiative Continuum écologique : Nature sans frontières**

L'Initiative Continuum écologique s'est fixé pour objectif le maintien ou la restauration de la connectivité écologique dans les Alpes à travers la promotion et le soutien de projets et d'initiatives réalisés dans ce secteur. Les partenaires de l'Initiative (le Réseau Alpin des Espaces Protégés ALPARC, la Commission Internationale pour la Protection des Alpes CIPRA et le Comité scientifique international de recherche alpine ISCAR) jouent un rôle d'interface entre les politiques, les acteurs de terrain et les scientifiques pour permettre l'échange et la mise en commun de savoirs, d'expériences et d'expertises. Les partenaires collaborent avec le Programme Espace alpin du WWF.

Le travail de l'Initiative Continuum écologique bénéficie du soutien de la Fondation suisse pour la Nature MAVA. Le catalogue de mesures a aussi bénéficié du soutien financier de l'Office fédéral allemand de la protection de la nature avec des moyens du Ministère Allemand de l'Environnement, de la Protection de la nature et de la Sécurité nucléaire ainsi que du Ministère Français de l'Ecologie, de l'Energie, du Développement durable et de la Mer.

# Initiative

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## Continuum écologique

### SOMMAIRE

<b>I</b>	<b>Introduction.....</b>	<b>5</b>
<b>II</b>	<b>Fondements juridiques.....</b>	<b>7</b>
	La Convention alpine.....	7
	Natura 2000.....	8
	Directive-cadre européenne sur l'eau.....	9
	Législations nationales.....	10
<b>III</b>	<b>Acteurs / secteurs.....</b>	<b>16</b>
	Agriculteurs : des acteurs incontournables du paysage et des milieux naturels.....	16
	Chasseurs et forestiers : ambassadeurs des réseaux écologiques.....	16
	Les cours d'eau sont des autoroutes naturelles.....	17
	Des acteurs clés : l'aménagement du territoire et les transports.....	17
	Des paysages attractifs pour la population locale et les visiteurs.....	18
	Protection de la nature sur l'ensemble du territoire.....	18
	Un défi politique.....	19
	Informier et sensibiliser.....	19
	Chacun d'entre nous peut faire évoluer les choses.....	19
	La mise en réseau écologique, une mission pour tous.....	20
<b>IV</b>	<b>Base de données de mesures.....</b>	<b>21</b>
	Nature conservation.....	21
	Agriculture.....	42
	Forestry.....	84
	Transport.....	100
	Water resources management.....	115
	Public relations work and sensitisation.....	127
	Hunting.....	147
	Spatial planning.....	149
	Tourism and leisure.....	153
	Communities.....	165
	Population.....	167
	Other.....	169

# Initiative

## Continuum écologique

---

<b>V</b>	<b>Bonnes pratiques</b> .....	<b>180</b>
	Protection de la nature.....	180
	Agriculture.....	184
	Tourisme et Loisir .....	188
	Relations publiques .....	193
	Gestion des eaux.....	197
	Transports.....	199
	Divers .....	201

# I INTRODUCTION

A long terme, les espaces protégés ne peuvent pas à eux seuls préserver la biodiversité de l'espace alpin. Des actions écologiques doivent être déployées sur l'ensemble du territoire, y compris et justement en dehors des espaces protégés. Des mesures et des programmes de promotion ciblés contribuent à la mise en œuvre d'un réseau écologique en facilitant la connectivité des habitats naturels et des espaces protégés.

L' « Initiative Continuum écologique » a établi ce catalogue de mesures afin de soutenir les activités de mise en place d'un réseau écologique panalpin dans sept régions-pilote alpines. Mais le catalogue est aussi destiné à aider toutes les autres régions et tous les autres acteurs qui, dans l'espace alpin et ailleurs, se mobilisent pour l'amélioration de la connectivité écologique.

## **Une mine d'actions et d'exemples**

Vous trouverez dans le « catalogue de mesures susceptibles d'améliorer la connectivité écologique dans l'espace alpin » des informations sur une large palette d'actions possibles dans le paysage afin d'améliorer le fonctionnement des réseaux écologiques. Des exemples en provenance de différents Etats alpins sont présentés sur la manière de créer, de préserver ou de remettre en état des surfaces et des structures afin qu'elles puissent servir d'éléments de jonction dans un réseau écologique. L'essentiel à cet égard est que des mesures individuelles contribuent à la création d'un réseau de biotopes de grande superficie, en portant sur des zones ayant une importance particulière en matière de connectivité ou sur certaines espèces cibles.

Actuellement, 71 mesures sont décrites dans des fiches et évaluées en fonction de critères sociaux, techniques, écologiques et économiques. Les renseignements fournis dans les fiches constituent des points de départ : la mise en œuvre et la planification concrètes de mesures requièrent des recherches complémentaires. Chaque mesure est consultable de manière interactive sur [www.alpine-ecological-network.org/information-services/measure-catalogue-fr](http://www.alpine-ecological-network.org/information-services/measure-catalogue-fr). Vous pouvez créer votre propre sélection de mesures correspondant aux critères les plus intéressants pour vous.

Les mesures sélectionnées qui semblent particulièrement intéressantes du fait de leur approche innovatrice, de leur originalité ou de leur mise en œuvre exemplaire sont décrites de manière détaillée à l'aide d'exemples ou de projets concrets. Ces exemples peuvent être une précieuse source d'inspiration et vous fournissent des informations pratiques, par exemple sur les personnes à contacter, ainsi que des références.

Avant de mettre effectivement en œuvre l'une des mesures présentées, vous devez vérifier si elle est compatible avec les objectifs fixés au niveau local pour le réseau de biotopes. Dans certaines circonstances, des ajustements aux conditions locales peuvent s'avérer nécessaires. D'autre part, un grand nombre de secteurs et de domaines différents sont concernés par la mise en œuvre des mesures présentées.

## **Partagez vos expériences avec d'autres**

Tous les utilisateurs du catalogue de mesures peuvent consigner sur [www.alpine-ecological-network.org/information-services/measure-catalogue-fr](http://www.alpine-ecological-network.org/information-services/measure-catalogue-fr), sous forme d'exemples, les expériences pratiques qu'ils ont réunies dans des régions-pilote ou ailleurs dans l'espace alpin, afin de les rendre accessibles au public intéressé. Si vous avez des informations complémentaires sur les mesures ou les exemples décrits, n'hésitez pas à nous en faire part ([aurelia.ullrich@cipra.org](mailto:aurelia.ullrich@cipra.org)).

## **Remarques complémentaires sur les évaluations**

Les évaluations ont été réalisées en majeure partie sur la base d'informations accessibles, qui reflètent en partie les expériences issues de projets individuels. Il s'agit donc d'indications fortement simplifiées, qui peuvent servir de points de départ.

Les catégories « efficacité écologique » et « impact socio-économique » prévoient quatre niveaux d'évaluation : « élevé », « moyen », « faible » et « aucun impact direct ». S'agissant de l'efficacité écologique, l'échelle des appréciations est conçue comme suit : plus l'effet positif de la mesure sur la biodiversité, et en particulier sur le réseau écologique, est étayé par des études scientifiques et des projets, plus l'impact de la mesure est considéré comme élevé. Inversement, cet impact est jugé faible si les preuves à l'appui sont en nombre limité.

Par conséquent, un impact économique élevé signifie que la mesure est susceptible de générer des ressources financières ou d'en économiser, et vice-versa. Globalement, l'impact socio-économique prend en compte aussi bien les effets directs qu'indirects, par exemple la création d'emplois ou la possibilité de contribuer au développement régional.

Toujours à propos de l' « impact socio-économique », signalons qu'il fournit une estimation approximative essentiellement axée sur les projets. La situation peut donc varier considérablement d'un cas à l'autre. En outre, il est souvent difficile d'indiquer les coûts : les coûts effectifs varient considérablement d'une mesure à l'autre, car ils sont conditionnés par divers facteurs. Ainsi, la situation initiale, la taille du territoire et les conditions spécifiques des surfaces jouent-elles un rôle important. Les estimations fournies sont donc des ordres de grandeur approximatifs, et elles n'ont qu'une valeur indicative.

Il en va de même de l'efficacité écologique : outre le fait qu'elle doit être mesurée en fonction des conditions initiales concrètes, elle dépend de l'adéquation de la mesure au contexte, et du soin qui a été apporté à sa planification, à sa mise en œuvre et à son adaptation au contexte régional. L'évaluation fournie par le tableau n'a qu'un caractère indicatif, elle peut varier considérablement lors de la mise en œuvre effective de la mesure.

## II FONDEMENTS JURIDIQUES

L'importance des réseaux écologiques pour la préservation de la biodiversité alpine se reflète dans de nombreuses législations au niveau international ou régional. Les fondements d'un réseau écologique à l'échelle alpine sont, en particulier, la Convention sur la biodiversité (CBD), Natura 2000 et la Convention alpine. Le cadre prescrit au plan européen est transposé progressivement au niveau national et subnational. Cela implique le développement d'instruments individuels adaptés aux circonstances et aux besoins locaux. Ainsi, au cours des dernières années, un nombre croissant de pays européens ont adopté des législations nationales relatives aux liaisons écologiques dans le paysage, témoignant ainsi de l'importance que revêt la préservation des réseaux écologiques dans la protection à long terme de la diversité biologique.

### La Convention alpine

La Convention alpine est une convention cadre entre les huit pays alpins, à savoir l'Allemagne, l'Autriche, la France, l'Italie, la Principauté du Liechtenstein, la Principauté de Monaco, la Slovénie, la Suisse et l'Union européenne, ayant pour but la protection et le développement durable de l'arc alpin.

L'article 12 du protocole « Protection de la nature et entretien des paysages » de la Convention alpine réclame l'établissement d'un « réseau national et transfrontalier d'espaces protégés, de biotopes et d'autres éléments protégés ou dignes de protection ».

Les réseaux transfrontaliers d'espaces protégés ont été pris en compte dans le Programme de travail pluriannuel (PTP) 2005-2010 de la Conférence alpine. Au sein de la priorité thématique « Nature, agriculture et sylviculture, paysage rural », l'un des dossiers les plus importants est le maintien des paysages, des habitats et des espèces. Parmi les actions permettant d'atteindre ce but, la mise en réseau de biotopes est également mentionnée. D'autres actions visant la mise en réseau transfrontalière d'espaces protégés et le rattachement à d'autres structures importantes pour l'écologie sont mentionnées comme étant l'une des priorités au sein des travaux futurs de la Conférence alpine (PTP, point 2.4.).

En 2007, les pays alpins ont mis en place la plate-forme « Réseau écologique ». Cette plate-forme, regroupant des représentants officiels des pays alpins ainsi que des experts, des gestionnaires d'espaces protégés et des membres d'institutions alpines, constitue un maillon important entre la politique, les sciences et la pratique, et garantit des échanges efficaces avec d'autres réseaux. Au sein de cette plate-forme, les experts collaborent étroitement dans trois domaines principaux : l'accompagnement scientifique de l'établissement d'un réseau écologique, les projets de mise en œuvre appliquée de réseaux écologiques et la communication et les relations publiques.

Convention alpine : [www.alpconv.org](http://www.alpconv.org), Plate-forme « Réseau écologique » : [www.alpine-ecological-network.org/platform](http://www.alpine-ecological-network.org/platform)

## Natura 2000

L'objectif principal de Natura 2000 est de garantir la présence d'un réseau cohérent d'habitats et d'espèces caractéristiques dans les pays membres de l'UE. Natura 2000 oeuvre pour la création d'un réseau cohérent et fonctionnel d'habitats et de biotopes. La Directive HFF recommande aux États membres de promouvoir les « éléments de liaison du paysage » susceptibles d'améliorer la cohérence écologique du réseau d'espaces protégés Natura 2000 (articles 3 et 10). Elle n'impose pas de délimiter de nouveaux espaces protégés, mais plutôt de prendre en compte les éléments de liaison dans l'aménagement du paysage, y compris hors des sites Natura 2000.

Natura 2000 se fonde sur les Directives de l'UE « Faune-Flore-Habitat » (Directive FFH 92/43/CEE) et « Conservation des oiseaux sauvages » (79/409/CEE). Le réseau communautaire d'espaces protégés se propose de conserver la diversité du patrimoine naturel européen. En outre, Natura 2000 préconise un état de conservation optimal des habitats et des espèces d'importance communautaire énumérés dans les annexes des deux Directives. Pour assurer la représentativité de ces habitats et de ces espèces, Natura 2000 définit des régions biogéographiques de référence correspondant aux aires de répartition des espèces. Avec d'autres massifs montagneux européens, l'arc alpin forme la région biogéographique alpine (régions de haute montagne).

Autre aspect important de Natura 2000 pour les réseaux écologiques : l'obligation de garantir à long terme les mesures de protection et de développement nécessaires à la bonne conservation des espèces et des habitats. Dans tous les sites d'intérêt communautaire, il est préconisé d'adopter des mesures visant à conserver les habitats naturels et les espèces mentionnés par la Directive, et de les traduire dans des plans de gestion concrets. L'un des critères retenus pour juger l'état de conservation est la connectivité écologique. Pour assurer la mise en oeuvre de ces mesures, la Directive FFH et la Directive Oiseaux prévoient que les États membres rendent compte régulièrement à la Commission européenne des démarches et des mesures qu'ils ont adoptées pour mettre en oeuvre les deux Directives (article 17 FFH – article 12 Directive Oiseaux). La Directive FFH impose de rédiger tous les six ans un rapport décrivant l'état des éléments du réseau Natura 2000. Ceci suppose l'obligation de réaliser une surveillance générale des espèces d'intérêt communautaire (article 11 de la Directive FFH), y compris hors des territoires Natura 2000. En effet, l'objectif de la mesure est de surveiller l'état de conservation des habitats et des espèces, en tenant particulièrement compte des espèces et des habitats naturels prioritaires, et ce même hors des sites Natura 2000.

Comme nous l'avons vu, les prescriptions juridiquement contraignantes et les objectifs de Natura 2000 offrent toute une série d'instruments au service des réseaux écologiques. La planification et la mise en oeuvre des mesures liées au réseau écologique sont donc étroitement liées à Natura 2000. En outre, les plans de gestion et les obligations de rapport et de suivi prévus par Natura 2000 peuvent contribuer de manière ciblée à la promotion du réseau de biotopes, raison pour laquelle ils ont été retenus parmi les mesures du présent catalogue.



Natura 2000 : [http://ec.europa.eu/environment/nature/natura2000/index\\_en.htm](http://ec.europa.eu/environment/nature/natura2000/index_en.htm), directive FFH : [http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index\\_en.htm](http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm), directive oiseaux : [http://ec.europa.eu/environment/nature/legislation/birdsdirective/index\\_en.htm](http://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm)

## Directive-cadre européenne sur l'eau

L'Union européenne a, avec la directive-cadre sur l'eau en vigueur depuis décembre 2000 (DCE, directive 2000/60/CE), imposé dans tous ses Etats-membres des objectifs environnementaux uniformes en matière de protection de la nappe phréatique et des eaux superficielles. A cet égard, la directive-cadre sur l'eau suit une approche globale, intégrative et supranationale qui met l'accent sur la protection durable des ressources et la préservation de la fonctionnalité écologique des lacs et des cours d'eau. L'objectif majeur de la DCE est d'atteindre un bon état écologique des fleuves, des lacs, des eaux côtières et des eaux souterraines d'ici à 2027 au plus tard.

La directive tient notamment compte, à cet effet, de la fonction écologique des lacs et cours d'eau comme espace de vie pour différentes espèces animales et végétales. Les objectifs d'amélioration de l'état des lacs et cours d'eau incluent également les écosystèmes terrestres dépendants et leur connectivité. De plus, le rétablissement de la continuité écologique pour les organismes aquatiques et pour le transport des sédiments dans les systèmes de cours d'eau apparus naturellement constitue une priorité (article 4 et annexe V). Ce n'est que si cette continuité est une réalité que par exemple des espèces de poissons migrateurs comme la truite peuvent atteindre leurs habitats naturels situés dans les portions supérieures des cours d'eau. Les invertébrés peuvent aussi être confrontés à des difficultés dues à l'isolement de certains tronçons de cours d'eau, par exemple en raison de seuils et barrages, d'usines hydrauliques, de lacs de retenue ou de sections canalisées.

Ces prescriptions légalement contraignantes et les objectifs fixés par la DCE fournissent des instruments concrets en faveur de la promotion d'un réseau écologique à l'échelle alpine. En effet, avec la DCE, les Etats-membres se sont engagés à rétablir la continuité écologique de tous les cours d'eau, dans la mesure du possible. La mise en œuvre de la DCE exige, entre autres, des mesures ciblées d'amélioration de la structure des lacs et des cours d'eau ainsi que de la continuité écologique, grâce par exemple à la construction d'échelles à poissons et/ou de canaux de contournement au niveau des centrales hydrauliques et des digues, ou à la suppression de canalisations et d'écoulements.

Directive cadre sur l'eau :

[http://europa.eu/legislation\\_summaries/agriculture/environment/l28002b\\_fr.htm](http://europa.eu/legislation_summaries/agriculture/environment/l28002b_fr.htm)

## Législations nationales

### **Autriche : Directive « protection des animaux sauvages »**

Le Ministère fédéral des transports, de l'innovation et de la technologie (BMVIT) est à l'origine d'une révision de la directive « protection des animaux sauvages » (Directive sur les voies de communication routières), qui stipule que lors de la gestion du trafic, de l'aménagement routier concret ainsi que lors de l'évaluation des risques pour l'environnement, il convient de prendre en compte des aspects de l'écologie sauvage conformément à la directive. Cette dernière détermine des normes écologiques minimales pour les passages à gibier sur les axes routiers. La société autrichienne des autoroutes et des voies rapides (ÖSAG) a participé à ce développement (SCHWARZEL et al. 2000).

Grâce à l'instrument d'aménagement écologique pour la faune sauvage (WÖRP) créé en 1983 par l'institut de recherche en sciences de la faune sauvage et écologie de Vienne, un concept de base d'écologie de la faune sauvage a été établi dans plusieurs Länder d'Autriche, dans le canton des Grisons en Suisse ainsi qu'au Liechtenstein. L'objectif de ce concept consiste à intégrer à long terme les espèces animales sauvages dans le paysage rural cultivé. Ceci doit se faire en harmonisant la connexion des biotopes et en effectuant des recherches sur la résistance des biotopes et sur la population de gibier. Le WÖRP comprend un vaste aménagement du territoire en rapport avec la répartition spatiale des populations d'animaux sauvages (aménagement de base à l'échelle nationale) et un aménagement plus détaillé à l'échelle régionale.

Des listes rouges des types de biotopes menacés ont été établies pour l'Autriche sous la responsabilité de l'Office fédéral pour l'environnement.

### **France : Réseau écologique national « Trame verte et bleue »**

La « Trame verte et bleue » française est l'un des grands projets nationaux issus du Grenelle de l'Environnement, rencontres politiques organisées en octobre 2007 visant à prendre des décisions à long terme en matière d'environnement et de développement durable, en particulier pour restaurer la biodiversité. La trame verte et bleue est un outil d'aménagement du territoire pour la restauration écologique du territoire en France issu d'un travail de concertation entre l'État, les collectivités et un grand nombre d'acteurs scientifiques, associatifs, etc.

Ce projet introduit pour la première fois dans le droit français la notion de continuité écologique. Sa mise en oeuvre se déroulera sur plusieurs années et fait partie d'un ensemble de mesures pour la biodiversité, introduites ou précisées dans la loi Grenelle II, actuellement en phase d'élaboration. Selon cette loi, l'Etat devrait définir des orientations nationales avant que chaque région ne définisse un schéma de cohérence écologique suivant ces orientations (avant fin 2012). Les communes devront prendre en compte ce schéma régional dans leurs documents de planification (directives territoriales, SCOT, PLU...).

Au niveau régional, certaines régions sont en train de concrétiser des initiatives en faveur des réseaux écologiques. Les projets les plus avancés sont ceux du Nord-Pas de Calais et de l'Alsace. Mais également les régions Rhône-Alpes, Ile-de-France et Basse-Normandie ont commencé à prendre des mesures/déployer des efforts dans cette direction.

Depuis 1996, le département Isère, qui comprend plusieurs espaces protégés importants, travaille à l'établissement d'un réseau écologique. Une cartographie du réseau écologique départemental (REDI) a été réalisée en 2001. Depuis lors, de nombreuses activités ont été entreprises pour traduire dans les faits ce réseau écologique (passages à faune supérieurs et inférieurs, limitation de vitesse, sensibilisation du public, intégration dans les processus d'aménagement).

La Fédération des Parcs naturels régionaux de France a élaboré une méthodologie pour mettre en oeuvre des réseaux écologiques dans le cadre des parcs naturels régionaux. Des parcs comme Oise-Pays de France, Scarpe-Escout, Pilat, Caps et marais d'Opale, Haut Languedoc et Lorraine ont commencé à tester cette méthode à titre expérimental.

De plus, les neuf parcs du Massif Central entendent cerner les continuums écologiques au niveau du massif afin d'assurer une liaison entre les Alpes et les Pyrénées.

Trame verte et bleue : <http://www.legrenelle-environnement.fr/grenelle-environnement/spip.php?rubrique=282>, Réseau écologique en Isère : <http://www.pathsoflife.eu>, continuums écologiques du massif central : <http://www.trame-ecologique-massif-central.com/>

## **Allemagne : La loi fédérale sur la protection de la nature**

Depuis la modification de la loi fédérale sur la protection de la nature (Bundesnaturschutzgesetz – BnatSchG -) de mars 2002, les Länder allemands sont tenus d'aménager un réseau de biotopes inter-länder sur au moins 10 % de leur territoire. Conformément à l'article 3 de cette loi, l'objectif de ce réseau de biotopes est la sauvegarde des espèces locales et de leurs habitats et la préservation ou la reconstitution de corrélations écologiques en mesure de fonctionner. Cela nécessite un processus à trois volets, qui déterminera les espaces qui fournissent d'ores et déjà une contribution au réseau de biotopes, les besoins en espaces supplémentaires adéquats et en espaces de développement adéquats. Il y a lieu de tenir compte, en l'occurrence, du fait que les corrélations écologiques se font dans des espaces de dimensions tout à fait diverses. Pour le réseau de biotopes inter-länder exigé dans l'article 3 de la BnatSchG, divers niveaux interviennent, des niveaux internationaux à régionaux. Tous les espaces, également ceux qui ont le statut d'espace protégé, ne sont intégrés dans le réseau de biotopes que lorsqu'ils sont adéquats pour réaliser l'objectif mentionné dans l'article 3 paragraphe 2 de la BNatSchG. Il est, par conséquent, nécessaire de développer des critères de sélection pour déterminer les espaces adéquats. Des recommandations ont été élaborées en ce sens par un groupe d'experts de la Fédération et des Länder (Burkhardt et al. 2004). En application de ces critères, dans le cadre d'un projet de recherche, il a été effectué un relevé des zones significatives à l'échelle nationale, en vue d'une association de biotopes (FUCHS et al.

2007). Les zones du « Ruban Vert » le long de l'ancienne frontière entre les deux Allemagne sont un élément significatif du maillage de biotopes allemand.

Loi fédérale sur la protection de la nature : <http://www.buzer.de/gesetz/8972/index.htm>

## **Le réseau BayernNetz Natur et la stratégie de la Bavière en matière de biodiversité**

La création d'un réseau régional de biotopes est inscrite depuis 1998 dans la loi bavaroise sur la protection de la nature, qui prévoit la réalisation de grands projets de protection de la nature. Les centaines de projets BayernNetz Natur permettent de créer et d'entretenir des habitats précieux pour la flore et la faune. Les projets BayernNetz Natur se caractérisent par une étroite collaboration entre les parties prenantes (notamment les agriculteurs, les administrations, les associations, les communes). Le principe premier de BayernNetz Natur est le caractère facultatif des mesures et la démarche coopérative adoptée. Le financement des projets BayernNetz Natur provient de différentes sources : Land, État allemand et Union européenne. Les fondations et les accords de parrainage offrent d'autres opportunités de financements. L'un des principaux objectifs de la « Stratégie de la Bavière en matière de biodiversité » est d'assurer la continuité écologique des migrations, qui sont entravées par les routes ou les barrages. Les espaces à faible trafic qui ne sont pas encore interrompus par des routes publiques et occupent une surface supérieure à 100 kilomètres carrés possèdent une grande valeur écologique. Il convient donc de la sauvegarder. En outre, les routes, les voies ferrées, les constructions et les barrages sur les cours d'eau doivent être rendus encore plus perméables. La stratégie de la Bavière en matière de biodiversité est réalisée en coordination avec d'autres départements et avec la participation des parties intéressées, en particulier les utilisateurs des surfaces et les propriétaires terriens.

BayernNetz Natur : <http://www.bayernnetznatur.de>, Stratégie de la Bavière en matière de biodiversité : <http://www.stmug.bayern.de/umwelt/naturschutz/biodiversitaet/index.htm>

## **Italie : Programmes agri-environnementaux**

En Italie, les programmes d'aide agricole sont définis au niveau régional. Chaque province fixe les objectifs des mesures contractuelles dans un plan pour le développement rural. Les programmes agri-environnementaux sont financés par l'Etat et les régions.

En plus des programmes agricoles purs, il existe aussi des programmes pour le paysage rural dans lesquels des mesures d'entretien et de développement du paysage sont proposées. Pour le maintien du paysage rural cultivé traditionnel, notamment dans les régions de montagne, ce sont entre autres des éléments paysagers importants du patrimoine, tels que les murs de pierres ou les haies, qui sont préservés et d'autres mesures d'entretien du paysage sont encouragées (ex. : contributions pour les clôtures et les canaux « Waale » traditionnels). Des contributions à l'entretien du paysage servent au maintien d'éléments particuliers dans le paysage rural cultivé. Pour le maintien des habitats

particulièrement précieux, il existe des primes d'entretien du paysage (primes à la surface). Dans les différentes régions, des modèles, inventaires et plans de paysages sont élaborés afin d'orienter les mesures et les aides. Le travail plus important dû à une exploitation traditionnelle et un rendement inférieur est rétribué par les primes d'entretien du paysage.

## **Liechtenstein**

Le Liechtenstein est fondamentalement intégré dans la coopération internationale et transfrontalière par son intégration dans les Worldwide International Instruments et les Pan-European Instruments. Le Liechtenstein, un État dont la superficie est très petite, applique depuis toujours le principe fondamental selon lequel les objectifs internationaux font, en règle générale, l'objet d'une harmonisation en coopération étroite avec les États voisins, en l'occurrence le Land du Vorarlberg en Autriche et les cantons suisses de St Gall et des Grisons. Pour cette raison, la coopération transfrontalière dans les domaines de l'écologie et de l'environnement nous a toujours beaucoup tenu à cœur et continuera à le faire, sans que cela soit spécifiquement ancré dans des dispositions légales ou d'autres instruments nationaux. Cette coopération se fait dans le domaine de la protection de la nature et des paysages, elle concerne entre autres l'écologie des eaux, les réserves forestières, les zones humides, la gestion des ongulés sauvages, les grands carnassiers, les espèces envahissantes, les passages à faune, etc.

En 2008 a commencé la mise en œuvre du « Projet de développement nature et agriculture ». Ces dernières années, de nombreuses données fondamentales ont été traitées en vue de ce projet, qui donne lieu non seulement à la réalisation de projets de renaturation et de réseaux au Liechtenstein, en collaboration étroite avec l'agriculture, mais aussi à la réalisation de corridors transrégionaux avec le Canton de Saint-Gall et avec le Bundesland du Vorarlberg.

Projet de développement nature et agriculture : [http://www.llv.li/amtstellen/llv-awnl-natur\\_und\\_landschaft/llv-awnl-natur\\_und\\_landschaft-entwicklungskonzept\\_natur\\_und\\_landwirtschaft.htm](http://www.llv.li/amtstellen/llv-awnl-natur_und_landschaft/llv-awnl-natur_und_landschaft-entwicklungskonzept_natur_und_landwirtschaft.htm)

## **Slovénie : Sylviculture proche de la nature**

La forêt joue un rôle particulier en Slovénie. Avec une couverture forestière de son territoire de 56,4 %, la Slovénie se situe à la troisième place au niveau européen. La surface forestière continue de s'étendre en raison de l'abandon de surfaces agricoles. La sylviculture s'appuie sur des principes de durabilité, de gestion de la forêt proche de la nature et de multifonctionnalité.

Le « Programme pour le développement des forêts de Slovénie » de 1996 rassemble les principales connaissances sur la forêt slovène ainsi que son rôle dans le maintien de la biodiversité. Ces forêts sont d'une importance capitale pour un réseau à l'échelle alpine en raison de leur bon degré de conservation, de l'importante surface qu'elles occupent ainsi que de la présence de nombreuses espèces menacées en Europe. Les habitats d'importance

écologique et les zones humides en forêts ainsi que les réserves forestières bénéficient d'une protection particulière.

Le programme de développement prévoit la participation des services forestiers et de la chasse ainsi que des associations de chasseurs pour certains aspects d'aménagement territorial.

Programme pour le développement des forêts de Slovénie :

[http://www.zgs.gov.si/fileadmin/zgs/main/img/PDF/ZAKONI/Program\\_razvoja\\_gozdov\\_Slovenije.htm](http://www.zgs.gov.si/fileadmin/zgs/main/img/PDF/ZAKONI/Program_razvoja_gozdov_Slovenije.htm)

### **Suisse : Règlement de qualité écologique et directive sur le dimensionnement des passages à faune**

En Suisse, les agriculteurs doivent aménager au moins 7 pour cent de leur superficie utilisable en agriculture en surface de compensation écologique (SCE) pour avoir droit à des subsides directs. Les surfaces de compensation écologique sont des prairies, des pâturages, des surfaces à litières et des haies riches en espèces diverses ainsi que d'autres éléments proches des conditions naturelles, comportant de nombreuses espèces, utilisées de manière extensive. Actuellement, ces surfaces de compensation écologique atteignent environ 10 % de la surface utilisée en agriculture. Depuis 2001, l'ordonnance sur la qualité écologique (OQE) dispense des incitations en fonction des résultats en vue d'encourager non seulement la qualité biologique mais aussi la mise en réseau des surfaces de compensation écologique. Cette mise en réseau sert à relier les populations restantes isolées au moyen d'espèces cibles et emblématiques typiques de la région. La qualité des prairies est évaluée au moyen de plantes indicatrices. Pour certains autres types d'habitat, d'autres critères viennent s'y ajouter – par exemple, dans le cas des haies, entre autres la structure, la largeur minimum, la provenance des espèces, l'entretien. Les cantons doivent contribuer au financement. Les contributions de mise en réseau et de qualité sont cumulables. En peu de temps, les incitations économiques de l'OQE, notamment dans les régions de montagne, ont eu pour résultats des mises en réseau étendues et des revalorisations biologiques des prairies et des pâturages riches en espèces diverses, que l'intensification agricole et les apparitions de friches avaient menacées.

La directive nommée DETEC sur le dimensionnement des passages à faune (2001) fixe la largeur de ceux qui sont aménagés le long des corridors faunistiques d'importance suprarégionale à 45 +/- 5 m. Dans le cadre de l'élaboration de cette prescription, l'Office fédéral des routes (OFROU) et l'Office fédéral de l'Environnement (OFEV) se sont mis d'accord pour assainir le réseau suisse de routes nationales et principales sous l'aspect biologique de la faune sauvage. Ce concept prévoit qu'au cours des prochaines décennies, une cinquantaine de passages à faune augmenteront la liberté de mouvement des mammifères sauvages indigènes, de part en part du réseau routier. Les points conflictuels à assainir ont été définis en gros dans le rapport sur les corridors (SRU 326). La planification détaillée – notamment le choix précis des sites et les types d'ouvrages spécifiques ainsi que l'interconnexion des ouvrages avec leur environnement – sera élaborée dans le cadre de

concepts cantonaux. Ces documents, concernant l'ensemble du canton ou uniquement les corridors de la liste ci-dessus, sont déjà disponibles en six Cantons, et sont envisagés dans les autres. Dans trois endroits de la liste, les projets de détail des travaux de construction sont déjà en cours. Les informations contenues dans le rapport sur les corridors – en partie complétées par celles du REN (SRU 373), entre autres sur la situation ou le degré de dangerosité des corridors faunistiques – ont, de plus, été intégrées dans 17 plans directeurs cantonaux et augmentent la protection de ces axes importants de liaison.

Ordonnance sur la qualité écologique (OQE) :

<http://www.bafu.admin.ch/landschaft/00522/01649/01651/index.html?lang=fr>

### III ACTEURS / SECTEURS

Vous êtes professionnel du secteur du tourisme, responsable de l'aménagement du territoire ou sylviculteur ? Ce chapitre vous apprendra dans ce cas pourquoi votre intervention en faveur de la connectivité des habitats naturels est essentielle.

#### **Agriculteurs : des acteurs incontournables du paysage et des milieux naturels**

De nombreux habitats sont apparus grâce à l'exploitation traditionnelle des terres par l'homme. L'agriculture exerce donc une influence déterminante sur la biodiversité dans les Alpes. Dans les vallées, l'agriculture intensive peut constituer des barrières à la mobilité de la faune et de la flore. En altitude, en revanche, les prairies utilisées de manière extensive offrent encore une diversité biologique très élevée. Ces prairies sont toutefois de plus en plus menacées par la modernisation des pratiques agricoles. Les agriculteurs peuvent contribuer de manière décisive à la préservation et à la mise en place de réseaux écologiques, par exemple en aménageant et conservant des bandes enherbées ou des bordures de champ et des éléments structurels tels que les haies et les murets de pierres sèches, notamment aux abords des surfaces exploitées de manière intensive. Une exploitation plus extensive incluant le renoncement aux engrais, pesticides, etc., contribue elle aussi à préserver la diversité biologique et à assurer la mise en réseau des habitats naturels. Ces actions des agriculteurs en faveur de la diversité biologique et de la mise en réseau des habitats devraient être indemnisées en conséquence. En effet, ces acteurs contribuent ainsi à la sauvegarde de la biodiversité, qui est un fondement de la vie, et d'un cadre de vie agréable pour l'ensemble de la société.

#### **Chasseurs et forestiers : ambassadeurs des réseaux écologiques**

La forêt façonne le paysage des Alpes : plus d'un tiers de leur surface est couvert de forêts. Outre son importance en tant qu'espace de vie, de détente, naturel et économique, la forêt assure également de nombreux services aux écosystèmes (protection de l'eau et des sols, régulation du climat, atténuation des catastrophes naturelles). De par son étendue, la forêt constitue un élément de liaison essentiel dans le paysage. L'importance de la forêt au plan écologique et la position sociale traditionnellement forte des chasseurs et des forestiers dans de nombreuses régions font de ceux-ci des ambassadeurs de premier plan pour les réseaux écologiques. La durabilité joue depuis toujours un rôle important dans leur activité. Ils peuvent contribuer à sensibiliser la population sur l'importance d'une gestion durable des forêts et de la faune. En effet, une forêt semi-naturelle comportant une part élevée de bois mort et d'arbres âgés est particulièrement adaptée à la mise en réseau d'habitats naturels remarquables. Les réserves forestières peuvent ainsi aider à préserver des zones précieuses au plan de la protection de la nature, comme les noyaux de peuplements âgés ou



les taillis, qui constituent des éléments essentiels d'un réseau de biotopes, et à les protéger contre les perturbations occasionnées par l'homme. Les méthodes de débardage alternatives permettent de moins endommager les forêts et les sols. Les lisières peuvent particulièrement bien remplir leur fonction de biotopes relais et de lieux de repli si elles sont richement structurées.

Une gestion raisonnée de la chasse est primordiale pour maintenir une forêt semi-naturelle, et donc des conditions de vie et de propagation optimales pour le plus grand nombre d'espèces possibles. Les régions où la chasse est interdite ou limitée peuvent en outre servir de zone centrale ou de biotope relais pour les espèces animales fragiles. Les actions d'amélioration des habitats naturels peuvent aider à atteindre cet objectif.

## **Les cours d'eau sont des autoroutes naturelles**

Les cours d'eau remplissent des fonctions essentielles en tant qu'écosystèmes. Ils offrent habitat, refuge et nourriture et sont, en tant qu' « autoroutes naturelles » pour la faune et la flore, des éléments de liaison linéaires dans les réseaux écologiques. Les passes à poissons et autres aménagements similaires permettent aux poissons et à d'autres espèces vivant dans les cours d'eau de surmonter les obstacles à la migration comme les déversoirs ou les bassins de retenue. Ces objectifs ne peuvent être garantis à long terme qu'avec une bonne qualité de l'eau, une dynamique hydraulique naturelle et des rives renaturées. Le maintien des ripisylves et des zones humides joue également un rôle primordial dans la diversité biologique.

Comme les responsables de la gestion des eaux, les pêcheurs ont également un rôle à jouer dans la préservation des systèmes hydrologiques semi-naturels. Ils connaissent les habitats et leurs occupants ainsi que les rapports entre les écosystèmes, et sont donc particulièrement sensibles aux changements qui les affectent. Ils peuvent soutenir les activités de protection de la nature et de gestion des eaux et s'avèrent ainsi être des partenaires-clés dans la mise en réseau écologique des fleuves, des lacs et des zones de rives. Une pêche durable et des cours d'eau semi-naturels ne profitent pas seulement à la diversité biologique. Ils sont également bénéfiques aux pêcheurs eux-mêmes, ainsi qu'à toutes les personnes en quête de détente le long des cours d'eau.

## **Des acteurs clés : l'aménagement du territoire et les transports**

L'aménagement du territoire et l'organisation des transports jouent un rôle décisif dans la mise en œuvre des réseaux écologiques. La planification spatiale et ses instruments peuvent rendre contraignantes et pérenniser les liaisons écologiques dans le paysage. Le principe de la connectivité écologique et les autres intérêts en présence doivent donc être intégrés dès le départ et avec le même poids dans tous les processus de planification au niveau suprarégional, régional et local.

Les infrastructures de transport contribuent fortement à la fragmentation des habitats naturels, notamment dans les vallées. Les points de conflits entre les axes de circulation et les couloirs de migration des animaux sauvages peuvent être résorbés par exemple par la mise en place de passages à faune et de tunnels, la fermeture périodique des routes ou la réduction du trafic.

## **Des paysages attractifs pour la population locale et les visiteurs**

Les paysages caractéristiques d'un territoire font partie intégrante de l'identité locale. Ils constituent un capital important pour le tourisme et un espace de loisirs pour la population. Grâce à l'interconnexion de leurs habitats, les paysages riches et diversifiés abritent une multitude d'animaux et de plantes et constituent simultanément un environnement varié à fort potentiel touristique. Les cours d'eau semi-naturels et leurs abords forment avec d'autres éléments de liaison du paysage des corridors écologiques qui relient les habitats de la faune et de la flore. Véritables poumons verts, ils contribuent à la qualité de l'air et offrent un cadre attrayant pour les loisirs de proximité et le tourisme. Le tourisme peut bénéficier directement des réseaux écologiques.

Mais le tourisme, en particulier dans ses formes intensives, a aussi souvent un impact négatif sur le paysage, et donc sur le réseau écologique. Les structures hôtelières, les pistes de ski et les infrastructures de transport peuvent affecter, voire détruire les habitats de la faune et de la flore. Certaines pratiques sportives et activités de loisirs perturbent les animaux et les végétaux et dégradent leurs habitats. Les responsables du tourisme sont donc des partenaires-clés pour pérenniser le paysage et les espaces naturels connectés. Grâce à des offres durables et à la sensibilisation des visiteurs, le tourisme peut aussi contribuer de manière essentielle à la préservation des liaisons écologiques dans le paysage.

## **Protection de la nature sur l'ensemble du territoire**

L'utilisation durable du paysage joue un rôle essentiel dans la conservation de la diversité biologique. Toutefois, les mesures de protection ne doivent pas se limiter aux espaces protégés, mais s'étendre à l'ensemble du territoire. Elles sont particulièrement importantes dans les espaces non protégés. Pour protéger efficacement la faune et la flore alpines menacées et permettre le retour des espèces indigènes disparues, la mise en place de liaisons écologiques dans le paysage est primordiale.

Les mesures de protection de la nature jouent un rôle décisif dans la mise en réseau écologique : elles participent à la sauvegarde et à l'amélioration des habitats naturels. Ceux-ci jouent un rôle majeur dans le réseau écologique en tant que zones centrales, habitats de transition ou biotopes relais. Les mesures de protection permettent également de créer des zones de liaison qui favorisent la perméabilité du paysage à grande échelle ou dans les zones de conflit. Les administrations en charge de la protection de la nature sont appelées à prendre à tous les niveaux les mesures nécessaires, en coopération avec les organisations de défense de la nature et les autres acteurs concernés : population, agriculteurs, sylviculteurs ou acteurs de l'aménagement du territoire.

## Un défi politique

De nombreuses mesures dans le domaine de la protection de la nature (préservation et rétablissement des espaces naturels de valeur, renaturation de cours d'eau, etc...), mais aussi de la sylviculture et de l'agriculture (création de zones de compensation écologique ou exploitation extensive) et en matière de planification des infrastructures de transport et de l'utilisation des sols peuvent contribuer à la création de réseaux écologiques. Ces actions doivent être exigées par les acteurs de terrain et encouragées par les politiques régionales et nationales. Les décideurs politiques peuvent soutenir un développement compatible avec le respect de l'environnement en associant par exemple les instruments d'aide financière à des critères de connectivité écologique, comme cela est déjà le cas dans certains pays dans le domaine agricole.

A ce chapitre, les communes ont une responsabilité particulière, car elles administrent la majeure partie du paysage et peuvent influencer ses formes d'utilisation par le biais de l'aménagement du territoire. Quel que soit le domaine dans lequel des actions sont entreprises, les mesures ne doivent pas être mises en œuvre de manière isolée, mais intégrées dans une stratégie globale de création d'un réseau écologique.

## Informier et sensibiliser

La compréhension de la signification des réseaux écologiques et une communication ouverte sont des éléments fondamentaux pour un développement efficace des réseaux écologiques. Une mise en réseau dans le domaine socio-économique et culturel revêt également une importance majeure.

L'éducation à l'environnement et la communication sont donc des aspects centraux dans la planification de projets de réseaux écologiques. L'information des groupes-cibles spécifiques et la sensibilisation des différents acteurs, mais aussi de la population en général, peuvent décider de la réussite à long terme des initiatives de mise en place de réseaux de biotopes. En effet, plus le public est conscient de l'importance des réseaux écologiques, plus nombreux sont ceux qui sont prêts à agir pour les préserver.

## Chacun d'entre nous peut faire évoluer les choses

Les réseaux écologiques ne sont pas mis en œuvre uniquement à grande échelle. Chacun d'entre nous peut y participer. Il existe de nombreuses manières de favoriser sur les terrains privés l'interconnexion des habitats et de réduire les effets négatifs provoqués par la fragmentation croissante de notre paysage alpin. Respecter les périodes de fauche ou utiliser des semences riches en espèces dans les champs et les zones habitées permet par exemple d'enrichir le paysage et d'améliorer les liaisons entre les espaces naturels. Les mesures prises sur les petites surfaces ont elles aussi leur importance. Chacun, à son niveau, peut contribuer de différente manière au réseau écologique. Que ce soit en créant un environnement semi-naturel dans son propre jardin, en utilisant avec parcimonie l'espace disponible ou en respectant l'environnement dans le cadre de ses sorties dans la nature.

## **La mise en réseau écologique, une mission pour tous**

Les activités en faveur de la connectivité écologique dans le paysage doivent s'appuyer sur l'adhésion d'une large part de la population. Plus les acteurs impliqués sont nombreux, plus l'adhésion aux projets d'amélioration des réseaux de biotopes est forte, et plus le soutien à ces projets est élevé. La motivation est particulièrement forte lorsqu'il existe un lien personnel avec le projet prévu. Selon les projets et l'orientation des activités, le nombre des acteurs impliqués peut être considérablement élargi : associations sportives, églises, écoles, mais aussi opérateurs énergétiques ou services d'urbanisme locaux.

## IV BASE DE DONNÉES DE MESURES

### Nature conservation

#### Conservation, management and creation of new standing water bodies



Standing water bodies include a wide variety of aquatic habitats such as lakes, pools, ponds and tarns. © Rainer Sturm/ pixelio.de

#### Involved sectors

Agriculture, Forestry, Hunting, Spatial planning, Nature protection, Local population/citizens

#### Affected habitats

Waterbodies

#### Description

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.

#### Impact

**Impact in particular on** Reptiles, Amphibians, Birds, Insects, Fish

## Ecological impact

**Improvement or preservation of habitats** 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 ecological network** 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.

**Time of realisation for measure** Weeks: 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.

**Impact scope** Local (municipality): In general, the impact is local but depending on the connectivity situation, it may also be regional in scope.

## Implementation

**Implementation period** Months: 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.

**Frequency** Recurring: Most maintenance measures must be repeated.

## Economic and legal aspects

**Costs** Medium (10'000-100'000 EUR): 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 m<sup>2</sup>) - 70,000, depending on size.

**Socio-economic impacts** Low: Intact standing water bodies contribute to an attractive and diverse landscape appearance (tourism).

**Sources of financing** Public: local, Public: regional, Public: national, Public: European

**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.

## Further information

**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**

Other: 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\\_11/-index1221750829191.html](http://www.landwirtschaft-mlr.baden-wuerttemberg.de/servlet/PB/menu/1064781_11/-index1221750829191.html)

**Controlling invasive species**



Ambrosia - one of the best known invasive species. © Martin Richter/ pixelio.de

**Involved sectors**

Agriculture, Forestry, Water management, Hunting, Nature protection, Local population/citizens

**Affected habitats**

Forest, Shrubs and wooded areas, Bogs and fens, wetlands, Alpine habitats, Grassland, Arable land, Areas for settlements and transport, Waterbodies

## Description

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.

## Impact

### Ecological impact

Improvement preservation habitats or Awareness of the impacts of invasive species is required, justifying control of measures (e.g. specific threat posed to rare or endangered species, risk of penetration of invasive species into new areas).

Element ecological network of 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.

**Time realisation measure** of Years: 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.

**Impact scope** Very localised (plot): The impact of measures is very limited in spatial terms.

## Implementation

**Implementation period** Months: Here too, many different measures and implementation periods are possible.

**Frequency** Recurring: Generally long-term strategies are needed to fight invasive species effectively.



## Economic and legal aspects

**Costs** High (100'000-1 Mio EUR): 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.

**Socio-economic impacts** Medium: 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.

**Sources of financing** of Public: local, Public: regional, Public: national, Public: European

**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.

## Further information

**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** Other: 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>

## Restoration of wetlands



The removal of trees and shrubs is a measure for the renaturation of fens and bogs. © Bund Naturschutz Ostallgaeu

### Involved sectors

Agriculture, Forestry, Water management, Spatial planning, Tourism and leisure, Nature protection

### Affected habitats

Bogs and fens, wetlands

### Description

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 CO<sub>2</sub> 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.

### Impact

#### Impact in particular on

Reptiles, Amphibians, Birds, Insects

#### Ecological impact

Improvement or preservation of habitats

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 ecological network** Intact peat bogs are important elements of a network of different wetlands (headwaters, humid forests, etc.)

**Time of realisation for measure** Years: 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.

**Impact scope** Regional: The scope of impact can be increased if relevant measures are embedded in a comprehensive (regional) strategy.

### Implementation

**Implementation period** Years: Wetland restoration measures should be embedded in a long-term comprehensive strategy, although individual measures can be implemented over the short term.

**Frequency** Recurring: Includes a wide variety of measures, many of which should be long-term and repeated regularly.

### Economic and legal aspects

**Costs** Medium (10'000-100'000 EUR): Costs vary with size of area, measures to be implemented and implementation period (approx. € 150-6000/ha).

**Socio-economic impacts** Low: Tourism and marketing strategies can be promoted as part of a comprehensive strategy (e.g. use of litter, "peat bog tourism").

**Sources of financing** Private sponsor, Public: local, Public: regional, Public: national, Public: European

**Legal situation** Wetland restoration measures can be integrated into various countryside management programmes and receive appropriate funding on that basis.

### Further information

**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** Other: <http://www.cipra.org/de/cc.alps/wettbewerb/moorrenaturierung> , <http://www.bfn.eu/allgaeu110.html>

**Contact** Germany: Dr. Christine Margraf, Bund Naturschutz in Bayern e.V. christine.margraf@bund-naturschutz.de

**Good Practice**

[Wetland restoration in the Bavarian Alps: the Allgäuer Moorallianz](#)  
[Renaturation des tourbières : l'exemple de l'Allgäuer Moorallianz](#)  
[Rinaturalizzazione delle torbiere: l'esempio della Allgäuer Moorallianz](#)

**Establishment of resting areas for birds along streams**



The structures associated with flowing waters are often important resting areas. © Mensi/pixelio.de

**Involved sectors**

Water management, Fishery, Spatial planning, Tourism and leisure, Nature protection, Other: Sports Associations

**Affected habitats**

Waterbodies

**Description**

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.

**Impact**

**Impact in particular on** Birds

## **Ecological impact**

**Improvement or preservation of habitats** The creation of a quiet environment on gravel banks during breeding periods improves habitat quality for gravel-breeding species.

**Element of ecological network** Natural flowing water systems and their associated structures are valuable elements of a biotope network and form stepping stone biotopes for some species.

**Time of realisation for measure** Months: Depending on the time of implementation, the quiet zones can soon start to be used as a breeding ground.

**Impact scope** Regional: The breeding areas may be of transregional importance for some species.

## **Implementation**

**Implementation period** Years: 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.)

**Frequency** Non-recurring: For greater effectiveness, this should be a long-term activity adapted to emerging needs.

## **Economic and legal aspects**

**Costs** Medium (10'000-100'000 EUR): Costs are heavily dependent on starting conditions and the scope of the requisite measures.

**Socio-economic impacts** Low: When combined with attractive offers for visitors, tourist value-added can be generated.

**Sources of financing** Public: local, Public: regional, Public: national, Public: European

**Legal situation** Relevant measures can be funded from countryside management programmes.

## **Further information**

**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.

<b>Information</b>	Austria: INTERREG project: <a href="http://www.lsn.tirol.gv.at/de/doc/kiesbrueter.pdf">http://www.lsn.tirol.gv.at/de/doc/kiesbrueter.pdf</a> Danube: <a href="http://www.land-oberoesterreich.gv.at/cps/rde/xchg/ooe/hs.xsl/73053_DEU_HTML.htm">http://www.land-oberoesterreich.gv.at/cps/rde/xchg/ooe/hs.xsl/73053_DEU_HTML.htm</a>
<b>Contact</b>	Austria: e.g. Office of the Government of Upper Austria, Department of Spatial Planning, Economic and Rural Development, Nature Conservation Division

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



The Alpine area is characterised by a fauna rich in bat species. © IRKA

### **Involved sectors**

Nature protection, Transport, Local population/citizens, Other: Church, Building authorities, Architects

### **Affected habitats**

Areas for settlements and transport

## Description

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.

## Impact

**Impact in particular on** Small mammals

## Ecological impact

Improvement or preservation of habitats Many species of bat (including several listed in Annex II of the Habitats Directive) are dependent on old buildings for their roosts.

Element of ecological network 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.

**Time of realisation for measure** Months: With appropriate restoration measures, the roosts may be colonised by the bats within the first year.

**Impact scope** Local (municipality): 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.

## Implementation

**Implementation period** Months: 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.

**Frequency** Non-recurring

## Economic and legal aspects

<b>Costs</b>	Low (1'000-10'000 EUR): Costs depend on starting conditions and the needs of the bat species concerned; compensation payments may be available in some cases.
<b>Socio-economic impacts</b>	Low: Taking account of bats during the restoration of buildings may incur additional costs.
<b>Sources of financing</b>	Private sponsor, Public: local, Public: regional, Public: European
<b>Legal situation</b>	Restoration of bat roosts often requires permission under nature conservation legislation.

## Further information

<b>Evaluation</b>	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.
<b>Information</b>	Other: Guidelines: <a href="http://www.lsn.tirol.gv.at/de/doc/leitfad_fledermaus.pdf">http://www.lsn.tirol.gv.at/de/doc/leitfad_fledermaus.pdf</a> ; Interreg Project: <a href="http://www.lsn.tirol.gv.at/en/index.htm">http://www.lsn.tirol.gv.at/en/index.htm</a> (en)
<b>Contact</b>	Other: 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
<b>Good Practice</b>	<a href="#">Habitat connectivity for bats in the Alpine region</a> <a href="#">Mise en réseau des habitats de chauves-souris dans l'espace alpin</a> <a href="#">Messa in rete degli habitat dei pipistrelli nell'arco alpino</a>



## Specific species conservation measures: wood grouse (capercaillie)



The wood grouse is a characteristic species of light, structurally rich boreal and montane forest habitats. © Eidgenössische Forschungsanstalt WSL

### Involved sectors

Forestry, Hunting, Tourism and leisure, Nature protection

### Affected habitats

Forest, Grassland

### Description

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.

### Impact

#### Impact in particular on

Birds

#### Ecological impact

Reduction of fragmentation or creation of new valuable habitats

Reduction of fragmentation effect of normal commercial forest stands.

Improvement or preservation of habitats

All measures primarily aim to improve the habitat for grouse and thus address the primary threat to the species.

<b>Element of ecological network</b>	Structures which characterise wood grouse (capercaillie) habitat are suitable as connective structures for other species as well.
<b>Other</b>	Various potential fields of conflict are addressed in relation to the wood grouse (capercaillie) (tourism/recreation, commercial forestry).
<b>Time of realisation for measure</b>	Years: Management measures for wood grouse populations entail long-term commitment and permanent changes to usage and procedures.
<b>Impact scope</b>	Local (municipality): With wood grouse in particular, measures always have regional as well as local significance.
<b>Implementation</b>	
<b>Implementation period</b>	Days: Individual management measures do not take up much time, but a regular and comprehensive approach is required to achieve the desired impacts.
<b>Frequency</b>	Recurring: Most of the relevant measures require regular implementation.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Low (1'000-10'000 EUR): Varies widely according to the measures undertaken; no general estimate possible.
<b>Socio-economic impacts</b>	Low: Measures which benefit the wood grouse will also have a positive impact on other species in montane forests.
<b>Sources of financing</b>	Other private sources, Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	Wood grouse is protected by a raft of legislation (Natura 2000).
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Other: e.g. Capercaillie Action Plan, Federal Office for the Environment (FOEN), Switzerland. Detailed information about the wood grouse (capercaillie): <a href="http://www.waldwissen.net/">http://www.waldwissen.net/</a>

## Contact

Other: 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 Ornithological Institute

## Specific species conservation measures: beaver



Lots of animals establish living spaces in unique waterbodies that were shaped by beavers.  
© Marion Heidemann-Grimm/pixelio.de

### Involved sectors

Agriculture, Forestry, Water management, Hunting, Nature protection, Transport, Other: Energy

### Affected habitats

Waterbodies

### Description

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.

## Impact

### Ecological impact

**Improvement preservation habitats** Many other species of fauna have developed in a water landscape or which the beaver has done much to create. It is therefore described as of 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 ecological network** 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.

**Time of realisation for measure** Long term: The restructuring of watercourses by beaver is a long-term process.

**Impact scope** Regional: Measures to promote beaver, but also the problems caused by them, must be addressed at both local and regional level.

### Implementation

**Implementation period** Long term: In areas where beaver occurs, conflicts will always arise. Coexistence with beaver must be re-learned for the long term.

**Frequency** Recurring: Long-term implementation of a series of measures, area management is essential.

### Economic and legal aspects

**Costs** Low (1'000-10'000 EUR): Varies according to the measures adopted. Farmers receive payment for ecological services in areas with beaver.

**Socio-economic impacts** Low: The beaver provides various "ecological" services, including flood protection.

**Sources of financing** Public: local, Public: regional, Public: national, Public: European

**Legal situation** In some federal states, the beaver is covered by hunting legislation.

### Further information

<b>Evaluation</b>	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.
<b>Information</b>	Switzerland: e.g. Biberfachstelle (Beaver Advice Centre), Neuchatel, Switzerland
<b>Contact</b>	Switzerland: Contact person at Beaver Advice Centre: Christof Angst

## Preparation of Natura 2000 management plans



Natura 2000 is an EU-wide network of protected areas intended to preserve the endangered habitats and species in the EU. © Dieter Schütz/ pixelio.de

### Involved sectors

Agriculture, Forestry, Water management, Hunting, Tourism and leisure, Nature protection

### Affected habitats

Forest, Shrubs and wooded areas, Bogs and fens, wetlands, Alpine habitats, Grassland, Arable land, Areas for settlements and transport, Waterbodies

## Description

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).

## Impact

### Impact in particular on

Small mammals, Big mammals, Reptiles, Amphibians, Birds, Insects, Fish

### Ecological impact

Improvement or preservation of habitats

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 ecological network

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).

### Time of realisation for measure

Years: 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.

### Impact scope

Regional: 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.

## Implementation

### Implementation period

Long term: 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.

<b>Frequency</b>	Recurring: Implementation of management plans is a long-term activity.
<b>Economic and legal aspects</b>	
<b>Costs</b>	High (100'000-1 Mio EUR): Depending on the species and habitats in the area concerned, about €150-190 per km <sup>2</sup> .
<b>Socio-economic impacts</b>	No direct impact: 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.
<b>Sources of financing</b>	Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	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).
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Other: EU information: <a href="http://ec.europa.eu/environment/nature/legislation/-habitatsdirective/index_en.htm">http://ec.europa.eu/environment/nature/legislation/-habitatsdirective/index_en.htm</a>
<b>Contact</b>	Other: Further information may be obtained from the national authorities concerned.

## Reporting duties and general monitoring in the Natura 2000 framework



The Flora-Fauna-Habitat Directive protects the otter in the context of Natura 2000 areas.  
© Templermeister/ pixelio.de

### Involved sectors

Agriculture, Forestry, Water management, Hunting, Tourism and leisure, Nature protection

### Affected habitats

Forest, Shrubs and wooded areas, Bogs and fens, wetlands, Alpine habitats, Grassland, Arable land, Areas for settlements and transport, Waterbodies

### Description

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.

### Impact

**Impact in particular on** Small mammals, Big mammals, Reptiles, Amphibians, Birds, Insects, Fish



## Ecological impact

**Improvement or preservation of habitats** 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 ecological network** 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).

**Time of realisation for measure** Long term: 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.

**Impact scope** Regional: 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.

## Implementation

**Implementation period** Long term: As part of Natura 2000, measures to improve the connectivity situation (conservation status of species) are planned and monitored over the long term.

**Frequency** Recurring: Ideally, mowing should be managed over a number of years.

## Economic and legal aspects

**Costs** High (100'000-1 Mio EUR): Very variable as they are heavily dependent on the data already available, the reported species and habitats, the conservation status etc.

**Socio-economic impacts** No direct impact: 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.

**Sources of financing** Public: local, Public: regional, Public: national, Public: European

**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.

## Further information

<b>Evaluation</b>	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.
<b>Information</b>	Other: EU information: <a href="http://ec.europa.eu/environment/nature/-legislation/habitatsdirective/index_en.htm">http://ec.europa.eu/environment/nature/-legislation/habitatsdirective/index_en.htm</a>
<b>Contact</b>	Other: Further information may be obtained from the national authorities concerned.

## Agriculture

### Land set aside



Areas of wild herbs on agricultural fields provide important areas for resting, breeding, feeding, mating or cover. © Kerstin Ziebandt/ pixelio.de

### Involved sectors

Agriculture, Nature protection

### Affected habitats

Bogs and fens, wetlands, Grassland, Arable land

## Description

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 landscape; the fields are sown with native field species and wild herbs and are not fertilised or treated with pesticides).

## Impact

**Impact in particular on** Small mammals, Big mammals, Birds, Insects

### Ecological impact

Improvement or preservation of habitats 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 ecological network 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.

**Time of realisation for measure** Months: Areas enhanced in this way provide year-round habitats.

**Impact scope** Local (municipality): 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).

## Implementation

**Implementation period** Weeks: 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.

**Frequency** Non-recurring, Recurring: The set aside land can change annually, but should be part of an overall set aside concept.

## Economic and legal aspects

<b>Costs</b>	Very low (less than 1'000 EUR): Set-aside may be subsidised by up to €200/ha p.a.
<b>Socio-economic impacts</b>	Low: Subsidies can provide a basic income for farmers. Set-aside also enhances the appearance of the landscape and safeguards pollination of crops.
<b>Sources of financing</b>	Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	Relevant measures are subsidised through various countryside management and cultural landscape programmes.

## Further information

<b>Evaluation</b>	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.
<b>Information</b>	Switzerland: <a href="http://www.landwirtschaft.ch/de/wissen/oekologie/">http://www.landwirtschaft.ch/de/wissen/oekologie/</a> Further information is available from the relevant authorities.

## Extensive use of grasslands



Extensively used grassland is often species-rich. © Markus Jenny

### Involved sectors

Agriculture, Hunting, Nature protection

### Affected habitats

Grassland

### Description

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.

### Impact

**Impact in particular on** Small mammals, Big mammals, Reptiles, Amphibians, Birds, Insects

### Ecological impact

Reduction of fragmentation or creation of new valuable habitats Extensivisation increases the permeability of the landscape matrix and thus mitigates possible barrier effects of farmland.

Improvement or preservation of habitats 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 ecological network	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.
<b>Time of realisation for measure</b>	Months: Species-rich grassland provides valuable refuge areas, including in winter. The impact is especially high during the vegetation period.
<b>Impact scope</b>	Local (municipality): Local planning of a network of extensively used areas and scattered species-rich meadows increases the impact of individual sites.
<b>Implementation</b>	
<b>Implementation period</b>	Weeks: 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.
<b>Frequency</b>	Recurring
<b>Economic and legal aspects</b>	
<b>Costs</b>	Very low (less than 1'000 EUR): 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.
<b>Socio-economic impacts</b>	Low: Enrichment of landscape appearance and therefore increased recreational value; ensures pollination of agricultural crops.
<b>Sources of financing</b>	Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	Extensive grassland use is an element of cultural landscape/countryside management programmes and contractual nature conservation. Subsidies are therefore provided for specific extensivisation schemes.
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Other: All relevant nature conservation and agricultural authorities.

## Species rich seeding on agricultural fields



Species rich seedings enrich the landscape's appearance. © qay/ pixelio.de

### Involved sectors

Agriculture, Hunting, Nature protection, Other: Beekeepers, Countryside management associations

### Affected habitats

Arable land

### Description

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.

### Impact

#### Impact in particular on

Small mammals, Big mammals, Birds, Insects

#### Ecological impact

Improvement or preservation of habitats

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 ecological network** 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.

**Time of realisation measure** Months: Some months elapse between the adoption of the preparatory measures and the appearance of the full impact during the vegetation period.

**Impact scope** Local (municipality): If integrated into a broader strategy (local planning) which includes field margins, for example, a heightened impact can be achieved.

### Implementation

**Implementation period** Weeks: Seeding does not involve a great deal of work, and generally, no management is required afterwards.

**Frequency** Non-recurring, Recurring: Preferable long-term programmes, but implementation of a single measure can be effective.

### Economic and legal aspects

**Costs** Very low (less than 1'000 EUR): Costs are likely to amount to approx. €150/ha p.a. over a 5-year period.

**Socio-economic impacts** Medium: 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.

**Sources of financing** Public: local, Public: regional, Public: national, Public: European

**Legal situation** Species-rich seeding can form part of countryside management/cultural landscape programmes.

### Further information

**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** Germany: [http://www.lwg.bayern.de/landespflege/-landschaftspflege/25786/ansaat\\_pilotpro.pdf](http://www.lwg.bayern.de/landespflege/-landschaftspflege/25786/ansaat_pilotpro.pdf), [http://www.lebensraum-brache.de/Projekte/Lebensraum\\_Brache/index.php/](http://www.lebensraum-brache.de/Projekte/Lebensraum_Brache/index.php/)



<b>Contact</b>	Germany: Bavarian State Institute for Viticulture and Horticulture (LWG), Countryside Management Department, contact: Martin Degenbeck
<b>Good Practice</b>	Species rich seeding on agricultural fields, Würzburg district, Germany <a href="#">Exemple du district de Würzburg, Allemagne</a> <a href="#">Esempio della regione di Würzburg, Germania</a>

## Promotion of organic farming



Landscape elements enhance biological diversity. © Jan Freese/ pixelio.de

### Involved sectors

Agriculture

### Affected habitats

Grassland, Arable land

### Description

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.

## Impact

**Impact in particular on** Small mammals, Reptiles, Amphibians, Birds, Insects

## Ecological impact

Improvement or preservation of habitats Extensively managed spaces are important habitats for a wide range of species and act as buffer zones in an intensively farmed landscape.

Element of ecological network Extensive areas 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 Positive impact on soils and the hydrological regime.

**Time of realisation for measure** Years: 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.

**Impact scope** Local (municipality): 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.

## Implementation

**Implementation period** Years: 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.

**Frequency** Recurring

## Economic and legal aspects

**Costs** Medium (10'000-100'000 EUR): Conversion is extremely cost-intensive (additional equipment, more space, etc.). Exact costs are highly dependent on operating structures.

**Socio-economic impacts** Medium: From a long-term perspective, positive effects through financial support and greater security of sales. Good marketing strategies are key.

**Sources of financing** Public: local, Public: regional, Public: national, Public: European

**Legal situation** Organic farming and conversion can be subsidised from countryside management/cultural landscape programmes (generally approx. € 200-500/ha p.a.).

**Further information**

**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** Germany: Organic farming in Rhön: Innovative example of how to ensure sales: <http://www.bionade.de/de/partner-projekte/umwelt/biosphaererhoen/>

## Extensive agriculture



Patches of flowering plants can make a contribution to the extensivisation of use in the farmland biotope. © Hermann/ pixelio.de

### Involved sectors

Agriculture, Nature protection

### Affected habitats

Arable land

### Description

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.

### Impact

#### Impact in particular on

Small mammals, Birds, Insects

#### Ecological impact

Reduction of fragmentation or creation of new valuable habitats

Extensivisation increases the permeability of the landscape matrix and thus decreases the possible barrier effects of farmland.

Improvement or preservation of habitats	Measures for the extensivisation of agriculture improve habitat quality (species richness) and create buffer zones to areas of intensive use.
Element of ecological network	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.
<b>Time of realisation for measure</b>	Months: The impact of relevant measures starts soon after implementation.
<b>Impact scope</b>	Local (municipality): Local planning of a network of extensively used areas (including grassland) increases the impact of individual extensive areas.
<b>Implementation</b>	
<b>Implementation period</b>	Weeks: Extensive management practices can be well-integrated into land-use management. The aim should be to establish long-term strategies (at least 5 years).
<b>Frequency</b>	Recurring
<b>Economic and legal aspects</b>	
<b>Costs</b>	Very low (less than 1'000 EUR): Depending on the measure, subsidies of €50-1000/ha may be available.
<b>Socio-economic impacts</b>	Low: Extensivisation of agriculture also enriches landscape appearance and hence its recreational value.
<b>Sources of financing</b>	Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	Extensivisation measures form part of cultural landscape/countryside management programmes and contractual nature conservation programmes, with appropriate subsidies for specific extensivisation measures.
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Other: All relevant nature conservation and agricultural authorities.

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



On fertilized areas biological diversity is often missing. © Thomas Max Müller/ pixelio.de

### Involved sectors

Forestry, Water management, Nature protection

### Affected habitats

Grassland, Arable land

### Description

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.

### Impact

**Impact in particular on** Insects

### Ecological impact

Reduction of fragmentation or creation of new valuable habitats 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.

Improvement or preservation of habitats Non-use, or at least reduced use, of fertilisers, herbicides and pesticides preserves species diversity and enhances agricultural areas in ecological terms.

Element of ecological network 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).

**Time of realisation for measure** Immediate: The impact of non-use or reduction occurs immediately; the impacts on water and soil are more long-term in nature.

**Impact scope** Very localised (plot): The impacts can be felt on the area concerned and in the locality (biodiversity).

### **Implementation**

**Implementation period** Days: Generally entails a reduced workload.

**Frequency** Recurring

### **Economic and legal aspects**

**Costs** Very low (less than 1'000 EUR): Cost savings result from reduced use; possibility of subsidies.

**Socio-economic impacts** High: Positive impacts on water, soils, health. Farmers may experience reduced yields.

**Sources of financing** Other private sources, Public: local, Public: regional, Public: national, Public: European

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

### **Further information**

**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** Switzerland: Agricultural and nature conservation authorities, e.g. in Switzerland: <http://www.bafu.admin.ch/>

## Species-Rich Grassland Programme



A list of meadow flowers enables to identify extensive species-rich grassland.  
© Rainer Sturm/ pixelio.de

### Involved sectors

Agriculture, Tourism and leisure

### Affected habitats

Bogs and fens, wetlands, Grassland

### Description

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.

### Impact

**Impact in particular on** Insects

#### Ecological impact

Improvement or preservation of habitats      With appropriate extensive management of meadows, species diversity of fauna as well as flora is increased.

Element of ecological network      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.



**Time of realisation for measure** Months: The positive impact on flora and fauna continues throughout the vegetation period.

**Impact scope** Very localised (plot): 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.

### Implementation

**Implementation period** Days: To achieve the stated goal (species richness), extensivisation of agriculture is generally required, which also reduces workload.

**Frequency** Non-recurring, Recurring: Long-term programmes desirable, but a single implemented measure can be effective.

### Economic and legal aspects

**Costs** Very low (less than 1'000 EUR): 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.

**Socio-economic impacts** High: If tourism professionals are involved, this measure can add value to tourism (local products, flowering landscape, events such as meadow management competitions).

**Sources of financing** Public: regional, Public: national, Public: European

**Legal situation** Voluntary participation by farmers in the measure.

### Further information

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

**Contact** France: Parc naturel régional du Massif des Bauges; contact: Philippe Mestelan

## Good Practice

[Project in the Regional Natural Park \(PNR\) of the Massif des Bauges, France](#)  
[Exemple du Parc naturel régional « Massif des Bauges », France](#)  
[Misura nel Parco naturale regionale “Massif des Bauges”, Francia](#)

## Agricultural field margin projects



Agricultural field margin with wild herbs. © Jan Freese/ pixelio.de

### Involved sectors

Agriculture, Tourism and leisure, Nature protection

### Affected habitats

Arable land

### Description

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.

## Impact

### Impact in particular on

Small mammals, Reptiles, Amphibians, Birds, Insects

### Ecological impact

Improvement or preservation of habitats

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 ecological network

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.

### Time of realisation for measure

Months: 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.

### Impact scope

Very localised (plot): 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.

## Implementation

### Implementation period

Days: 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.

### Frequency

Non-recurring, Recurring: Long-term programmes are desirable, but an individual measure can be effective as well.

## Economic and legal aspects

### Costs

Very low (less than 1'000 EUR): The subsidy rates are established regionally. They mainly cover the loss of revenue resulting from set-aside and possible costs of seeding.

### Socio-economic impacts

Medium: With their net-like structure in cleared agricultural landscapes, they create an appealing and diverse landscape appearance with increased recreational value.

### Sources of financing

Public: local, Public: regional, Public: national, Public: European

<b>Legal situation</b>	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.
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Germany: Further information can be obtained from regional agencies (nature conservation and agriculture), e.g. in Baden-Württemberg (Germany).

## Preservation, maintenance and replanting of hedges



Hedges are linear connecting elements of the biotope network © Yann Kohler

### Involved sectors

Agriculture, Water management, Hunting, Spatial planning, Tourism and leisure, Nature protection

### Affected habitats

Bogs and fens, wetlands, Grassland, Arable land

## Description

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.

## Impact

### Impact in particular on

Small mammals, Reptiles, Amphibians, Birds, Insects

### Ecological impact

Reduction of fragmentation or creation of new valuable habitats

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.

Improvement or preservation of habitats

Hedges are very important habitats for numerous birds, insects, amphibians, spiders and also some species of mammals.

Element of ecological network

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.

### Time of realisation for measure

Months: 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.

### Impact scope

Very localised (plot): The direct impact of hedges is very localised, however they can also gain regional importance when integrated in a biotope system.

## Implementation

### Implementation period

Days: 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.

### Frequency

Recurring: Hedges must be maintained or cut back over the years.

## Economic and legal aspects

### Costs

Low (1'000-10'000 EUR): Costs vary greatly depending on the different maintenance and planting or construction techniques.

### Socio-economic impacts

Medium: 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.

### Sources of financing

Private sponsor, Other private sources, Public: local, Public: regional, Public: national, Public: European

### Legal situation

In many regions the preservation, maintenance and replanting of hedges are supported by nature conservation or agricultural subsidies.

## Further information

### 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.

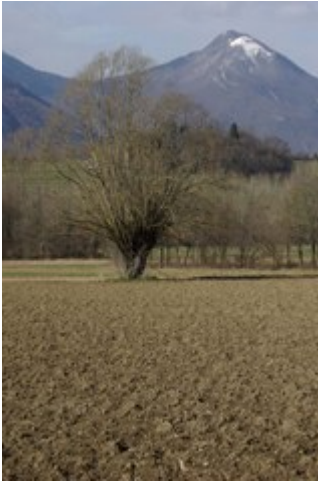
### Information

Other: Nature conservation societies, nature conservation departments in authorities, numerous regional biotope network projects (e.g. the Grand Marais (Grosses Moos) biotope network: <http://www.biotopverbund.ch/>)

### Contact

Other: "Grosses Moos" project leader: Martin Johner Head of Scientific Department, Ecrins National Park: Richard Bone

## Planting of individual trees or tree groups



In agricultural landscapes, individual trees or tree groups act as stepping stones.  
© Yann Kohler

### Involved sectors

Agriculture, Spatial planning, Nature protection, Transport

### Affected habitats

Grassland, Arable land

### Description

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.

### Impact

**Impact in particular on** Small mammals, Birds, Insects

### Ecological impact

Improvement or preservation of habitats      Individual trees enhance the surrounding landscape and provide an important habitat for numerous species of fauna.

<b>Element of ecological network</b>	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.
<b>Other</b>	Beneficial to local climate.
<b>Time of realisation for measure</b>	Years: Newly planted trees develop their function in the biotope network with increasing age.
<b>Impact scope</b>	Local (municipality): Individual trees play an important role as stepping stones in the local biotope network.
<b>Implementation</b>	
<b>Implementation period</b>	Weeks: Prior to planting, meticulous planning is required; maintenance is essential after planting.
<b>Frequency</b>	Non-recurring: In addition, regular maintenance of the trees is needed.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Very low (less than 1'000 EUR): 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.
<b>Socio-economic impacts</b>	Low: Individual trees and groups of trees are valuable landscape-enriching elements and sources of food (fruit, blossom for tea) and of timber and fuelwood.
<b>Sources of financing</b>	Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	In most regions, particularly large and ancient individual trees are often designated "natural monuments" or "protected landscape elements".
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Germany: More information can be obtained from the responsible nature conservation agencies and at: <a href="http://www.landwirtschaft-mlr.baden-wuerttemberg.de/servlet/PB/menu/1109685/index.html/">http://www.landwirtschaft-mlr.baden-wuerttemberg.de/servlet/PB/menu/1109685/index.html/</a>



## Creation and maintenance of dry stone walls



Walls made from rock fragments are important structural elements of the landscape.  
© Yann Kohler

### Involved sectors

Agriculture, Spatial planning, Nature protection, Local population/citizens

### Affected habitats

Shrubs and wooded areas, Bogs and fens, wetlands, Grassland, Arable land

### Description

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.

### Impact

**Impact in particular on** Small mammals, Reptiles, Amphibians, Birds, Insects

### Ecological impact

Improvement or preservation of habitats

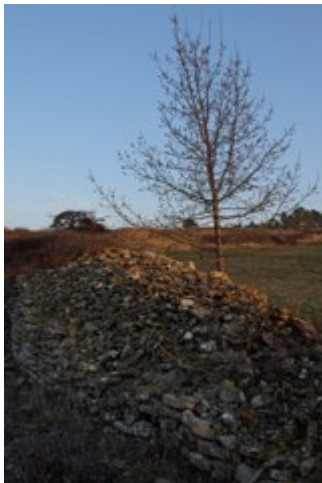
Promotion of typical plant species such as algae, lichens and mosses, moths and snails. Quiet areas and winter quarters for invertebrates and reptiles. Some species of wild bee (mason bee - *Chalicodoma siculum*) nest in the cracks in the walls.

Element of ecological network

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.

<b>Time of realisation for measure</b>	Immediate: Dry stone walls can be populated immediately after construction.
<b>Impact scope</b>	Local (municipality): Due to their impact as a stepping stone biotope, dry stone walls also play a role in regional biotope networks.
<b>Implementation</b>	
<b>Implementation period</b>	Weeks: 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.
<b>Frequency</b>	Non-recurring: Regular maintenance of existing or new stone walls is needed.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Low (1'000-10'000 EUR): Depending on the quality of the stones (one tonne per continuous metre), a new construction costs in the region of €310-470 per m <sup>2</sup> (excluding excavation works), time expenditure: 2-4 m/day with experienced workers.
<b>Socio-economic impacts</b>	Low: With appropriate subsidies, the additional costs for building and maintaining dry stone walls will be low.
<b>Sources of financing</b>	Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	Subsidies for dry stone walls are possible through countryside management programmes and also within programmes for steep slopes (e.g. viticulture).
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Other: e.g. BirdLife: <a href="http://www.birdlife.ch/pdf/trockenmauern.pdf">http://www.birdlife.ch/pdf/trockenmauern.pdf</a> or: <a href="http://www.landwirtschaft-mlr.baden-wuerttemberg.de/servlet/PB/menu/1063566/index.html">http://www.landwirtschaft-mlr.baden-wuerttemberg.de/servlet/PB/menu/1063566/index.html</a>
<b>Contact</b>	Switzerland: Schweizer Vogelschutz SVS/BirdLife Schweiz

## Creation, maintenance and preservation of rock fragment piles



Walls made from rock fragments are important structural elements of the landscape. © Yann Kohler

### Involved sectors

Agriculture, Hunting, Nature protection, Local population/citizens

### Affected habitats

Bogs and fens, wetlands, Grassland, Arable land

### Description

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.

### Impact

**Impact in particular on** Small mammals, Reptiles, Amphibians, Birds, Insects

### Ecological impact

Improvement or  
preservation of habitats

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 ecological network	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.
<b>Time of realisation for measure</b>	Immediate: Rock fragment piles can be populated immediately after construction.
<b>Impact scope</b>	Very localised (plot): 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.
<b>Implementation</b>	
<b>Implementation period</b>	Days: 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.
<b>Frequency</b>	Non-recurring: Existing rock fragment piles need regular maintenance.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Very low (less than 1'000 EUR): 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.
<b>Socio-economic impacts</b>	No direct impact
<b>Sources of financing</b>	Other private sources, Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	In many regions, rock fragment piles are protected by law. Their conservation is supported by nature conservation and/or agricultural subsidies.

## Further information

### 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

Other: 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).

## Maintenance and preservation of mixed orchards



Mixed orchards are extremely species-rich habitats which require regular. © Yann Kohler

### Involved sectors

Agriculture, Tourism and leisure, Nature protection, Municipalities

### Affected habitats

Grassland, Arable land

## Description

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.

## Impact

**Impact in particular on** Small mammals, Big mammals, Reptiles, Birds, Insects

## Ecological impact

Improvement or preservation of habitats	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 ecological network	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.
<b>Time of realisation for measure</b>	Long term: 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.
<b>Impact scope</b>	Local (municipality): 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.

## Implementation

<b>Implementation period</b>	Weeks: The requisite expert maintenance of mixed orchards comprises several different and regular tasks throughout the year (mowing, pruning, harvesting, tree management, ...)
<b>Frequency</b>	Recurring: Regular maintenance is needed for valuable stands of trees.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Low (1'000-10'000 EUR): 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.
<b>Socio-economic impacts</b>	Medium: On tourism through the enhancement of the landscape, on the regional economy and identity through local products (labels, old fruit varieties, juice etc.)
<b>Sources of financing</b>	Private sponsor, Other private sources, Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	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).
<b>Further information</b>	
<b>Evaluation</b>	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'.
<b>Information</b>	Germany: 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.
<b>Contact</b>	Germany: Expert: Stefan Kilian, Bavarian State Research Center of Agriculture, Institute for Agricultural Ecology, Organic Farming and Soil Protection (LFL-IAB)

## Encouragement of unpaved paths



Unpaved, greened paths have a greatly reduced barrier effect. © Yann Kohler

### Involved sectors

Agriculture, Forestry, Spatial planning, Tourism and leisure, Nature protection, Transport

### Affected habitats

Forest, Grassland, Arable land

### Description

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.

### Impact

**Impact in particular on** Small mammals, Reptiles, Amphibians, Birds, Insects

### Ecological impact

Reduction of fragmentation or creation of new valuable habitats      Reduction of the barrier effect of paths for insects (e.g. beetles and spiders)



<b>Improvement or preservation of habitats</b>	Unpaved paths are important for some bird species as well as brown hares ( <i>Lepus europaeus</i> ). Wet sites by paths are used by some species, e.g. as spawning areas for the yellow-bellied toad ( <i>Bombina variegata</i> ) or as a source of nesting material.
<b>Element of ecological network</b>	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.
<b>Time of realisation for measure</b>	Months: The new habitats created by the unpaved paths, or the near-natural design of existing pathways, are populated quickly.
<b>Impact scope</b>	Very localised (plot): In principle, the impact is more localised, but the measure can gain regional importance with a large scale approach.
<b>Implementation</b>	
<b>Implementation period</b>	Weeks: The implementation periods of suitable measures depend on the situation at the outset. The measures can be integrated easily into new pathway projects.
<b>Frequency</b>	Non-recurring
<b>Economic and legal aspects</b>	
<b>Costs</b>	Medium (10'000-100'000 EUR): The exact costs depend on the situation at the outset, and subsidies from countryside management programmes are sometimes possible.
<b>Socio-economic impacts</b>	Low: Unpaved paths are also more attractive for recreational use (hiking, mountain biking) and therefore have a high touristic value.
<b>Sources of financing</b>	Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	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).

**Further information**

Some examples show that, after the 'greening' of paths, there are more frequent occurrences 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.

**Evaluation**

**Information**

Austria: Upper Austria: [http://www.land-oberoesterreich.gv.at/cps/rde/xchg/ooe/hs.xsl/70510\\_DEU\\_HTML.htm](http://www.land-oberoesterreich.gv.at/cps/rde/xchg/ooe/hs.xsl/70510_DEU_HTML.htm)

**Contact**

Austria: e.g. Office of the Government of Upper Austria, Department of Spatial Planning, Economic and Rural Development, Nature Conservation Division

## Maintenance and restoration of traditional irrigation systems



Artificial water transportation systems are important landscape elements.

© Zaubervogel/ pixelio.de

### Involved sectors

Agriculture, Water management, Spatial planning, Tourism and leisure, Nature protection

**Affected habitats** Grassland, Arable land

### Description

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 “acquadotti” 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.

**Impact in particular on** Amphibians, Birds, Insects

### Ecological impact

Improvement or preservation of habitats

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 ecological network

Due to their net-like structure, the irrigation systems form linear connecting elements in a biotope network.

<b>Time of realisation for measure</b>	Long term: 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.
<b>Impact scope</b>	Local (municipality): 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.
<b>Implementation</b>	
<b>Implementation period</b>	Months: Maintenance, repair and management measures are long-term activities.
<b>Frequency</b>	Recurring: Requires implementation of long-term measures.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Medium (10'000-100'000 EUR): In South Tyrol, for example, maintenance of the "waale" receives an amount up to a maximum of 70% of recognised projected costs.
<b>Socio-economic impacts</b>	Medium: In the tourism sector, may be marketed successfully as part of a hiking trail concept (e.g. the Waalweg paths in South Tyrol).
<b>Sources of financing</b>	Other private sources, Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	The management and restoration of traditional irrigation systems are funded by agricultural and/or nature conservation programmes in various areas.
<b>Further information</b>	
<b>Evaluation</b>	Experience has been gained in South Tyrol, which has the most extensive system in the Alpine region, Valais, Switzerland, and elsewhere.
<b>Information</b>	Other: Information about contributions to landscape management in South Tyrol: Amt für Natur- und Landschaft (Office of Nature and Landscape) <a href="http://www.provinz.bz.it/natur/index_d.asp/">http://www.provinz.bz.it/natur/index_d.asp/</a> Project: "Kulturlandschaft Zeneggen 2000" (Cultural Landscape Zeneggen 2000) <a href="http://www.zeneggen.ch/">http://www.zeneggen.ch/</a>
<b>Contact</b>	Italy: e.g. Amt für Natur- und Landschaft (Office of Nature and Landscape), South Tyrol

## Grazing projects - landscape conservation with sheep



Traditional pasturing with sheep cultivates areas in a sustainable way. © www.sxc.hu

### Involved sectors

Agriculture, Tourism and leisure, Nature protection, Other: Countryside management, Associations, Districts and other local authorities

### Affected habitats

Bogs and fens, wetlands, Grassland

### Description

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.

### Impact

#### Impact in particular on

Insects

#### Ecological impact

Reduction of fragmentation or creation of new valuable habitats

Tests using plant seeds have shown that the diaspores can be 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.

Improvement or preservation of habitats

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.

<b>Element of ecological network</b>	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.
<b>Time of realisation for measure</b>	Immediate: 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.
<b>Impact scope</b>	Regional: Regional strategies must be produced to enable sufficient grazing land to be provided for the sheep and achieve connectivity effects through migratory grazing.
<b>Implementation</b>	
<b>Implementation period</b>	Months: 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.
<b>Frequency</b>	Recurring: Optimal solution: integrate in a long-term regional grazing concept.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Low (1'000-10'000 EUR): The costs of sheep grazing are around €175-385/ha/year.
<b>Socio-economic impacts</b>	High: The products from sheep farming (wool, meat, dairy products) provide regional value-added. Sheep farming jobs are created.
<b>Sources of financing</b>	Private sponsor, Other private sources, Public: local, Public: regional
<b>Legal situation</b>	Grazing can be supported at local and regional level by means of contract-based nature conservation and maintenance premiums (approx. €160-260/ha/year).
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Germany: e.g. the grazing strategy from the Bavarian Environment Agency in the Lech valley ( <a href="http://www.lfu.bayern.de/">http://www.lfu.bayern.de/</a> )
<b>Contact</b>	Germany: 'Lebensraum Lechtal (the habitat of the Lech valley) project management: <a href="http://www.lebensraum-lechtal.de/">http://www.lebensraum-lechtal.de/</a>

## Maintenance of open areas by controlled burning



Targeted and expert “controlled burning” can help to preserve an open landscape. © Yann Kohler

### Involved sectors

Agriculture, Nature protection, Other: Countryside management associations

### Affected habitats

Grassland

### Description

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.

### Impact

**Impact in particular on** Small mammals, Insects

### Ecological impact

Improvement or preservation of habitats	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.
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<b>Element of ecological network</b>	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.
<b>Time of realisation for measure</b>	Immediate: 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.
<b>Impact scope</b>	Very localised (plot): 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.
<b>Implementation</b>	
<b>Implementation period</b>	Days: 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.
<b>Frequency</b>	Recurring: To ensure this in the long run, burning must be repeated over a number of years and must be part of an overall concept.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Very low (less than 1'000 EUR): The costs of controlled burning amount to approx. ca. € 50-150/ha, so generally, it is up to 50% cheaper than other management options.
<b>Socio-economic impacts</b>	Low: 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.
<b>Sources of financing</b>	Other private sources, Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	Burning must comply with local nature conservation and agricultural legislation.



## Further information

### 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

Germany: Global Fire Monitoring Center (GFMC)  
<http://www.fire.uni-freiburg.de/>

### Contact

Germany: Prof. Dr. Johann G. Goldammer, Head of Fire Ecology Research Group, University of Freiburg

## Tree maintenance and preservation of pollarded trees



A freshly pollarded willow. © Yann Kohler

### Involved sectors

Agriculture, Water management, Nature protection, Local population/citizens

### Affected habitats

Shrubs and wooded areas, Grassland, Arable land

## Description

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.

## Impact

**Impact in particular on** Birds, Insects

## Ecological impact

Improvement or preservation of habitats	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 ecological network	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.
<b>Time of realisation for measure</b>	Immediate: Pollarded trees develop their habitat and stepping stone biotope function with increasing age.
<b>Impact scope</b>	Very localised (plot): As part of a local or regional strategy for the management of the pollarded trees, the biotope networking impact can be substantially increased.

## Implementation

**Implementation period** Days: 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.

**Frequency** Recurring: The characteristic shape of pollarded trees will result from regular pruning every 5-20 years.

## Economic and legal aspects

**Costs** Very low (less than 1'000 EUR): Subsidies can amount to around € 25-30 per tree.

**Socio-economic impacts** Medium: 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.

**Sources of financing** Other private sources, Public: local, Public: regional, Public: national, Public: European

**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.

## Further information

**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** Other: Braun, Konold (1998): Kulturgeschichte und Bedeutung der Kopfweiden in Südwestdeutschland. Beiheft 89, Veröffentlichungen für Naturschutz und Landschaftspflege in Baden-Württemberg. 240 p.

**Contact** Austria: e.g. Pollarded tree project run by Burgenland Society for Nature Conservation: <http://www.naturschutzbund.at/burgenland/>

## Forestry

### Creation of forest reserves



Cross-linked forests are important for a biotope network. © Maja Dumat/ pixelio.de

#### **Involved sectors**

Agriculture, Forestry, Nature protection

#### **Affected habitats**

Forest

## Description

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).

## Impact

**Impact in particular on** Small mammals, Big mammals, Reptiles, Amphibians, Birds, Insects

## Ecological impact

**Improvement or preservation of habitats** 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 ecological network** 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.

**Time of realisation for measure** Years: Depending on the starting conditions in the forest stand, a near-natural state may have to be established first.

**Impact scope** Local (municipality): 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).

## Implementation

**Implementation period** Months: The administrative process associated with designation as a forest reserve usually takes some time.

**Frequency** Non-recurring

## Economic and legal aspects

**Costs** Low (1'000-10'000 EUR): Financial support is usually provided as a basic amount (approx.€ 15/ha) + a flat rate for default on contract (up to € 340/ha).

<b>Socio-economic impacts</b>	Low: Legislation on forests and nature conservation governs the payment of compensation for forest reserves.
<b>Sources of financing</b>	Private sponsor, Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	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.
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Switzerland: e.g. St. Gallen's forest reserve strategy: <a href="http://www.wald.sg.ch/home/forstdienst/forstorganisation-/waldregionen0/waldregion_4_see/waldreservate.html">http://www.wald.sg.ch/home/forstdienst/forstorganisation-/waldregionen0/waldregion_4_see/waldreservate.html</a>

## Calming measures for forests that merit protection



Calming of forested areas improves habitat quality for typical and in some cases rare species of fauna. © Rainer Sturm/ pixelio.de

### Involved sectors

Forestry, Hunting, Spatial planning, Tourism and leisure, Nature protection, Other:

### Affected habitats

Forest

### Description

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.

### Impact

**Impact in particular on** Small mammals, Big mammals, Birds

### Ecological impact

Improvement or preservation of habitats Calming of forested areas improves habitat quality for typical and in some cases rare species of fauna.

<b>Element of ecological network</b>	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).
<b>Time of realisation for measure</b>	Immediate: 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.
<b>Impact scope</b>	Local (municipality): Channelling measures should be planned on a broader spatial basis as otherwise, conflicts will simply be shifted to neighbouring areas.
<b>Implementation</b>	
<b>Implementation period</b>	Months: Strategies for the channelling of visitors require comprehensive planning. Stakeholders must be involved from the outset in order to increase acceptance.
<b>Frequency</b>	Recurring: For higher effectiveness, long-term action adapted to emerging needs is required.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Medium (10'000-100'000 EUR): 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.
<b>Socio-economic impacts</b>	Low: Attractive educational pathways and circular pathways can add value to tourism and also be utilised for environmental education purposes.
<b>Sources of financing</b>	Private sponsor, Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	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.
<b>Further information</b>	
<b>Evaluation</b>	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

Germany: 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>

## Maintenance and management of coppice forests



Coppice forests are particularly species-rich habitats. © Gerhard Elsner

### Involved sectors

Agriculture, Forestry, Nature protection

### Affected habitats

Forest

## Description

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.

## Impact

**Impact in particular on** Small mammals, Reptiles, Amphibians, Birds, Insects

## Ecological impact

**Improvement or preservation of habitats** Coppice forests are important habitats for many rare species of flora and fauna, including Hazel Grouse and especially thermophilous (warmth-loving) species.

**Element of ecological network** Use of coppice stands along linear structures (paths, roads, embankments) can form elements of a biotope network.

**Time of realisation for measure** Years: 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.

**Impact scope** Local (municipality): 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.

## Implementation

**Implementation period** Weeks: Relevant measures can be implemented fairly swiftly.

**Frequency** Recurring: The typical structure is a result of regular use.

## Economic and legal aspects

**Costs** Low (1'000-10'000 EUR): If wood from coppice forests is used for energy purposes, profits outweigh the costs of the relevant measures.

<b>Socio-economic impacts</b>	Low: Coppice forests can be used as renewable energy sources with corresponding economic value-added.
<b>Sources of financing</b>	Private sponsor, Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	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).
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Other: Project examples, e.g. at <a href="http://rohrhardsberg-life.de/artikel/niederwaelder">http://rohrhardsberg-life.de/artikel/niederwaelder</a> or: <a href="http://www.baselland.ch/naturschutz_wald-htm.310132.0.html">http://www.baselland.ch/naturschutz_wald-htm.310132.0.html</a>

### Extraction of timber: conserving stocks and soils



The use of horses causes less damage to stands and regeneration areas.  
© www.agrar.steiermark.at

#### Involved sectors

Forestry

#### Affected habitats

Forest

## Description

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.

## Impact

**Impact in particular on** Small mammals, Birds

## Ecological impact

Improvement or preservation of habitats Negative effects of timber extraction (including noise) are reduced by the deployment of less damaging extraction methods.

Other Less damaging timber extraction methods make a contribution to soil protection and water pollution control.

**Time of realisation for measure** Immediate: Positive effects are noticeable immediately.

**Impact scope** Very localised (plot): The measure has a very localised impact in the direct timber extraction area. A large-scale approach increases the scope of impact accordingly.

## Implementation

**Implementation period** Days: The measure can be integrated easily into timber extraction activities.

**Frequency** Non-recurring

## Economic and legal aspects

**Costs** Low (1'000-10'000 EUR): 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.

**Socio-economic impacts** Low: 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 available.

<b>Sources of financing</b>	Private sponsor, Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	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.
<b>Further information</b>	
<b>Evaluation</b>	Currently, horses are only used infrequently for timber extraction, and the experiences are available from the state forestry administrations concerned.
<b>Information</b>	Other: e.g. from the forestry authorities in question.

## Conservation of ecologically significant trees i.e. trees with holes



Old and dead trees are important habitats. © Hubertus Schwarzentraub

### Involved sectors

Forestry, Nature protection, Local population/citizens

### Affected habitats

Forest

## Description

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.

## Impact

**Impact in particular on** Small mammals, Birds, Insects

## Ecological impact

**Improvement or preservation of habitats** The trees enhance the forest biotope and provide a habitat for flora, fungi and fauna (nesting places, deadwood for insects, etc.).

**Element of ecological network** 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.

**Time of realisation for measure** Immediate: 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.

**Impact scope** Local (municipality): With a sufficient number of trees, appropriately distributed, good local impacts can be achieved.

## Implementation

**Implementation period** Days: 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.

**Frequency** Recurring: Requires regular management or adaptation and careful land management.

## Economic and legal aspects

**Costs** Very low (less than 1'000 EUR): Subsidies can amount to €40-80 per trunk/p.a. depending on species and number of trees.

**Socio-economic impacts** Low: Possible loss of revenue through non-use, but this can be compensated regionally from subsidies.

**Sources of financing** Public: local, Public: regional, Public: national, Public: European

<b>Legal situation</b>	Safety obligations established in law must be complied with during site selection.
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Other: Information is available from: <a href="http://www.waldwissen.net/">http://www.waldwissen.net/</a> and various forestry authorities.

## Conservation and development of old-growth and deadwood islands



Old-growth and deadwood islands are important habitats for numerous animal and plant species. © soquett/ pixelio.de

### Involved sectors

Forestry, Hunting, Nature protection

### Affected habitats

Forest

## Description

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.

## Impact

**Impact in particular on** Small mammals, Birds, Insects

## Ecological impact

**Improvement or preservation of habitats** Old-growth forest and dead trees provide a habitat for a variety of insects and species of bird.

**Element of ecological network** 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 ...).

**Time of realisation for measure** Long term: 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.

**Impact scope** Local (municipality): 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.

## Implementation

**Implementation period** Long term: 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.

**Frequency** Recurring: Requires regular care or adaptation and careful management.

## Economic and legal aspects

**Costs** Very low (less than 1'000 EUR): No costs. In some regions, financial support is provided for the conservation of old-growth and deadwood.



<b>Socio-economic impacts</b>	Low: Income loss due to delayed use or non-use of the affected trees.
<b>Sources of financing</b>	Other private sources, Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	As a rule, these are voluntary measures but may be mandatory in some certified forests.
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Other: A wealth of information is available on the Internet site: <a href="http://www.waldwissen.net/">http://www.waldwissen.net/</a> , which covers a range of forest-related topics.

## Structurally rich forest edges



Structured forest edges have hedges and other structural elements. © B. Stolze/ pixelio.de

### Involved sectors

Agriculture, Forestry, Hunting, Nature protection, Other: Schools

### Affected habitats

Forest

### Description

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.

### Impact

**Impact in particular on** Small mammals, Big mammals, Birds, Insects

### Ecological impact

Improvement or preservation of habitats	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 ecological network	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.

<b>Time of realisation for measure</b>	Years: The desired structure will not develop until 5-10 years after the first targeted management measures to create a structurally rich forest margin.
<b>Impact scope</b>	Local (municipality): Relevant measures may also have an impact beyond the immediate locality.
<b>Implementation</b>	
<b>Implementation period</b>	Weeks: The duration of measures depends on the type and intensity of intervention.
<b>Frequency</b>	Recurring: The typical structure can only be developed through regular maintenance.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Low (1'000-10'000 EUR): 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).
<b>Socio-economic impacts</b>	Low: 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.
<b>Sources of financing</b>	Other private sources, Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	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.
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Switzerland: e.g. Amt für Wald (Forestry Office) Graubünden, Switzerland <a href="http://www.wald.gr.ch/download/waldrand.pdf">http://www.wald.gr.ch/download/waldrand.pdf</a>

## Transport

### Measures for seasonal amphibian migration



Every year millions of amphibians get run over by cars. © Michael Wittstock/pixelio.de

#### Involved sectors

Agriculture, Water management, Tourism and leisure, Nature protection, Transport, Local population/citizens, Municipalities

#### Affected habitats

Areas for settlements and transport

#### Description

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.

#### Impact

**Impact in particular on** Amphibians

#### Ecological impact

Reduction of fragmentation or creation of new valuable habitats	The purpose of the measures is to reduce the fragmentation effects for amphibians during migration and facilitate habitat access.
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Improvement or preservation of habitats	Amphibians prefer suitable habitats for their migrations. Habitat improvement measures should therefore be carried out in parallel.
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<b>Element of ecological network</b>	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.
<b>Time of realisation for measure</b>	Immediate: The actions last for the duration of the spring migrations. They must have immediate impact and mitigate the acute danger.
<b>Impact scope</b>	Very localised (plot): Amphibians do not have very large ranges. The measures are generally carried out at local/municipal level.
<b>Implementation</b>	
<b>Implementation period</b>	Weeks: Speed limits, mobile fences, warning signs etc. are used for several weeks during the peak of the migration (usually 6 weeks).
<b>Frequency</b>	Non-recurring, Recurring: Permanently installed crossings for amphibians plus mobile facilities to be set up and managed during migrations of amphibians.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Very low (less than 1'000 EUR): Vary widely depending on the measure. Work is often carried out by volunteers.
<b>Socio-economic impacts</b>	No direct impact: Possible prevention of traffic accidents. Often, sensitisation of the general public.
<b>Sources of financing</b>	Private sponsor, Other private sources, Public: local, Public: regional
<b>Legal situation</b>	These are voluntary actions which must, however, respect general traffic safety provisions.
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Switzerland: e.g. Swiss Centre for Amphibian and Reptile Conservation (KARCH)
<b>Contact</b>	Other: Various nature conservation organisations.

## Corridors for small animals



While building streets one has to think of amphibians and small animals.

© Conseil Général Isère

### Involved sectors

Forestry, Hunting, Nature protection, Transport, Local population/citizens

### Affected habitats

Areas for settlements and transport

### Description

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.

### Impact

**Impact in particular on** Small mammals, Reptiles, Amphibians, Insects

### Ecological impact

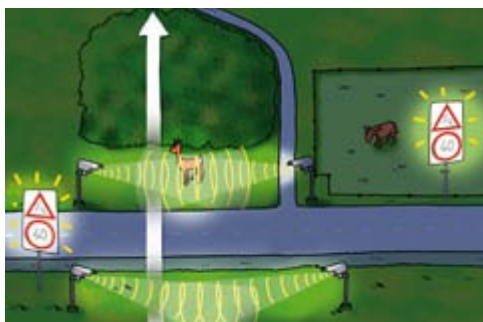
Reduction of fragmentation or creation of new valuable habitats If properly planned and implemented, underpasses for small animals can greatly reduce the fragmentation effects of linear infrastructure systems.

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.

<b>Time of realisation for measure</b>	Immediate: As soon as the system is installed on the affected section of road, guide structures lead the animals to the underpasses.
<b>Impact scope</b>	Local (municipality): As most of the target species have relatively small ranges, the impact is generally fairly localised.
<b>Implementation</b>	
<b>Implementation period</b>	Weeks: Particularly sensitive sections of existing roads are generally well-known. When installing new systems, studies are required. Installation can take place fairly rapidly.
<b>Frequency</b>	Non-recurring: Installation a single activity, but regular care and checks are essential.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Medium (10'000-100'000 EUR): Relatively low costs if installed during road-building; retrofitting is very complex and expensive.
<b>Socio-economic impacts</b>	No direct impact
<b>Sources of financing</b>	Public: local, Public: regional, Public: European
<b>Further information</b>	
<b>Evaluation</b>	Thanks to the conduits and guide structures, the underpasses are generally very effective and are used by a wide variety of animal species.
<b>Information</b>	Other: Nature conservation associations, especially those working with amphibians and involved in the seasonal amphibian migrations.
<b>Contact</b>	Other: e.g. NABU, WWF, Pro Natura.

## Wildlife warning systems to avoid wildlife collisions



Installation of warning systems for the prevention of accidents involving deer at known deer crossing points. © Conseil d'Isère

### Involved sectors

Forestry, Hunting, Spatial planning, Nature protection, Transport

### Affected habitats

Areas for settlements and transport

### Description

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.

### Impact

**Impact in particular on** Big mammals

### Ecological impact

Reduction of fragmentation or creation of new valuable habitats 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.

Other The system aims to change the behaviour of car-drivers, not deer. Drivers are alerted to an acute, rather than a potential, hazard.

**Time of realisation for measure** Immediate: Impact starts as soon as the system comes into operation.

### Impact scope

Very localised (plot): 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.



## Implementation

**Implementation period** Days: The system can be installed quickly once a decision has been taken on where it should be located (in consultation with hunters).

**Frequency** Recurring: Long-term measures, to be adapted as required.

## Economic and legal aspects

**Costs** Medium (10'000-100'000 EUR): 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).

**Socio-economic impacts** Medium: Prevents damage to vehicles, physical injury to individuals and loss of game animals.

**Sources of financing** Other private sources, Public: local, Public: regional, Public: national, Public: European

**Legal situation** Voluntary cooperation among stakeholders.

## Further information

**Evaluation** A pilot project involving Calstrom-type warning systems carried out from 1995-1997 in Switzerland had very positive effects.

**Information** Switzerland: Wildtier Schweiz <http://www.wild.uzh.ch/>

**Contact** Switzerland: Expert: Roman Kistler, Fishing and Hunting Administration of Thurgau Canton (CH) Expert: Paul Marchesi, DROSERA - écologie appliquée SA, Sion (CH)

## Green bridges/ wildlife crossings



Wildlife crossings should be located at known animal crossing points or specific “conflict points” in the transregional transport network. © Sina Hölscher

### Involved sectors

Forestry, Hunting, Spatial planning, Nature protection, Transport, Other: NGO, Districts

### Affected habitats

Areas for settlements and transport

### Description

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.

### Impact

#### Impact in particular on

Small mammals, Big mammals, Reptiles, Amphibians, Insects

#### Ecological impact

Reduction of fragmentation or creation of new valuable habitats

Green bridges are a suitable method of mitigating the fragmentation effects of roads, connecting habitats across roads and safeguarding regional and transregional migration routes.

Improvement or preservation of habitats

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.

<b>Element of ecological network</b>	If integrated into a biotope networking strategy, the crossing aids become important sections of corridors.
<b>Other</b>	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.
<b>Time of realisation for measure</b>	Months: Once built, the bridge can be used immediately. Guide structures leading to it facilitate animals' acceptance.
<b>Impact scope</b>	Local (municipality): Depending on the species and the importance of the crossing point, the impact can range from local to transregional.
<b>Implementation</b>	
<b>Implementation period</b>	Months: Planning and construction of these crossing aids are very costly and time-consuming.
<b>Frequency</b>	Non-recurring: Should be accompanied by monitoring of effectiveness.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Very high (>1 Mio. EUR): Building costs of a green bridge amount to € 1-5 million. Ongoing maintenance costs must also be considered.
<b>Socio-economic impacts</b>	Low: Reduction in number of accidents involving deer (physical damage, loss of game, personal injury ...)
<b>Sources of financing</b>	Other private sources, Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	Legal provisions exist indirectly via the European and national level relating to the spatial linkage of protected areas.
<b>Further information</b>	
<b>Evaluation</b>	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**

Austria: 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**

Austria: A wealth of key information, literature, links and case studies is available from Austrian Federal Environment Agency (<http://www.umweltbundesamt.at/>)

**Use of indigenous seeds and plants**



Meadow from the Swabian mountains, which is cut twice a year. © Dr. Gottfried Briemle, Aulendorf

**Involved sectors**

Agriculture, Water management, Spatial planning, Nature protection, Transport

**Affected habitats**

Areas for settlements and transport

## Description

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).

## Impact

**Impact in particular on** Insects

### Ecological impact

**Improvement or preservation of habitats** 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 ecological network** 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).

**Time of realisation for measure** Months: Some months will elapse from the time of the preparatory measures to the development of the full impact during the vegetation period.

**Impact scope** Local (municipality): The use of indigenous seeds should be promoted transregionally in order to increase the impact of individual measures.

### Implementation

**Implementation period** Days: Can be well-integrated into conventional landscaping measures. In "greening" measures, appropriate seeds must be used.

**Frequency** Recurring: This requires the implementation of a long-term strategy.

### Economic and legal aspects

**Costs** Very low (less than 1'000 EUR): The use of indigenous seeds and plants may result in higher costs in some cases.

<b>Socio-economic impacts</b>	Low: Seed production of indigenous wild species can offer alternative income generation opportunities for farmers in the region (domestic value-added instead of seed imports).
<b>Sources of financing</b>	Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	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.
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Germany: Further information at: <a href="http://www.stmug.bayern.de/umwelt/-naturschutz/autochthon/index.htm">http://www.stmug.bayern.de/umwelt/-naturschutz/autochthon/index.htm</a>

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



When creating green areas during the construction of roads one has to regard the fitting seed assortments. © Rike/ pixelio.de

### Involved sectors

Agriculture, Water management, Spatial planning, Transport

## Affected habitats

Areas for settlements and transport

### Description

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.

### Impact

**Impact in particular on** Small mammals, Birds, Insects

### Ecological impact

Improvement or preservation of habitats Embankments which are designed to be as near-natural as possible and spaces adjacent to infrastructure can provide habitats for rare species.

Element of ecological network 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.

**Time of realisation for measure** Months: Some months elapse from the time the preparatory measures are carried out until the full impact occurs during the vegetation period.

**Impact scope** Local (municipality): 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.

### Implementation

**Implementation period** Days: "Greening" measures do not take much time and can be well-integrated into conventional landscaping schemes.

**Frequency** Recurring: This requires the implementation of a long-term strategy.

### Economic and legal aspects

<b>Costs</b>	Very low (less than 1'000 EUR): 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.
<b>Socio-economic impacts</b>	Low: 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).
<b>Sources of financing</b>	Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	In Upper Austria, framework guidelines have been developed for the performance, ecological supervision and approval of site-appropriate "greening" schemes.
<b>Further information</b>	
<b>Evaluation</b>	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).
<b>Information</b>	Austria: Further information on seed mixtures: <a href="http://www.wildblumensaatgut.at/Resources/Regelwerk.pdf">http://www.wildblumensaatgut.at/Resources/Regelwerk.pdf</a> , <a href="http://www.saatbau.at/deutsch/saatgut/renatura/produktvorstellung/begrueungsmischungen.html">http://www.saatbau.at/deutsch/saatgut/renatura/produktvorstellung/begrueungsmischungen.html</a>
<b>Contact</b>	Austria: Working Group on Site-Appropriate Greening: Head - Dr. Bernhard Krautzer



## Roadverge management to encourage species diversity



Green strips along roadsides. © Rainer Sturm / pixelio.de

### Involved sectors

Nature protection, Transport

### Affected habitats

Areas for settlements and transport

### Description

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.

### Impact

#### Impact in particular on

Insects

### Ecological impact

Reduction of fragmentation or creation of new valuable habitats

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.

Improvement or preservation of habitats

Delaying mowing gives plants the opportunity to bloom and form fruits and seeds and thus provide habitats for more fauna, especially insects.

Element of ecological network

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.

<b>Time of realisation for measure</b>	Months: The impact develops mainly during the vegetation period.
<b>Impact scope</b>	Very localised (plot): The measure mainly benefits insects and plants and so its impact is mainly local.
<b>Implementation</b>	
<b>Implementation period</b>	Months: 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.
<b>Frequency</b>	Recurring: Ideally, mowing should be managed over a number of years.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Low (1'000-10'000 EUR): No additional costs arise as a result of the measure compared with conventional mowing management.
<b>Socio-economic impacts</b>	Medium: Better planning of working time and use of resources and a reduced workload can all help to cut costs.
<b>Sources of financing</b>	Public: local, Public: regional, Public: national
<b>Legal situation</b>	Traffic safety prescribed by law must be adhered to.
<b>Further information</b>	
<b>Evaluation</b>	<p>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.</p>
<b>Information</b>	<p>Other: Information on "managed mowing", together with checklists and examples, are available on the GENTIANA website: <a href="http://www.gentiana.org/">http://www.gentiana.org/</a></p>
<b>Contact</b>	<p>Other: Contact person for these projects at Gentiana: Pierre Salen</p>
<b>Good Practice</b>	<p><a href="#">Managed mowing of roadside verges, Isère, France</a> <a href="#">Gestion raisonnable du fauchage des bords des routes</a> <a href="#">Gestione ottimizzata degli sfalci ai margini delle carreggiate</a></p>

## Water resources management

### Revitalisation of flowing waters



Flowing water systems form important corridors for the migration and dispersion of flora and fauna. © Olga Meier-Sander/ pixelio.de

#### Involved sectors

Water management, Fishery, Spatial planning, Tourism and leisure, Nature protection

#### Affected habitats

Waterbodies

#### Description

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.

#### Impact

**Impact in particular on** Reptiles, Amphibians, Birds, Fish

#### Ecological impact

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.

<b>Time of realisation for measure</b>	Years: 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.
<b>Impact scope</b>	Regional: The flowing waters contained in the catchment area, adjacent biotopes and the entire flood plain must be included.
<b>Implementation</b>	
<b>Implementation period</b>	Long term: Dependent on the type and scope of the measures and the state of the section of the watercourse at the outset.
<b>Frequency</b>	Non-recurring: Should be accompanied by monitoring of effectiveness.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Very high (>1 Mio. EUR): 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.
<b>Socio-economic impacts</b>	Medium: Revitalisation measures, by means of effective flood protection, can have positive economic effects despite the high costs.
<b>Sources of financing</b>	Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	River restoration and revitalisation measures are part of landscape planning, but can, on a smaller scale, also be carried out by voluntary nature conservation.
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Other: 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.
<b>Contact</b>	Other: <a href="http://www.tiroler-lech.at">http://www.tiroler-lech.at</a> , <a href="http://www.life-drau.at">http://www.life-drau.at</a> , <a href="http://www.sanierung-salzach.info">http://www.sanierung-salzach.info</a> , <a href="http://www.swiss-experiment.ch/images/6/6f/RECORD_Beschreibung_deutsch.pdf">http://www.swiss-experiment.ch/images/6/6f/RECORD_Beschreibung_deutsch.pdf</a> , <a href="http://www.donauauen.at">http://www.donauauen.at</a>

## Good Practice

[LIFE Project: Wild River Landscape of the Tyrolean Lech, Austria](#)  
[Projet LIFE – Paysage de rivière torrentielle du Lech, Tyrol, Autriche](#)  
[Progetto LIFE Paesaggio torrentizio Tirolo Lech, Austria](#)

## Management and maintenance of flowing waters



An individual management plan should be produced for each body of water. © Carolin Begle/ CIPRA International

### Involved sectors

Agriculture, Water management, Fishery, Nature protection

### Affected habitats

Waterbodies

### Description

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.

## Impact

### Impact in particular on

Reptiles, Amphibians, Birds, Fish

### Ecological impact

Reduction of fragmentation or creation of new valuable habitats

Richly structured near-natural flowing waters are important landscape elements with a high connectivity potential.

Improvement or preservation of habitats

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 ecological network

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.

### Time of realisation for measure

Immediate: The impact either becomes apparent immediately or only appears after a few years, depending on the measure.

### Impact scope

Regional: Watercourse management measures are carried out locally but can be of importance at regional level.

## Implementation

### Implementation period

Days: 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.

### Frequency

Recurring: Should be regular.

## Economic and legal aspects

### Costs

Low (1'000-10'000 EUR): 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.

### Socio-economic impacts

Medium: Flood protection measures can have positive economic effects.

<b>Sources of financing</b>	Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	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.
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Other: From the relevant water management authorities and voluntary nature conservation organisations.
<b>Contact</b>	Switzerland: e.g. <a href="http://wasser.umweltschutz.ch/download/merkblatt_g3.pdf">http://wasser.umweltschutz.ch/download/merkblatt_g3.pdf</a> or <a href="http://wasser.umweltschutz.ch/download/leitfaden_aktionstag_03.pdf">http://wasser.umweltschutz.ch/download/leitfaden_aktionstag_03.pdf</a>

## Establishment of riverside margins with site-specific/typical riparian vegetation



Riparian strips, at least 3-5 m wide, along flowing waters act as buffers and form linear connecting elements © Yann Kohler

### Involved sectors

Agriculture, Fishery, Spatial planning, Nature protection

### Affected habitats

Waterbodies

### Description

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.

### Impact

**Impact in particular on** Small mammals, Reptiles, Amphibians, Birds, Insects

### Ecological impact

Reduction of

fragmentation or

creation of new valuable habitats

Richly structured near-natural flowing waters are important landscape elements with a high connectivity potential.

Improvement or

preservation of habitats

The habitat quality for various species of flora and fauna is improved and diverse structures are created along the watercourse.



<b>Element of ecological network</b>	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.
<b>Other</b>	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.
<b>Time of realisation for measure</b>	Months: Riparian strips created in a near-natural way develop their positive impacts after a few months (first vegetation period).
<b>Impact scope</b>	Very localised (plot), Local (municipality): 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.
<b>Implementation</b>	
<b>Implementation period</b>	Weeks, Months: 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.
<b>Frequency</b>	Recurring: While planting is a single operation, it has to be followed by regular maintenance.
<b>Economic and legal aspects</b>	
<b>Costs</b>	High (100'000-1 Mio EUR): 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.
<b>Socio-economic impacts</b>	No direct impact: Expenditure can be reduced through the development of watercourses through their own dynamics. The appearance of the landscape is enhanced.
<b>Sources of financing</b>	Public: local, Public: regional, Public: national, Public: European
<b>Funding opportunities</b>	Austria: Information will be available soon.
<b>Legal situation</b>	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).
<b>Further information</b>	

**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**

Other: 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.

**Maintenance of alluvial forests**



Riparian forests are the natural type of vegetation along streams and rivers. © Ich-und-Du/pixelio.de

**Involved sectors**

Agriculture, Forestry, Water management, Nature protection

**Affected habitats**

Forest, Waterbodies

## Description

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).

## Impact

**Impact in particular on** Small mammals, Reptiles, Amphibians, Birds

## Ecological impact

**Improvement or preservation of habitats** 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 ecological network** 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.

**Time of realisation for measure** Months: 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.

**Impact scope** Local (municipality): 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).

## Implementation

**Implementation period** Months: 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.

<b>Frequency</b>	Non-recurring: Regular support measures to help create a typical structure, in accordance with the local situation.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Low (1'000-10'000 EUR): Costs vary greatly depending on the measure. In most cases, conservation does not require comprehensive maintenance measures; renunciations of use can incur costs.
<b>Socio-economic impacts</b>	Low: Subsidies for the protection of the aquatic environment and for flood protection (e.g. cultural landscape programme) are possible.
<b>Sources of financing</b>	Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	Conflicts of objectives regarding other functions may occur. Riparian forests in Europe have a special protected status, inter alia, through the Habitats Directive.
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Other: From the relevant nature conservation authorities and organisations. Further information also available under: <a href="http://www.waldwissen.net">www.waldwissen.net</a>

## Creation of fish passes and other fish migration aids



Numerous versions of fish migration aids exist. In the picture: fish pass. © Umweltbundesamt

### Involved sectors

Water management, Fishery, Nature protection, Other: Energy

### Affected habitats

Waterbodies

### Description

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.

### Impact

**Impact in particular on** Insects, Fish

### Ecological impact

Reduction of fragmentation or creation of new valuable habitats	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.
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Element of ecological network	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.
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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.
<b>Time of realisation for measure</b>	Immediate: The migration aids can be used by fish and other living organisms in flowing waters as soon as they have been installed.
<b>Impact scope</b>	Local (municipality): 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.
<b>Implementation</b>	
<b>Implementation period</b>	<b>Weeks: Many of the migration aids addressed are complex structures which, on top of the planning process, also take some time to build.</b>
<b>Frequency</b>	<b>Non-recurring: Should be accompanied by monitoring of effectiveness.</b>
<b>Economic and legal aspects</b>	
<b>Costs</b>	<b>High (100'000-1 Mio EUR): Fish migration aids are very expensive installations. Depending on the structure, the costs can range from 100,000 to several millions of euros.</b>
<b>Socio-economic impacts</b>	<b>Low: Increased fish stocks, improved water quality in the flowing waters.</b>
<b>Sources of financing</b>	<b>Private sponsor, Other private sources, Public: local, Public: regional, Public: national, Public: European</b>
<b>Legal situation</b>	<b>The need for fish migration aids is regulated by law throughout Europe by, inter alia, the EU Water Framework Directive.</b>
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Other: e.g.: Salzburger Fischpass-Fibel: Erfahrungen zu Bau und Betrieb von Fischaufstiegshilfen (2002). Land Salzburg, Abt. Naturschutz, Referat Gewässerschutz. 152 S.

## Public relations work and sensitisation

### Sports competitions



Sports competitions can help raise public awareness of biotope networks. © rheinerftkreis/flickr.com

### Involved sectors

Agriculture, Forestry, Hunting, Tourism and leisure, Nature protection, Local population/citizens, Public relations and environmental education, Other: Sports Associations

### Affected habitats

Measure independent of habitat

### Description

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.

### Impact

**Impact in particular on** Big mammals

### Ecological impact

**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.

**Time of realisation for measure** Immediate: Public awareness is raised immediately, but direct ecological impacts only arise after some years with adoption of more comprehensive measures (see above).

**Impact scope** Transregional: Events can be organised at various levels, but individual events should be embedded in a transregional concept.

### Implementation

**Implementation period** Months: Organising an event is very time-consuming if it is to appeal to the general public and generate effective publicity.

**Frequency** Non-recurring, Recurring: Can be a single, annual action.

### Economic and legal aspects

**Costs** Low (1'000-10'000 EUR): Depending on the size of the event and accompanying actions, at least € 2000 will be required.

**Socio-economic impacts** No direct impact: By increasing public awareness, positive impacts (donations, volunteers) can be expected. The events may also be of interest to the tourism sector.

**Sources of financing** Private sponsor, Public: local, Public: regional, Public: national

### Further information

**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** Other: Further information about the "race for life" for the European wildcat is available at: <http://wildkatzet3.bund.net/index.php?id=79>

**Good Practice** ["Running Wild" – the wildcat run, Germany](#)  
[Exemple « Running Wild – Courir pour le chat sauvage »](#)  
[Esempio "Running Wild – Corsa per il gatto selvatico"](#)



## Information campaigns in towns and municipalities



Settlements contribute to the fragmentation of the landscape. © Zeitempiegel/ Frank Schultze

### Involved sectors

Nature protection, Local population/citizens, Municipalities

### Affected habitats

Measure independent of habitat

### Description

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.

### Impact

#### Impact in particular on

Small mammals, Reptiles, Amphibians, Birds, Insects

#### Ecological impact

Reduction of fragmentation or creation of new valuable habitats

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.

Improvement or preservation of habitats

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.

<b>Element of ecological network</b>	Appropriately designed and managed parks and gardens can form significant stepping stone biotopes.
<b>Other</b>	More nature in settlements has positive effects on the hydrological regime, climate and human health.
<b>Time of realisation for measure</b>	Years: 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).
<b>Impact scope</b>	Local (municipality): In order to achieve a good impact, it is important to work at community level and involve as many local residents as possible!
<b>Implementation</b>	
<b>Implementation period</b>	Long term: Most of the measures listed can be implemented relatively quickly and with little expense or work.
<b>Frequency</b>	Non-recurring, Recurring: Long-term awareness building is needed for optimal effect. Individual measures can be implemented with limited resources.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Medium (10'000-100'000 EUR): Most of the examples listed are not very cost-intensive. The work can be carried out as part of local projects, often with volunteers.
<b>Socio-economic impacts</b>	Low: More attractive living environment, more "nature" in settlements.
<b>Sources of financing</b>	Private sponsor, Other private sources, Public: local, Public: regional
<b>Legal situation</b>	Implementation of the measures takes place on a voluntary basis.
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	France: Departement Isère has published numerous brochures on this theme and runs regular information campaigns: <a href="http://www.isere-environnement.fr/pages/index/id/6416/">http://www.isere-environnement.fr/pages/index/id/6416/</a>
<b>Contact</b>	France: Conseil général de l'Isère ( <a href="http://www.cg38.fr/">http://www.cg38.fr/</a> )

## Guided tours and information events



Local information events and guided tours are important measures. © WWF/ L.Umek

### Involved sectors

Agriculture, Spatial planning, Nature protection, Municipalities

### Affected habitats

Measure independent of habitat

### Description

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).

### Impact

#### Ecological impact

Other Indirect through training and sensitisation of decision-makers and local stakeholders.

#### Time of realisation for measure

Immediate: 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.

#### Impact scope

Local (municipality): Depends on audience. Cooperation between municipalities at regional level should be proposed.

## Implementation

**Implementation period** Weeks: Training and guided tours take some time to prepare, but delivery can take place in a standardised format.

**Frequency** Recurring: Long-term awareness building is needed for optimal effect.

## Economic and legal aspects

**Costs** Very low (less than 1'000 EUR): Cost are incurred due to the working time taken in preparing and delivering training and preparing information material.

**Socio-economic impacts** Low: Sensitisation of the public.

**Sources of financing** Other private sources, Public: local, Public: regional

**Legal situation** Voluntary information events.

## Further information

**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** Other: Experience already gained in some pilot regions in the Alps (Engadine, Gesäuse, Isère).

**Contact** France: e.g. Arnaud Callec, Conseil général de l'Isère

## Coordination of cultivation competition



A particular commitment to nature and species conservation and the preservation of cultural landscapes can be rewarded through competitions. © Hermann/ pixelio.de

### Involved sectors

Agriculture, Forestry, Tourism and leisure, Nature protection, Local population/citizens, Public relations and environmental education

### Affected habitats

Forest, Bogs and fens, wetlands, Grassland, Arable land

### Description

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.

### Impact

#### Ecological impact

Improvement or preservation of habitats	Competitions can offer incentives for habitat improvement, thus creating habitats for rare species of animal and plant (e.g. extensive grassland).
Element of ecological network	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.

**Time of realisation for measure** Months: The impact depends on the focus of the competition but manageable time frames should be aimed for.

**Impact scope** Local (municipality): The impact can be enhanced with comprehensive planning and embedding in an overall concept.

### Implementation

**Implementation period** Weeks: Competitions can be implemented within very short periods of time.

**Frequency** Non-recurring, Recurring: Can be a single or annual action.

### Economic and legal aspects

**Costs** Low (1'000-10'000 EUR): Costs are associated with the prizes awarded, the inspection of sites, PR work, and organisation. Depending on size, at least €2000 will be required.

**Socio-economic impacts** Low: If marketed appropriately, competitions can serve to attract tourists.

**Sources of financing** Private sponsor, Public: local, Public: regional

### Further information

**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** Germany: e.g. <http://www.wiesenmeisterschaft-eifel.de>

## Educational pathways



Increase knowledge while offering an experience of nature. © froutes/ flickr.com

### Involved sectors

Tourism and leisure, Nature protection, Public relations and environmental education, Other: Schools

### Affected habitats

Measure independent of habitat

### Description

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.

### Impact

#### Ecological impact

Other

Indirect ecological impact via environmental education and public information.

#### Time of realisation for measure

Immediate: 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.

<b>Impact scope</b>	Regional: Depending on the location of the educational pathway, it may also attract tourists and visitors from other areas.
<b>Implementation</b>	
<b>Implementation period</b>	Months: If properly thought out, the planning, development and implementation of an educational pathway can involve quite a considerable workload.
<b>Frequency</b>	Non-recurring: Requires permanent maintenance of info boards.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Low (1'000-10'000 EUR): 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.
<b>Socio-economic impacts</b>	Low: May attract visitors. Environmental education.
<b>Sources of financing</b>	Private sponsor, Other private sources, Public: local, Public: regional, Public: European
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Other: Brochure on the project and further details: <a href="http://www.pronatura.ch/ge/index.php?lang=3&amp;mz=5">http://www.pronatura.ch/ge/index.php?lang=3&amp;mz=5</a> / <a href="http://www.frapna-haute-savoie.org/">http://www.frapna-haute-savoie.org/</a>
<b>Contact</b>	France: Contact at FRAPNA Haute-Savoie: Damien Hiribarrondo  <a href="#">"Grünes Licht für ökologische Korridore" (Green Light for ecological corridors), French-Swiss border in the Geneva Basin area</a>
<b>Good Practice</b>	<a href="#">Exemple de la région frontalière franco-suisse du bassin lémanique</a> <a href="#">Esempio del confine franco-svizzero del bacino del Lago di Lemano</a>



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



Children are the adults of tomorrow. © IRKA

### Involved sectors

Nature protection, Public relations and environmental education, Other: Schools, Kindergarden

### Affected habitats

Measure independent of habitat

### Description

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.).

### Impact

#### Ecological impact

Other Indirectly through environmental education.

#### Time of realisation for measure

Immediate: 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.

<b>Impact scope</b>	Local (municipality): The educational tool is being distributed throughout the region and presented to classes in schools.
<b>Implementation</b>	
<b>Implementation period</b>	Weeks: 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.
<b>Frequency</b>	Non-recurring
<b>Economic and legal aspects</b>	
<b>Costs</b>	Very low (less than 1'000 EUR): Presentation of the games in the classes and facilitation are undertaken by volunteers. The games kit itself costs € 40.
<b>Socio-economic impacts</b>	Low
<b>Sources of financing</b>	Private sponsor, Other private sources, Public: local, Public: regional
<b>Legal situation</b>	Voluntary education offer.
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Other: The games kit was developed in 2005-2008 as part of an environmental education campaign on ecological corridors: <a href="http://www.frapna-haute-savoie.org/">http://www.frapna-haute-savoie.org/</a>
<b>Contact</b>	Other: <a href="http://www.frapna.org/">http://www.frapna.org/</a>
<b>Good Practice</b>	<a href="#"><u>"Nature sans frontières" (Nature without Frontiers) games kit from the French nature conservation organisational FRAPNA</u></a> <a href="#"><u>Exemple de l'association française de défense de l'environnement FRAPNA : le kit de jeux « Nature sans frontières »</u></a> <a href="#"><u>L'esempio dell'Associazione ambientalista francese FRAPNA: Il kit di giochi "Natura senza frontiere"</u></a>

## Visitor information



Signage, information boards and waymarking can channel visitors in sensitive areas.

© Yann Kohler

### Involved sectors

Agriculture, Forestry, Tourism and leisure, Nature protection, Local population/citizens, Public relations and environmental education

### Affected habitats

Measure independent of habitat

### Description

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.

### Impact

#### Ecological impact

Improvement or preservation of habitats	In combination with strategies to channel visitors, habitat improvements can be achieved (e.g. by creating a quieter environment in some areas).
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.

<b>Time of realisation for measure</b>	<b>Immediate:</b> 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.
<b>Impact scope</b>	<b>Local (municipality):</b> 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.
<b>Implementation</b>	
<b>Implementation period</b>	Months: Planning and implementation of information strategies take time, depending on the size of the area.
<b>Frequency</b>	Non-recurring: Info boards require permanent care.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Low (1'000-10'000 EUR): 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.
<b>Socio-economic impacts</b>	No direct impact: Attractive information offers may be beneficial to tourism.
<b>Sources of financing</b>	Other private sources, Public: local
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Switzerland: Information programme in Grosses Moos (Switzerland): <a href="http://www.echanges.ch/exchange02/pdf/atelier_moos.pdf">http://www.echanges.ch/exchange02/pdf/atelier_moos.pdf</a>

## Volunteer programmes



Some providers offer the opportunity to undertake voluntary work in the ecological sphere.  
© lia.la/ pixelio.de

### Involved sectors

Agriculture, Forestry, Fishery, Tourism and leisure, Nature protection, Other: Private people, NGO, Companies

### Affected habitats

Forest, Shrubs and wooded areas, Bogs and fens, wetlands, Alpine habitats, Grassland, Arable land, Areas for settlements and transport, Waterbodies

### Description

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.

### Impact

#### Ecological impact

Improvement or preservation of habitats

As a result of the volunteer work, and depending on the location and the measures undertaken, habitat quality can be improved.

Element of ecological network	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.
<b>Time of realisation for measure</b>	Weeks: Depends on the specific measures being carried out. To increase participants' motivation, it is beneficial to achieve rapidly visible results.
<b>Impact scope</b>	Local (municipality): Assignments are carried out at local level. The impact increases with appropriate large-scale planning.
<b>Implementation</b>	
<b>Implementation period</b>	Weeks: Often, assignments last one week, but may only last for a few days. Several groups may contribute to the implementation of Individual measures.
<b>Frequency</b>	Non-recurring, Recurring: Single or repeated action, depending on type of measure.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Low (1'000-10'000 EUR): Tools and vehicles must be available, as well as experts to explain and manage the projects; publicity work.
<b>Socio-economic impacts</b>	No direct impact: Relevant initiatives may also be attractive to tourists, and positive regional economic effects can be achieved.
<b>Sources of financing</b>	Private sponsor
<b>Legal situation</b>	Relevant organisations cooperate closely with forestry or nature conservation.
<b>Further information</b>	
<b>Evaluation</b>	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).
<b>Information</b>	Switzerland: <a href="http://www.bergwaldprojekt.ch">http://www.bergwaldprojekt.ch</a> <a href="http://www.bergwaldprojekt.de">http://www.bergwaldprojekt.de</a> <a href="http://www.wwf.ch/de/tun/aktivwerden/freiwillig/umwelteinsatz/index.cfm">http://www.wwf.ch/de/tun/aktivwerden/freiwillig/umwelteinsatz/index.cfm</a>

## Landscape preservation days



Countryside management measures can involve joint action between various stakeholders and the local community. © Barbara Breyer/ Zeiteinspiegel

### Involved sectors

Agriculture, Forestry, Fishery, Hunting, Nature protection, Local population/citizens, Municipalities

### Affected habitats

Forest, Shrubs and wooded areas, Bogs and fens, wetlands, Alpine habitats, Grassland, Arable land, Areas for settlements and transport, Waterbodies

### Description

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.

### Impact

#### Ecological impact

Improvement or preservation of habitats	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 ecological network	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.

**Time of realisation for measure** Immediate: The impact depends on the measures carried out.

**Impact scope** Very localised (plot): Implementation of the measures is generally localised.

### **Implementation**

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

**Frequency** Non-recurring, Recurring: Single or repeated action, depending on type of measure.

### **Economic and legal aspects**

**Costs** Very low (less than 1'000 EUR): The requisite tools must be available, and it is customary to provide food for the helpers; costs can generally be kept low.

**Socio-economic impacts** No direct impact: Important tasks can be undertaken, reducing the overall costs of biotope networking measures.

**Sources of financing** Private sponsor, Public: local

### **Further information**

**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** Other: Information about existing initiatives is available, for example, at: <http://rohrhardsberg-life.de/artikel/landschaftspflege>  
[http://wasser.umweltschutz.ch/download/leitfaden\\_aktionstag\\_03.pdf](http://wasser.umweltschutz.ch/download/leitfaden_aktionstag_03.pdf)



## Monitoring by farmers



Farmers are important partners in the implementation of relevant measures. © Uwe Steinbrich/pixelio.de

### Involved sectors

Forestry, Nature protection

### Affected habitats

Grassland, Arable land

### Description

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.

### Impact

#### Ecological impact

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.

#### Time of realisation for measure

Months: Biotope networking measures must be carried out before monitoring takes place.

**Impact scope** Very localised (plot): Monitoring takes place on individual plots. The impact can be increased if entire regions participate in relevant programmes.

### Implementation

**Implementation period** Months: Appropriate training must be provided for farmers before monitoring commences.

**Frequency** Recurring: Because of the high conceptual preparation and management cost this requires long-term implementation.

### Economic and legal aspects

**Costs** Very low (less than 1'000 EUR): Preparation, training for participants, processing of results. A monitoring subsidy could also be paid to participants.

**Socio-economic impacts** No direct impact: Compensation (payment of a subsidy) is possible to offset the moderate additional expenses incurred by farmers in conjunction with monitoring.

**Sources of financing** Private sponsor, Public: local, Public: regional

### Further information

**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** Austria: Information is available, for example, at:  
[http://www.vorarlberg.at/vorarlberg/umwelt\\_zukunft/umwelt/natur-undumweltschutz/foerderungen/oepul2007/naturschutzmassnahmenimoe.htm](http://www.vorarlberg.at/vorarlberg/umwelt_zukunft/umwelt/natur-undumweltschutz/foerderungen/oepul2007/naturschutzmassnahmenimoe.htm)  
[http://www.oekl.at/stories/storyReader\\$698](http://www.oekl.at/stories/storyReader$698)

## Hunting

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



In French game reserves, hunting is strictly prohibited. Habitat improvements should.  
© Yann Kohler

#### Involved sectors

Agriculture, Forestry, Hunting, Nature protection, Municipalities

#### Affected habitats

Forest, Shrubs and wooded areas, Bogs and fens, wetlands, Alpine habitats, Grassland, Arable land, Areas for settlements and transport, Waterbodies

#### Description

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.

**Impact in particular on** Big mammals

#### Ecological impact

Improvement or preservation of habitats Designation of these areas is often accompanied by habitat improvement measures (in France, this is mandatory for game reserves under hunting legislation).

<b>Element of ecological network</b>	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.
<b>Time of realisation for measure</b>	Immediate: A change in the behaviour of red deer, for example, in quiet zones can be observed within a short period (diurnal activity, confidence).
<b>Impact scope</b>	Local (municipality): 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.
<b>Implementation</b>	
<b>Implementation period</b>	Weeks: 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.
<b>Frequency</b>	Non-recurring
<b>Economic and legal aspects</b>	
<b>Costs</b>	Very low (less than 1'000 EUR): Costs arise solely in relation to the administrative process (planning, designation) and possibly publicity/signage.
<b>Socio-economic impacts</b>	Low: May help to prevent damage to agriculture and forestry in some regions.
<b>Sources of financing</b>	Other private sources, Public: local, Public: regional, Public: national
<b>Legal situation</b>	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.
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Other: Association of French Hunters: <a href="http://www.chasseurdefrance.com/">http://www.chasseurdefrance.com/</a> Swiss cantonal administrations (hunting departments), e.g. Obwalden Canton

## Spatial planning

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



The dynamic character of the biotope network has to be maintained. © Rainer Sturm/pixelio.de

#### Involved sectors

Agriculture, Forestry, Water management, Hunting, Spatial planning, Tourism and leisure, Nature protection, Local population/citizens, Municipalities

#### Affected habitats

Forest, Shrubs and wooded areas, Bogs and fens, wetlands, Alpine habitats, Grassland, Arable land, Areas for settlements and transport, Waterbodies

#### Description

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.

#### Impact

**Impact in particular on** Small mammals, Big mammals, Reptiles, Amphibians, Birds, Insects, Fish

## Ecological impact

Reduction of fragmentation or creation of new valuable habitats      The consideration of the biotope network in spatial planning helps to avoid fragmentation in future.

Element of ecological network      The key elements of the biotope network are safeguarded for the long term.

**Time of realisation for measure**      Immediate: Spatial planning of key sites and structures avoids incorrect use and safeguards the long-term functionality of the network.

**Impact scope**      Local (municipality): Depending on the planning tool and the biotope network plan, may vary widely.

## Implementation

**Implementation period**      Months: Consideration in planning tools requires a very precise concept of the biotope network, mapping and coordination with other stakeholders - a lengthy process.

**Frequency**      Non-recurring, Recurring: Can only be effective as part of a long-term concept. Specific single actions can be implemented to preserve specific areas as part of that concept.

## Economic and legal aspects

**Costs**      Medium (10'000-100'000 EUR): Cannot be specified precisely. Planning is, however, very time-consuming and labour-intensive.

**Socio-economic impacts**      High: Numerous and diverse impacts on all stakeholders affected by the biotope network.

**Sources of financing**      Public: local, Public: regional, Public: national

**Legal situation**      Local, regional, state planning instruments.

## Further information

**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**      Other: e.g. in the French Region Rhône-Alpes, municipality of St. Martin d'Uriage, or Fribourg Canton in Switzerland.

## Wildlife/ ecological spatial planning



Wild animals often cause damage in cultural landscapes. © Carsten Przygoda/ pixelio.de

### Involved sectors

Agriculture, Forestry, Water management, Hunting, Spatial planning, Tourism and leisure, Nature protection, Municipalities

### Affected habitats

Forest, Shrubs and wooded areas, Bogs and fens, wetlands, Alpine habitats, Grassland, Arable land, Areas for settlements and transport, Waterbodies

### Description

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.

### Impact

**Impact in particular on** Big mammals, Birds

#### Ecological impact

Reduction of fragmentation or creation of new valuable habitats

The aim of WÖRP is the conservation of species-appropriate coherent habitats for wildlife. Habitat connectivity is an essential part of habitat conservation.

Improvement or preservation of habitats

It includes habitat conservation and improvement measures, overwintering concepts for hoofed game, and minimisation of use-related conflicts.

<b>Element of ecological network</b>	Building on the results of WÖRP, appropriate connectivity measures are adopted, including the construction of green bridges.
<b>Other</b>	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.
<b>Time of realisation for measure</b>	Long term: Implementation of WÖRP is a long-term process which must constantly be adapted to changing conditions.
<b>Impact scope</b>	Regional: 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.
<b>Implementation</b>	
<b>Implementation period</b>	Months: As WÖRP is a complex planning tool requiring substantial information, the process takes time.
<b>Frequency</b>	Non-recurring: Single though long-term process; may require subsequent complementation or adaptation.
<b>Economic and legal aspects</b>	
<b>Costs</b>	High (100'000-1 Mio EUR): Dependent on many different factors (size of area, detail of plans, etc.) so varies widely from case to case.
<b>Socio-economic impacts</b>	High: May have considerable impacts on spatial planning, farming, hunting etc.
<b>Sources of financing</b>	Other private sources, Public: local, Public: regional, Public: national, Public: European
<b>Legal situation</b>	In Austria, specific regulations (WÖRP-Verordnung) governing WÖRP are in place. In some federal states in Austria, WÖRP is established in hunting legislation.
<b>Further information</b>	
<b>Evaluation</b>	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.



<b>Information</b>	Other: The Austrian states of Vorarlberg, Salzburg, Carinthia, and Liechtenstein, Graubünden (CH), and Austria's National Parks (Kalkalpen, Donau-Auen).
<b>Contact</b>	Austria: Salzburg federal state: Dipl.-Ing. Rupert Haupolter; Research Institute of Wildlife Ecology, University of Veterinary Medicine, Vienna: Prof. Dr. Friedrich Reimoser

## Tourism and leisure

### Tourist marketing of the biotope network



A focused marketing enhances a regional creation of value. © CIPRA International

#### Involved sectors

Agriculture, Forestry, Spatial planning, Tourism and leisure, Nature protection, Local population/citizens, Municipalities

#### Affected habitats

Forest, Shrubs and wooded areas, Bogs and fens, wetlands, Alpine habitats, Grassland, Arable land, Areas for settlements and transport, Waterbodies

## Description

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.

## Impact

### Ecological impact

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.

**Time of realisation for measure** Years: 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.

**Impact scope** **Regional: Marketing strategies should preferably be implemented at regional level but a biotope network can be promoted at local level.**

### Implementation

**Implementation period** Years: It can be assumed that the implementation of the strategies will take a long time.

**Frequency** Recurring: Realization is a long-term activity.

### Economic and legal aspects

**Costs** Medium (10'000-100'000 EUR): 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.

**Socio-economic impacts** Medium: Positive economic effects should be achieved if sound marketing strategies are developed.

**Sources of financing** Private sponsor, Other private sources, Public: regional, Public: national

## Further information

### 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

Germany: Information from the Federal Agency for Nature Conservation: [http://www.bfn.de/0311\\_gruenes\\_band.htm](http://www.bfn.de/0311_gruenes_band.htm) Project website: <http://www.erlebnisgruenesbnad.de/>

### Good Practice

["Experience the Green Belt", Germany](#)  
[Exemple « Erlebnis Grünes Band » \(À la découverte de la Trame verte\), Allemagne](#)  
[Esempio "Esperienza nastro verde" in Germania](#)

## Trails to connect protected areas



Trails can draw attention to aspects of ecological connectivity. © Bollinger Hanspeter/pixelio.de

### Involved sectors

Spatial planning, Tourism and leisure, Nature protection, Local population/citizens, Municipalities

### Affected habitats

Forest, Shrubs and wooded areas, Bogs and fens, wetlands, Alpine habitats, Grassland, Arable land, Areas for settlements and transport, Waterbodies

## Description

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.

## Impact

### Ecological impact

**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.

**Time of realisation for measure** Years: The use of good communication methods increases awareness of the issue immediately; acceptance within the general public only emerges after visible positive results.

**Impact scope** Regional: The scope of implementation and impact are heavily dependent on the conditions in the regions and habitats concerned.

## Implementation

**Implementation period** Months: The development and promotion of the trails require a long planning phase.

**Frequency** Non-recurring: Regular maintenance of, e.g., info boards.

## Economic and legal aspects

**Costs** Medium (10'000-100'000 EUR): The costs for planning, signage and advertising are expected to be high and will depend on the situation at the outset.

**Socio-economic impacts** Medium: On the basis that the region is being made more attractive, positive economic impacts are expected.

**Sources of financing** Private sponsor, Other private sources, Public: regional, Public: national

## Further information

**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

Other:

<http://www.wwf.ch/de/derwwf/themen/alpen/wanderwege/index.cfm>  
, <http://www.naturfreunde-natura2000.de/>,  
<http://www.naturatrails.at>

## Trail concepts and visitor guidance for winter sports



In Vorarlberg/A and Switzerland the cross-national campaign "Respektiere deine Grenzen" supports the creation of leisure areas for wild animals. © Thommy Weiss/pixelio.de

### Involved sectors

Forestry, Hunting, Tourism and leisure, Nature protection, Other: Sports Associations

### Affected habitats

Forest, Alpine habitats, Grassland

### Description

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.

### Impact

**Impact in particular on** Big mammals, Birds

## Ecological impact

Improvement or preservation of habitats	Disturbance in sensitive areas is avoided during the winter.
Element of ecological network	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.

## Time of realisation for measure

Immediate: Disturbance created by just a single winter sportsperson can have fatal consequences for sensitive species. Marking alternative routes prevents the animals from being disturbed.

## Impact scope

Local (municipality): 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.

## Implementation

### Implementation period

Months: Determining the sensitive routes or sections of routes, formulating alternatives, preparing the information campaigns and signage along the new routes require some preparatory work.

### Frequency

Recurring: Time-consuming and costly preparation of measures needed. Their implementation requires optimal care and continuous adaptation.

## Economic and legal aspects

### Costs

Low (1'000-10'000 EUR): Costs vary greatly depending on the project; besides labour, the main expenditure relates to publicity materials.

### Socio-economic impacts

Low

### Sources of financing

Private sponsor, Other private sources, Public: local, Public: regional

### Legal situation

Voluntary collaboration of stakeholders.

## Further information

### 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

Germany: 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

Germany: Information on the projects in Berchtesgaden National Park: [http://www.nationalpark-berchtesgaden.bayern.de-/01\\_nationalpark/01\\_aufgaben/09\\_management/-06\\_skibergsteigen/index.htm](http://www.nationalpark-berchtesgaden.bayern.de-/01_nationalpark/01_aufgaben/09_management/-06_skibergsteigen/index.htm) (en)

### Good Practice

[Environment-friendly ski touring, Berchtesgaden, Germany](#)  
[Le ski de randonnée respectueux de l'environnement](#)  
[Sci alpinismo compatibile con la natura](#)

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



Agreements with sportspeople can prevent disturbances in sensitive areas, e.g. on crags.  
© Yann Kohler

### Involved sectors

Other: Sports Associations

### Affected habitats

Forest, Shrubs and wooded areas, Bogs and fens, wetlands, Alpine habitats, Grassland, Arable land, Areas for settlements and transport, Waterbodies

### Description

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 with responsibility for crags are just some of the key elements of these strategies.

### Impact

#### Impact in particular on

Small mammals, Big mammals, Reptiles, Amphibians, Birds, Insects, Fish



## Ecological impact

**Improvement or preservation of habitats** 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 disturbance.

**Element of ecological network** 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.

**Time of realisation for measure** Immediate: 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.

**Impact scope** Local (municipality): 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.

## Implementation

**Implementation period** Weeks: Signage and closures can be set up quickly. Training and 'educating' the sportspersons, establishing a standard marking system etc. are long-term goals.

**Frequency** Non-recurring: Time-consuming and costly preparation of measures needed. Their implementation requires optimal management and continuous adaptation.

## Economic and legal aspects

**Costs** Medium (10'000-100'000 EUR): 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.

**Socio-economic impacts** No direct impact

**Sources of financing** Public: local, Public: regional, Public: European

**Legal situation** Voluntary collaboration with sportspersons and sports associations.

**Further information**

**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**

Germany: Comprehensive information about the climbing strategies and environmentally compatible climbing is available from the rock information system: [www.dav-felsinfo.de](http://www.dav-felsinfo.de) (de)

**Contact**

Germany: DAV contact person on the subject of climbing and nature conservation: Jörg Ruckriegel.

**Good Practice**

[Climbing strategies: an environmentally friendly approach to climbing, Germany](#)  
[Programmes d'escalade – L'escalade respectueuse de la nature](#)  
[Alpinismo – Arrampicate compatibili con la natura](#)

## Flight bans over sensitive areas



Various types of sport may also have a negative impact. © Manfred Schimmel/ pixelio.de

### Involved sectors

Tourism and leisure, Nature protection, Local population/citizens, Other: Sports Associations

### Affected habitats

Forest, Shrubs and wooded areas, Bogs and fens, wetlands, Alpine habitats, Grassland, Arable land, Areas for settlements and transport, Waterbodies

### Description

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”.

### Impact

**Impact in particular on** Small mammals, Big mammals, Birds

### Ecological impact

Improvement or preservation of habitats 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 ecological network** Depending on the quality of the areas and on the species occurring in them, valuable areas from a nature conservation perspective constitute important elements of an ecological network.

**Time of realisation for measure** Immediate: The positive impacts of suitable strategies are noticeable immediately after implementation; long-term acceptance, however, will probably only emerge over time.

**Impact scope** Regional: Strategies should be planned with a broader spatial perspective, otherwise conflicts will merely be shifted into neighbouring areas.

### **Implementation**

**Implementation period** Years: 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.

**Frequency** Recurring: Requires long-term action adapted to actual needs.

### **Economic and legal aspects**

**Costs** Medium (10'000-100'000 EUR): The planning process, which is based on the involvement of all stakeholders, requires a long period of time, and scientific studies must be produced.

**Socio-economic impacts** Low: No negative impacts are expected if alternative flight areas are provided.

**Sources of financing** Private sponsor, Public: local, Public: regional, Public: national, Public: European

**Legal situation** Voluntary agreement.

### **Further information**

**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** Germany: 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](http://www.bfn.de/fileadmin/MDB/documents/skript83_text.pdf)

**Contact** Germany: Expert support at the Federal Agency for Nature Conservation: Michael Pütsch

## Communities

### Biotope network plans on the local scale



To implement the right measures in the right way and in the right place an area-wide biotope network plan is necessary. © Wikipedia commons

#### Involved sectors

Agriculture, Forestry, Water management, Fishery, Hunting, Spatial planning, Tourism and leisure, Nature protection, Transport, Local population/citizens, Municipalities

#### Affected habitats

Forest, Shrubs and wooded areas, Bogs and fens, wetlands, Alpine habitats, Grassland, Arable land, Areas for settlements and transport, Waterbodies

#### Description

Targeted and functional measures are important for effective biotope networking. An area-wide biotope network plan is essential if the right measures are to be implemented in the right way and in the right place. At the level of the local authority, priority areas for the biotope network can be included in the appropriate planning documents. This permits the land use interests of the various sectors to be weighed up at the same time. Ecological interests and development potential for the residential and economic area need not necessarily conflict.

#### Impact

##### Impact in particular on

Small mammals, Big mammals, Reptiles, Amphibians, Birds, Insects, Fish

##### Ecological impact

Reduction of fragmentation or creation of new valuable habitats

High-level biotope network planning can help reduce habitat fragmentation. In the best case, the combined plans of several local authorities constitute a supra-regional biotope network concept.

<b>Improvement or preservation of habitats</b>	Individual biotope improvements derive from development and improvement measures taken in the framework of the biotope network concept.
<b>Element of ecological network</b>	Targeted improvements are made to the individual elements of the local biotope network.
<b>Time of realisation for measure</b>	Immediate, Weeks, Months: Biotope network planning at the municipal level combines various measures with diverse effects in a range of sectors.
<b>Impact scope</b>	Local (municipality), Regional, Transregional: Depending on the actual design and integration of the local authority's biotope network concept in the higher-level planning process, the measures can have regional and supra-regional effects.
<b>Implementation</b>	
<b>Implementation period</b>	Years: Field data capture and the subsequent concept design phase take time. Several years may elapse between the initial planning phase and final implementation.
<b>Frequency</b>	Non-recurring, Recurring: The biotope network concept and related planning documents need to be updated every few years. Some of the measures involved may only need to be taken once.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Medium (10'000-100'000 EUR): The costs of the concept can vary significantly depending on the data already available.
<b>Socio-economic impacts</b>	No direct impact: Promotion of the plans for a biotope network can have positive effects on the regional economy(e.g. tourism). Benefits may also derive from the clear planning specifications.
<b>Sources of financing</b>	Private sponsor, Public: local, Public: regional
<b>Legal situation</b>	Local biotope network concepts should be integrated in the relevant planning instruments in the interest of a strong legal position in the implementation phase.
<b>Further information</b>	
<b>Evaluation</b>	In Neumarkt in the Salzburg region of Austria, such a concept was developed in 2007-2009 and integrated in the local spatial development plan.
<b>Information</b>	Austria: To obtain further information or order the Neumarkt report go to: <a href="http://www.vielfaltleben.at/article/articleview/81282/1/29332">http://www.vielfaltleben.at/article/articleview/81282/1/29332</a>

**Contact** Austria: Office of the Salzburg Regional Government, Department of Nature Protection

## Population

### Near-natural gardening



Near-natural gardens ideally offer a large number of structures and biotopes for a wide range of species of flora and fauna. © CIPRA International

### Involved sectors

Local population/citizens, Municipalities

### Affected habitats

Areas for settlements and transport

### Description

Near-natural gardens with large quantities of robust indigenous trees and shrubs, herbs and other plants are an asset for built-up areas that can also contribute to the creation of biotope networks. Near-natural gardens ideally offer a large number of structures and biotopes for a wide range of species of flora and fauna. Dry stone walls, piles of stones and twigs, deadwood, fruit trees and ponds all play an important role as living spaces, refuges, sources of food, and hunting and nesting grounds. In the near-natural garden, the compost used as fertiliser completes the natural cycle. Synthetic products such as pesticides, herbicides and mineral fertilisers are superfluous.

### Impact

**Impact in particular on** Small mammals, Reptiles, Amphibians, Birds, Insects

## Ecological impact

Improvement or preservation of habitats      Near-natural design enhances the garden's suitability as a biotope for various small mammals, amphibians, reptiles and insects.

Element of ecological network      In combination with other near-natural spaces, near-natural gardens can form part of a local biotope network.

**Time of realisation for measure**      Immediate, Weeks: Depending on the timing of the measures, the effects can be seen in the current vegetation period already.

**Impact scope**      Very localised (plot), Local (municipality): Individual near-natural spaces can form part of a local biotope network.

## Implementation

**Implementation period**      Days, Weeks: Some measures can be implemented immediately (replacement with indigenous species, discontinued use of artificial fertilisers) whereas others take more time and effort (building a dry-stone wall or creating a pond).

**Frequency**      Non-recurring, Recurring: Depending on the specific solutions selected, one-off or repeated activities may be required.

## Economic and legal aspects

**Costs**      Very low (less than 1'000 EUR): Most measures can be implemented at little expense and may even save money.

**Socio-economic impacts**      No direct impact: Depending on the plants chosen for the near-natural garden, some can be used in the kitchen.

**Sources of financing**      Private sponsor, Public: local, Public: regional

## Further information

**Evaluation**      A number of programmes have been launched in support of near-natural gardens, but there is rarely any higher-level planning for a biotope network.

**Information**      Austria: Austrian programme entitled "Natur im Garten":  
<http://www.gemeinden.umweltberatung.at/start.asp?b=3608>  
Germany: Tips for laying out a near-natural garden available from Naturschutzbund Deutschland:  
<http://hamburg.nabu.de/projekte/garten/gartentipps/05213.html>



## Other .

### Connectivity measures with support from church-owned land



The churches are important owners of land and farmland. © Rainer Sturm/ pixelio.de

#### Involved sectors

Agriculture, Forestry, Nature protection, Local population/citizens, Other: Church

#### Affected habitats

Forest, Shrubs and wooded areas, Bogs and fens, wetlands, Alpine habitats, Grassland, Arable land, Areas for settlements and transport, Waterbodies

#### Description

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.

#### Impact

**Impact in particular on** Small mammals, Big mammals, Reptiles, Amphibians, Birds, Insects

#### Ecological impact

Improvement or preservation of habitats Depending on the measures and habitats concerned, the quality of individual habitats is improved.

Element of ecological network With appropriate planning, church land can form elements of an ecological network, perhaps even on a transregional basis.

<b>Time of realisation for measure</b>	Months: The impacts depend heavily on the measures and ecosystems concerned.
<b>Impact scope</b>	Local (municipality): Integrating the measure into an overall strategy increases its impact accordingly.
<b>Implementation</b>	
<b>Implementation period</b>	Months: 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.
<b>Frequency</b>	Non-recurring, Recurring: Single or repeated action, depending on type of measure.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Low (1'000-10'000 EUR): Many different measures can be planned and implemented depending on the situation at the outset and the conditions of the land involved.
<b>Socio-economic impacts</b>	Low: Subsidies can increase the incomes of the farmers involved or can offset any additional costs incurred.
<b>Sources of financing</b>	Private sponsor, Public: local, Public: regional
<b>Legal situation</b>	Suitable measures can be promoted by cultural landscape and countryside management programmes.
<b>Further information</b>	
<b>Evaluation</b>	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).
<b>Information</b>	Other: <a href="http://www.pan-partnerschaft.de/faltblatt/naila.pdf">http://www.pan-partnerschaft.de/faltblatt/naila.pdf</a> <a href="https://www.dbu.de/projekt_18212/db_1036.html">https://www.dbu.de/projekt_18212/db_1036.html</a> oder <a href="http://www.kfh-wb.de/projekte/biot.htm">http://www.kfh-wb.de/projekte/biot.htm</a>
<b>Contact</b>	Germany: Information from the Association for the Protection of Nature in Bavaria (BN), Hof group, contact person: Klaus Schaumberg

## Environmentally compatible design of power lines



Power lines are shaping the landscape now for about hundred years.

© Cornerstone/pixelio.de

### Involved sectors

Agriculture, Forestry, Hunting, Spatial planning, Tourism and leisure, Nature protection,  
Other: Energy

### Affected habitats

Forest, Shrubs and wooded areas, Bogs and fens, wetlands, Alpine habitats, Grassland,  
Arable land, Areas for settlements and transport, Waterbodies

### Description

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.

### Impact

**Impact in particular on** Small mammals, Big mammals, Reptiles, Amphibians, Birds, Insects

### Ecological impact

Improvement or preservation of habitats With well-thought-out and sensible biotope management planning, various habitats and biotopes can be created in the aisles beneath power lines.

Element of ecological network 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.

<b>Time of realisation for measure</b>	Long term: The development of their impact as elements of a biotope network requires careful planning and a long-term design and maintenance process.
<b>Impact scope</b>	<b>Local (municipality): A regional strategy is imperative, but the impact will generally have local significance only.</b>
<b>Implementation</b>	
<b>Implementation period</b>	Months: 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.
<b>Frequency</b>	Recurring: Requires long-term measures.
<b>Economic and legal aspects</b>	
<b>Costs</b>	High (100'000-1 Mio EUR): Costs vary depending on the project being planned. The maintenance measures in the aisles must, however, take place regularly, involving continuous labour costs.
<b>Socio-economic impacts</b>	Low: The landscape is upgraded, especially areas with overhead power lines, which are generally viewed in negative terms.
<b>Sources of financing</b>	Other private sources, Public: regional, Public: national
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Other: Information on biotope management in power line routes can be obtained from energy supplier RWE, for example.
<b>Contact</b>	Switzerland: Expert at the Swiss Federal Institute of Technology, Zurich: Dr. Thomas Coch, nature and landscape conservation

## Determination of light pollution



Light pollution denotes the brightening of the night sky caused by artificial light sources. © Helmut J. Salzer/ pixelio.de

### Involved sectors

Tourism and leisure, Nature protection, Transport, Local population/citizens, Other: Districts and other local authorities

### Affected habitats

Areas for settlements and transport

### Description

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.

### Impact

**Impact in particular on** Small mammals, Big mammals, Amphibians, Birds, Insects

### Ecological impact

Reduction of fragmentation or creation of new valuable habitats      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.

Improvement or preservation of habitats      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.

<b>Time of realisation for measure</b>	Immediate: Reducing light intensity creates positive effects immediately.
<b>Impact scope</b>	Local (municipality): 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.
<b>Implementation</b>	
<b>Implementation period</b>	Months: 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.
<b>Frequency</b>	Non-recurring: Measures should be followed by an evaluation of their success.
<b>Economic and legal aspects</b>	
<b>Costs</b>	Low (1'000-10'000 EUR): 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.
<b>Socio-economic impacts</b>	High: After such an audit, It is estimated that municipalities can cut their energy costs by 20-40% through targeted investment.
<b>Sources of financing</b>	Public: local, Public: regional, Public: national, Public: European
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	Other: Comprehensive information on the issue of light pollution is available from the International Dark-Sky Association <a href="http://www.darksky.org/">http://www.darksky.org/</a> (en)
<b>Contact</b>	France: e.g. ADEME (French Environment and Energy Management Agency) in France <a href="http://www2.ademe.fr/">http://www2.ademe.fr/</a> (fr, en)
<b>Good Practice</b>	<a href="#">Light pollution/light smog audits, Isère, France</a> <a href="#">Diagnostic de la pollution lumineuse</a> <a href="#">Diagnostica dell'inquinamento luminoso</a>

## Safety measures on electricity masts and cables



The energy supply is generally reliant on a dense network of overground cables. © K.T./pixelio.de

### Involved sectors

Nature protection, Other: Energy

### Affected habitats

Forest, Shrubs and wooded areas, Bogs and fens, wetlands, Alpine habitats, Grassland, Arable land, Areas for settlements and transport, Waterbodies

### Description

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.

### Impact

**Impact in particular on** Birds

### Ecological impact

Reduction of fragmentation or creation of new valuable habitats      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.

Improvement or preservation of habitats	Safeguards roosting and resting places for both migrating and sedentary birds.
<b>Time of realisation for measure</b>	Immediate: Once the safety measures have been completed, the birds are no longer in danger.
<b>Impact scope</b>	<b>Very localised (plot): Although the direct impact of the measure is local, entire populations can be affected in terms of the number of birds killed.</b>
<b>Implementation</b>	
<b>Implementation period</b>	Years: 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.
<b>Frequency</b>	Non-recurring
<b>Economic and legal aspects</b>	
<b>Costs</b>	Very high (>1 Mio. EUR): Applying safety measures to masts and cables over a wide area will incur very high costs (up to several millions of euros).
<b>Socio-economic impacts</b>	Low
<b>Sources of financing</b>	Other private sources, Public: local, Public: regional, Public: national
<b>Legal situation</b>	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.
<b>Further information</b>	
<b>Evaluation</b>	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.



<b>Information</b>	Other: 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 nature n°140. Strasbourg, 76 p.
<b>Contact</b>	Other: NABU – Federal working group on birds and powerlines. <a href="http://www.birdsandpowerlines.org/">http://www.birdsandpowerlines.org/</a> BirdLife International
<b>Good Practice</b>	<a href="#">Marking of power lines and appropriate design of electricity pylons</a> <a href="#">Signalisation des lignes électriques et aménagement des pylônes électriques</a> <a href="#">Visualizzazione degli elettrodotti e configurazione dei tralicci</a>

## Corridor contracts



Region Rhône-Alpes/F contributes with corridor contracts to the ecological connectivity.  
© Franz Schutze/Zeitenspiegel

### Involved sectors

Other: Districts and other local authorities

### Affected habitats

Forest, Shrubs and wooded areas, Bogs and fens, wetlands, Alpine habitats, Grassland, Arable land, Areas for settlements and transport, Waterbodies

## Description

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.

## Impact

**Impact in particular on** Small mammals, Big mammals, Reptiles, Amphibians, Birds, Insects, Fish

### Ecological impact

Reduction of fragmentation or creation of new valuable habitats Measures to reduce fragmentation are being promoted.

Improvement or preservation of habitats Measures to improve habitats are being promoted.

Element of ecological network 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.

**Time of realisation for measure** Immediate: The support becomes available immediately after the contract is approved and for a period of 5 years.

**Impact scope** **Regional: 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.**

### Implementation

**Implementation period** Long term: The contracts are concluded for a period of 5 years.

**Frequency** Non-recurring, Recurring: Individual measures should be part of an overall concept and be executed over a number of years (say, 5). Some measures only need to be taken once.

### Economic and legal aspects

<b>Costs</b>	High (100'000-1 Mio EUR): 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.
<b>Socio-economic impacts</b>	Medium: Dependent on the project being supported.
<b>Sources of financing</b>	Public: regional
<b>Legal situation</b>	A 5-year contract between one or several local authorities and the region.
<b>Further information</b>	
<b>Evaluation</b>	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.
<b>Information</b>	France: Rhône-Alpes region <a href="http://biodiversite.rhonealpes.fr/spip.php?rubrique2/">http://biodiversite.rhonealpes.fr/spip.php?rubrique2/</a> <a href="http://www.rhone-alpes.ecologie.gouv.fr/">http://www.rhone-alpes.ecologie.gouv.fr/</a>
<b>Contact</b>	France: Person responsible in the Rhône-Alpes region: Hélène Guilloy

## V BONNES PRATIQUES

Les mesures sélectionnées qui semblent particulièrement intéressantes du fait de leur approche innovatrice, de leur originalité ou de leur mise en œuvre exemplaire sont décrites de manière détaillée à l'aide d'exemples ou de projets concrets. Ces exemples peuvent être une précieuse source d'inspiration et vous fournissent des informations pratiques, par exemple sur les personnes à contacter, ainsi que des références.

### Protection de la nature

#### Renaturation des tourbières : l'exemple de l'Allgäuer Moorallianz

Les tourbières et les prairies à litière de l'Allgäuer Moorallianz comptent parmi les marais les plus riches et les plus importants d'Allemagne. La zone de transition entre les tourbières alpines et préalpines est ici très bien conservée. En outre, les pâturages communaux de l'Ostallgäu comptent de nombreux pâturages marécageux semi-naturels. Ce territoire est habité par plusieurs espèces typiques des tourbières, telles que le solitaire et l'aeschne azurée, ainsi que par plus de 90 espèces menacées ou en voie de disparition (notamment le cuivré de la Bistorte, la déesse précieuse et la vipère péliade).



© Bund Naturschutz Ostallgaeu

Pour préserver cet important patrimoine naturel, les autorités, les communes et les associations se sont fédérées au sein d'un organisme dénommé Allgäuer Moorallianz. La Moorallianz a pour objectif de conserver et de renaturer les tourbières de l'Allgäu. Elle réunit divers acteurs, notamment les agriculteurs, les administrations, les écoles, les associations de protection du paysage, le secteur du tourisme et les écologistes. Dans plusieurs sites, les prairies humides et les prairies à litière bordant les tourbières ont été drainées, soumises à une exploitation intensive, et elles ont souvent été remplacées par des herbages. Les surfaces agricoles sont dominées par l'élevage laitier à titre d'activité principale, tandis que dans les régions d'altitude, on pratique essentiellement le pastoralisme. Près de 90% des tourbières de l'Allgau sont asséchées ou endommagées. Seules 5 à 10% d'entre elles sont semi-naturelles, à peine 1% sont naturelles.

Le projet « Allgäuer Moorallianz » vise donc à préserver et à développer les précieuses zones centrales des tourbières de l'Allgau en gardant intact leur régime hydrogéologique et en adaptant leur utilisation. Les mesures préconisées prévoient notamment le

réengorgement des hautes tourbières et des tourbières de transition, le réaménagement des drainages et le retour à l'état semi-naturel des ruisseaux. Par ailleurs, on envisage d'exploiter le cordon prairial bordant les tourbières d'une manière plus respectueuse de la nature en adoptant des formes d'utilisation adéquate, telles que la fenaison et le pâturage. Les zones particulièrement précieuses, comme les plans d'eau et les sources vulnérables au piétinement, nécessitent une protection spéciale, tandis que les prairies maigres riches en espèces doivent être remises en état. En outre, on envisage des mesures d'éclaircie visant à favoriser le développement de zones de transition structurées entre la forêt et les espaces ouverts, afin d'offrir des habitats au tétras-lyre et au grand tétras.

Au-delà des nombreux objectifs de protection de la nature qu'elle poursuit, l'Allgäuer Moorallianz mise aussi sur les aspects socio-économiques, notamment sur la sensibilisation et l'information de la population et des décideurs politiques. Par ailleurs, l'Allianz envisage d'ouvrir certains sites aux loisirs de proximité et au tourisme afin de favoriser un « tourisme des tourbières ». Le projet prévoit également des stratégies marketing pour les produits agricoles réalisés grâce aux mesures d'entretien mises en œuvre (notamment la commercialisation des litières des prairies du même nom par le biais d'une bourse ad hoc). L'amélioration de l'attractivité touristique de la région passe également par le développement de sentiers de découverte, qui permettent par ailleurs de gérer le flux des visiteurs. Un vaste projet d'éducation à l'environnement propose des visites guidées, des excursions, des journées thématiques, notamment à l'attention des écoles. Ce projet, qui s'adresse aussi et surtout à la population locale, s'attache à souligner les aspects liés à la protection de la nature, ainsi que l'importance des tourbières pour la lutte contre le changement climatique et contre les crues.

## **Bilan**

Le projet « Allgäuer Moorallianz » réunit une multitude d'acteurs et apporte une contribution importante au réseau écologique. Il soutient de manière ciblée les tourbières dans le cadre d'une démarche régionale. De par ses multiples visées, qui englobent protection de la nature, objectifs socio-économiques et réalisations pratiques, il représente une démarche innovante axée sur la mise en valeur du potentiel naturel. Le projet a passé la première phase du concours pour l'attribution du prix « Idee Natur » décerné par l'Office fédéral de protection de la nature. Il est susceptible de recevoir des financements en tant que projet de grande envergure axé sur la protection de la nature.

## **Contacts et informations complémentaires**

Concours « Idee Natur » de l'Office fédéral pour la protection de la nature

<http://www.idee-natur.de/wettbewerb.html> (de)

Informations sur l'association Bund Naturschutz de Bavière

<http://www.kempton.bund-naturschutz.de/index.php?id=6263> (de)

## Mise en réseau des habitats de chauves-souris dans l'espace alpin

Dans le cadre du projet INTERREG IIIB Mise en réseau des habitats (« Living Space Network »), des programmes et des mesures de protection, notamment à caractère transfrontalier, ont été développés en faveur des populations de chauves-souris. Les principes fondamentaux élaborés dans ce contexte fournissent de précieuses indications quant à la conservation et à la mise en réseau des habitats remarquables pour les chauves-souris.



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De par ses caractéristiques naturelles et la diversité de ses paysages, l'espace alpin possède une population très diversifiée de chauves-souris. Ces animaux étant très exigeants à l'égard de leur habitat – ils ont besoin d'une grande variété de structures connectées – ils sont une composante fondamentale du réseau écologique. Au fil des saisons et aux différents moments de la journée, les chauves-souris utilisent des habitats très diversifiés, qui peuvent être éloignés de plusieurs centaines de kilomètres. Ces habitats leur servent de gîtes, mais aussi de territoires de chasse, en particulier dans les forêts semi-naturelles et dans les paysages ruraux caractérisés par des structures diversifiées.

L'un des principaux résultats du projet de protection des chauves-souris est la réalisation d'un guide pour la réhabilitation des bâtiments, qui précise les exigences d'une vingtaine d'espèces de chauves-souris vivant dans les structures bâties : en effet, nombre de chauves-souris doivent aménager leur gîte dans des bâtiments car leurs territoires naturels se sont raréfiés suite à l'exploitation intensive des forêts. La réhabilitation et la transformation des bâtiments anciens peuvent considérablement perturber l'animal. Le guide propose 230 exemples de travaux de réhabilitation, pour la plupart réalisés dans l'espace alpin. En outre, il fournit des informations sur l'écologie des gîtes des différentes espèces, en particulier sur leur utilisation temporelle et spatiale, et sur leurs principales caractéristiques. Enfin, sur la base des expériences réalisées, le guide décrit la façon dont l'animal réagit aux perturbations et aux modifications de son gîte, et il fournit des lignes directrices concernant les mesures de réhabilitation préconisées pour chaque espèce.

Le projet se propose également de préserver les terrains de chasse du petit murin. Un programme transfrontalier de conservation des prairies semi-naturelles a été mis au point dans cette perspective. L'amélioration ciblée des habitats permet d'accroître les terrains de chasse potentiels et la disponibilité de nourriture, ce qui devrait avoir un effet positif sur la population de chauves-souris. Les mesures de valorisation des terrains de chasse peuvent différer considérablement d'une région à l'autre. Dans les paysages exploités de manière

intensive, l'extensification des surfaces agricoles et l'aménagement de nouvelles prairies extensives peuvent avoir un impact positif. L'époque et le rythme de la fauche jouent également un rôle important, ainsi que le non-recours aux engrais. En revanche, dans d'autres régions, la mise en jachère, l'embroussaillage et le reboisement qui en résultent mettent en péril les terrains de chasse des chauves-souris. Dans ces territoires, il est donc nécessaire de prévoir d'autres mesures et instruments. En outre, la promotion des terrains de chasse pour les chauves-souris ne doit pas être dissociée des mesures de protection de leurs gîtes de reproduction. Il convient dès lors de développer une démarche globale prenant en compte les diverses exigences de l'animal en matière d'habitats.

Outre d'autres projets axés sur la protection ciblée des chauves-souris dans les Alpes, plusieurs manifestations et actions d'information ont été réalisées dans le cadre du projet de mise en réseau des habitats. Signalons en particulier l'organisation d'une conférence internationale et d'initiatives connexes visant à sensibiliser le public aux chauves-souris.

### **Bilan**

Des initiatives nombreuses et variées ont été réalisées dans le cadre du projet INTERREG consacré à la protection des chauves-souris dans l'espace alpin. Le guide de réhabilitation des bâtiments est un excellent outil permettant de rénover les bâtiments tout en respectant les chauves-souris. Néanmoins, les projets mis au point ne peuvent être couronnés de succès que s'ils sont effectivement appliqués et s'ils sont développés en permanence.

Les résultats du projet sont un bon point de départ pour la planification de mesures favorables aux chauves-souris dans le cadre du réseau écologique. Ils fournissent toute une série de suggestions à différents niveaux.

### **Contacts et informations complémentaires**

INTERREG IIIB Mise en réseau des habitats, sous-projet Chauves-souris, avec entre autres un guide pour la réhabilitation des bâtiments :

<http://www.lsn.tirol.gv.at/en/index.htm> (de, it)

## Agriculture

### Exemple du Parc naturel régional «Massif des Bauges», France

L'inventaire des espèces d'une prairie est le reflet de son mode d'exploitation et du site. Si le mode d'exploitation reste inchangé, la composition des espèces est relativement constante. Cette corrélation offre l'opportunité de subordonner les aides accordées aux prairies extensives à la présence d'espèces végétales remarquables. La mise en œuvre de cette approche innovante et ciblée nécessite la création d'un catalogue des fleurs champêtres permettant de reconnaître de manière simple et sûre une prairie extensive riche en espèces.



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Dans le cadre du programme « Prairies fleuries », l'octroi des aides est subordonné à l'observation dans les prairies de certaines espèces végétales aisément reconnaissables (espèces indicatrices). Le respect des engagements est assuré par une méthode de contrôle ad hoc sur le terrain. Dans la période qui précède la première fauche (de la mi-mai à la mi-juin selon l'altitude et le stade phénologique), les agriculteurs contrôlent leurs parcelles en respectant la méthode prescrite, et ils notent les espèces indicatrices identifiées. S'ils observent un certain nombre d'espèces indicatrices sur leur parcelle, ils reçoivent une rémunération.

Cette mesure repose sur une démarche volontaire. Les agriculteurs concernés s'engagent à conserver la diversité floristique de leurs parcelles (prairies et pâturages), mais aucune interdiction ne leur est imposée, ni aucune procédure particulière n'est prescrite pour atteindre ces résultats. Ceci permet de prendre en compte les compétences de l'agriculteur, de le responsabiliser et de le sensibiliser à la protection de la nature et à la biodiversité. Pour mieux faire connaître cette mesure, un prix est décerné chaque année aux plus belles prairies.

Dans le Parc naturel des Bauges, cette mesure a été mise en place en 2006. En 2008, près de 70 agriculteurs y participaient, pour une surface totale de 1 000 ha. L'aide accordée s'élève à 89 € par hectare sur toutes les surfaces concernées.

### Bilan

L'expérience du Parc naturel régional « Massif des Bauges » est extrêmement positive. Les aides accordées aux prairies et pâturages riches en espèces sont bien accueillies par les agriculteurs, qui sont rémunérés en fonction des résultats de leur travail, mais sans aucune



obligation à leur charge ni aucune dépense supplémentaire. En outre, leur expérience et leurs compétences sont respectées. Les collaborateurs du Parc naturel chargés du suivi de la mesure expriment aussi un avis très positif : ils n'ont plus pour mission de contrôler, mais de conseiller les agriculteurs. Une nouvelle forme de communication et de coopération a ainsi été instaurée.

Le programme « Prairies fleuries » du Parc naturel des Bauges est une mesure relativement récente. Dans le Land du Bade-Wurtemberg (Allemagne), elle est mise en œuvre avec succès depuis 2002 : plus de 10 000 agriculteurs participent aux programmes MEKA II et III. En France, huit parcs naturels expérimentent actuellement cette mesure de valorisation des prairies fleuries dans le cadre de programmes analogues.

En Allemagne, des études échelonnées sur plusieurs années ont montré les effets positifs de la mesure sur le plan écologique. Dans le Parc naturel des Bauges, il est encore trop tôt pour dresser un tel bilan écologique.

### **Contacts**

Parc naturel régional du Massif des Bauges, interlocuteur : Philippe Mestelan  
<http://www.parcdesbauges.com/agriculture/agri-environnement/> (fr)

### **Informations complémentaires**

Ministère de l'alimentation et de l'espace rural du Bade-Wurtemberg, informations sur le programme « Artenreiches Grünland nach MEKA in Baden-Württemberg »  
[http://www.landwirtschaft-mlr.baden-wuerttemberg.de/servlet/PB/menu/1040915\\_11/index1215700849246.html](http://www.landwirtschaft-mlr.baden-wuerttemberg.de/servlet/PB/menu/1040915_11/index1215700849246.html) (de)

Rapport détaillé d'un voyage d'étude organisé par le Parc naturel des Bauges et l'INRA d'Avignon sur le thème des prairies fleuries. Ce document présente de manière détaillée le programme du Bade-Wurtemberg et celui du Parc naturel du Massif des Bauges  
[http://www.alparc.org/content/download/21418/199283/version/1/file/Rapport\\_voyage\\_MEKA\\_Juillet07.pdf](http://www.alparc.org/content/download/21418/199283/version/1/file/Rapport_voyage_MEKA_Juillet07.pdf) (fr)

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

## Semis riche en espèces sur terre cultivée, district de Würzburg, Allemagne

Le projet pilote « Mit Biotopverbund in die Kulturlandschaft » (Réseau écologique : vers un paysage rural), qui a été réalisé dans deux communes du district de Würzburg, ambitionne la création d'un vaste réseau écologique sur une période de cinq ans. En outre, il vise à réduire les conflits potentiels entre les divers utilisateurs, notamment l'agriculture et la sylviculture, la chasse, la protection de la nature et les loisirs.

Dans cette optique, des mélanges de graines à base de diverses espèces sauvages et cultivées ont été mis au point. Ces mélanges ont été semés essentiellement sur les terres en jachère. La mise en œuvre du projet prévoit l'utilisation des outils de développement agricole traditionnels (mesures agro-environnementales, réaffectation et gel des parcelles), mais aussi la combinaison de ces outils avec d'autres mesures, ainsi que leur développement ultérieur. Une équipe multidisciplinaire (formée notamment de biologistes, d'experts forestiers et de spécialistes en entretien du paysage) a été constituée pour mettre au point le projet. Diverses administrations ont été impliquées, notamment l'Office de l'agriculture, l'Office des forêts et l'Association pour la protection du paysage. Les agriculteurs, les chasseurs et les représentants des communes ont également été mis à contribution.



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Dans un premier temps, on a analysé les attentes de la population à l'égard des champs. Les sondages réalisés ont montré que la majorité des résidents souhaitait davantage de bords de sentiers fleuris, de haies, de bosquets champêtres, de plans d'eau et de prairies complantées d'arbres fruitiers.

On s'est ensuite demandé comment répondre aux attentes de la population dans le cadre de la création d'un réseau écologique. Il s'est avéré que l'implantation de structures végétales durables (haies, bosquets champêtres) est très difficile sur les terres arables de qualité, et qu'une telle action n'était possible qu'en combinaison avec des mesures de compensation ou de substitution. L'une des principales mesures du réseau écologique a donc été de promouvoir les plantes à fleurs sur les surfaces arables. À cette fin, on a ensemencé les surfaces gelées avec diverses espèces de plantes sauvages. Au fil du projet, la composition des semis a évolué, et elle a été calibrée sur les exigences de différentes espèces animales. Plusieurs mélanges de graines ont ainsi été mis au point, notamment un mélange de fleurs particulièrement adapté aux bordures des champs et aux surfaces en jachère. L'un des principaux critères à prendre en compte dans la composition des mélanges est qu'ils ne doivent pas poser de problèmes pour la culture des parcelles et qu'ils doivent permettre un

retour aux modes de production traditionnels. En outre, on a volontairement utilisé des espèces autochtones.

## **Bilan**

Les surfacesensemencées d'espèces sauvages diversifiées offrent une source de nourriture et un abri à bon nombre d'espèces, dans un contexte - les champs - souvent caractérisé par une structure végétale assez pauvre. L'importance des surfacesensemencées pour la protection des espèces a pu être démontrée par de nombreuses études scientifiques consacrées aux oiseaux et aux invertébrés, qui ont été réalisées en marge de l'initiative (carabidés, araignées, papillons diurnes). La présence d'animaux nidifiant dans les haies (par ex. le pie-grièche écorcheur) a également pu être documentée.

Enfin, le second questionnaire – qui a été soumis au terme du projet - a montré que les zones fleuries sont très bien accueillies par les agriculteurs, les chasseurs et la population locale. Dans le cadre du projet, 3,56% de la commune et 8% de la surface de production ont été enherbés. Le financement des parcelles peut être assuré par des mesures agro-environnementales. Une possibilité de financement innovante est représentée par la contribution financière des chasseurs et des communes bénéficiant de la mesure. Globalement, le projet a montré que, dans les paysages exploités de manière intensive, l'ensemencement de plantes sauvages diversifiées est une mesure optimale pour créer un réseau écologique attractif et efficace sur le plan écologique.

L'ensemencement des surfaces avec des espèces diversifiées, notamment dans le cadre des programmes destinés aux lisières des champs, est une mesure figurant dans nombre de programmes agro-environnementaux. Le projet « Réseau écologique : vers un paysage rural », s'est particulièrement attaché à analyser l'importance de la création d'habitats sur les terres gelées dans le cadre de la mise en place d'un réseau écologique. Des résultats analogues ont été obtenus dans le cadre du projet financé par le DBU « Lebensraum Brache » (Les terres en jachère : un habitat), qui étudie les opportunités d'aménagement des terres en jachère tout en prenant en compte les exigences de la faune sauvage, et ce grâce aux outils de gestion des marchés agricoles (gel des terres) existant en Allemagne.

## **Contacts**

Bayerische Landesanstalt für Weinbau und Gartenpflege (LWG), Abteilung Landespflege, interlocuteur : Martin Degenbeck

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

## **Informations complémentaires**

Bayerische Landesanstalt für Weinbau und Gartenpflege, Abteilung Landespflege (2007) : Biotopverbund : vers un paysage rural. L'ensemencement d'espèces diversifiées sur les terres arables : un nouvel instrument majeur pour la protection de la nature – Résultats d'un projet pilote dans le District de Würzburg.

[http://www.lwg.bayern.de/landespflege/landschaftspflege/25786/ansaat\\_pilotpro.pdf](http://www.lwg.bayern.de/landespflege/landschaftspflege/25786/ansaat_pilotpro.pdf) (de)

Projet « Lebensraum Brache » (Les terres en jachère : un habitat) de la Deutsche Wildtierstiftung, financé par la Deutsche Bundesstiftung Umwelt (DBU). Rapport final « Qui sème la diversité crée un espace de vie – Comment transformer les jachères monotones et

les terres gelées en précieux habitats »

<http://www.lebensraum->

[brache.de/downloads/service/downloads/eigene/2007\\_Endbericht\\_Lebensraum\\_Brache.pdf](http://www.lebensraum-brache.de/downloads/service/downloads/eigene/2007_Endbericht_Lebensraum_Brache.pdf)

(de)

## Tourisme et Loisir

### «Erlebnis Grünes Band» (À la découverte de la Trame verte), Allemagne

Grâce à ses espèces et à ses habitats diversifiés – pour la plupart menacés –, mais aussi à son importance majeure pour le réseau écologique, la Trame verte revêt une grande valeur pour la protection de la nature. En effet, le long de l'ancienne frontière qui séparait la RFA de la RDA, la nature a pu s'épanouir librement pendant plusieurs décennies. Sur toute sa longueur de l'ancienne frontière, la Trame verte relie des territoires écologiquement précieux avec des paysages agricoles exploités de manière intensive, comme les Börden (terrains bas fertiles typiques du nord de l'Allemagne). Elle offre souvent un dernier refuge à nombre d'espèces animales et végétales menacées et particulièrement sensibles aux perturbations.



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En vue d'assurer la conservation à long terme de la Trame verte, l'Office fédéral pour la protection de la nature finance depuis 2007 un projet intitulé « À la découverte de la Trame verte ». Ce projet vise à sensibiliser la population locale et les touristes à l'importance de la Trame verte, et il propose de faire connaître et découvrir ces paysages et leur histoire aux touristes et aux visiteurs. À cette fin, au-delà des mesures concrètes d'entretien du paysage, le projet envisage l'adoption d'une signalisation uniforme, le balisage des pistes cyclables et des sentiers de randonnée, la réalisation d'expositions, la conception de forfaits de découverte la nature et de forfaits touristiques.

En vue d'élaborer des stratégies marketing ad hoc, trois régions modèles ont été identifiées. Elles ont adopté chacune un label propre axé sur des thèmes différents. Un aspect majeur est représenté par l'histoire de la région, qui délimitait autrefois les deux Allemagne. Dans cette optique, des forfaits touristiques ont été conçus avec la participation des structures d'accueil intéressées. Signalons notamment les initiatives visant à valoriser l'artisanat et les attraits historiques et culturels de la région.

La coopération transfrontalière est encouragée dans toutes les régions modèles. Elle vise à surmonter non seulement les limites administratives (par ex. entre les districts et les Länder), mais aussi les frontières qui séparent souvent les différents secteurs (environnement, agriculture, tourisme et patrimoine historique). Cette démarche mise sur une approche intégrée qui, à long terme, est destinée à apporter une contribution majeure au développement régional respectueux de la nature.

Tous les acteurs des régions modèles bénéficient d'une assistance professionnelle et scientifique : citons notamment l'évaluation générale du projet, la création d'une image commune, les conseils fournis par les experts et le marketing centralisé.

### **Bilan**

Divers forfaits et offres ont déjà été développés dans le cadre du projet. On les trouve sur Internet et sous forme de brochures, sous le label commun « Erlebnis Grünes Band ».

### **Informations complémentaires**

Informations du Bundesamt für Naturschutz (Office fédéral pour la protection de la nature)  
[http://www.bfn.de/0311\\_gruenes\\_band.html](http://www.bfn.de/0311_gruenes_band.html) (de)

Site Internet « Erlebnis Grünes Band »  
<http://www.erlebnisgruenesband.de/> (de)

## **Programmes d'escalade – L'escalade respectueuse de la nature, Allemagne**

De nombreuses parois rocheuses sont le refuge d'espèces animales et végétales rares et protégées. Les fougères et les mousses affectionnent les zones humides et ombragées au pied des parois, tandis que leur sommet brûlé par le soleil exige une capacité d'adaptation à la sécheresse et aux fortes amplitudes thermiques. Entre ces deux extrêmes, toutes sortes de plantes trouvent refuge dans des espaces très restreints : les parois lisses accueillent les lichens, les petits trous sont le lieu de vie des plantes à fleurs, les touffes d'herbe poussent sur les vires, tandis que les bruyères communes se développent près du sommet.



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Les parois rocheuses sont également le lieu de vie d'une faune tout à fait spécifique : parmi les oiseaux, signalons le faucon pèlerin et le hibou grand-duc, qui sont très tributaires des biotopes des parois, au même titre que certaines espèces d'insectes très spécialisées et rares. Parmi les mammifères des parois rocheuses particulièrement en danger, les chauves-souris passent leurs quartiers d'hiver dans les cavités, tandis que l'été il n'est pas rare qu'elles élisent domicile dans les crevasses. Pour éviter que ces espaces naturels uniques ne soient endommagés par les grimpeurs, il est utile et nécessaire de réglementer la pratique de l'escalade dans un esprit respectueux de la nature.

### **Mesure du Club alpin allemand (DAV)**

Les diverses mesures conçues par le Club alpin allemand pour une escalade respectueuse de la nature prévoient l'élaboration de programmes d'escalade en collaboration avec les autorités et les associations de défense de l'environnement. Le DAV table sur des solutions différenciées réglementant sur une petite échelle les sites où l'escalade respectueuse de l'environnement est praticable et ceux où, au contraire, il est préférable d'y renoncer pour protéger la nature. Les voies d'accès et les zones fermées des parois sont balisées à l'aide de panneaux standards utilisés sur l'ensemble du territoire allemand. Durant la période de couvain des oiseaux protégés, notamment des faucons pèlerins, une partie des parois ou leur totalité est fermée à titre temporaire.

Un élément central de cette stratégie est représenté par les assistants locaux d'escalade. Avec les autres associations allemandes d'escalade (notamment IG Klettern et Vereinigung der Pfälzer Kletterer), le DAV a créé une structure de suivi des zones d'escalade allemandes extra-alpines qui, depuis l'instance faïtière au niveau fédéral jusqu'aux commissions des Länder et des régions en passant par les assistants locaux d'escalade, permettent de pérenniser les zones d'escalade dans le cadre d'une nature intacte. Les assistants d'escalade coordonnent des actions telles que la réhabilitation écocpatible des itinéraires, l'aménagement des voies d'accès et la participation active à la surveillance des faucons pèlerins.

La signalisation standardisée des parois rocheuses adoptée à l'échelon national facilite la communication avec les sportifs. La végétation des parois rocheuses se présente comme une riche mosaïque alternant des surfaces sans végétation avec des zones couvertes de verdure. Pour respecter cette diversité, les programmes d'escalade prévoient souvent le zonage des parois à petite échelle. Les symboles simples de la croix et de la flèche permettent de séparer les zones fermées des zones à accès libre. En outre, sur les sites sensibles, ces symboles signalent la voie d'accès optimale. Enfin, mentionnons la création d'un système d'information unique en son genre : un portail Internet fournissant des renseignements détaillés sur les parois d'escalade allemandes (recherche détaillée des parois, cartographie interactive, informations générales sur la nature locale, actualités nationales et régionales, outils utiles pour les assistants d'escalade).

### **Bilan**

Grâce à la stipulation d'accords volontaires, les mesures sont très bien acceptées par les grimpeurs. Par ailleurs, cette procédure présente l'avantage de soulager les administrations et, par conséquent, de réduire les coûts et d'accroître la flexibilité. Lorsque le contrôle des

résultats permet l'acquisition de nouvelles connaissances scientifiques, on peut modifier la réglementation sans grosses contraintes en termes d'organisation et de ressources financières.

La stratégie présentée repose sur la stipulation d'accords clairs avec les utilisateurs (sportifs) et sur la participation active des volontaires. En outre, le travail d'information réalisé en parallèle est un moyen simple mais efficace d'établir le dialogue avec les sportifs et de les sensibiliser à la nature dans le cadre de leurs loisirs.

### **Informations complémentaires**

Pour des informations plus détaillées sur les programmes d'escalade et l'escalade respectueuse de la nature, se reporter au portail d'information consacré aux parois rocheuses :

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

### **Le ski de randonnée respectueux de l'environnement, parc national Berchtesgaden, Allemagne**

Depuis quelques années, les randonnées en raquettes et le ski de randonnée suscitent un engouement croissant. Ces sports permettent de profiter du paysage hivernal hors des sentiers et des pistes, mais leurs adeptes pénètrent dans les lieux de refuge des animaux sauvages qui, l'hiver surtout, sont très sensibles aux perturbations.



© Christian Schneider

### **Exemple du Parc national de Berchtesgaden, Allemagne**

Dans le Parc national de Berchtesgaden, en accord avec les associations alpines, l'administration du Parc effectue une coupe et un nettoyage réguliers de six itinéraires traditionnels afin de mieux gérer le flux de skieurs. Ceci permet d'éviter que le ski de randonnée ne s'étende trop en termes spatiaux, temporels et quantitatifs. En outre, la description des itinéraires dans les guides de randonnée permet de concentrer la pratique de ce sport sur certains sites, et d'éviter de perturber les zones de refuge des animaux sauvages.

Signalons que le projet « Ski de randonnée respectueux de la nature » du Club alpin allemand (DAV) est également mis en œuvre dans la région du Parc national. Ce projet vise à organiser la pratique du ski de randonnée aussi durablement que possible et dans un esprit respectueux de la nature. Les habitats sensibles de la faune sauvage, en particulier les territoires où vivent les tétraonidés, doivent être touchés le moins possible par les itinéraires.

Dans les zones critiques, le DAV a élaboré des itinéraires recommandés à l'intention des randonneurs à ski. Le public est informé grâce à une signalétique spéciale (délimitation des zones sensibles, signalisation des sentiers, panneaux et cartes sur les parkings). En outre, le DAV envisage de collaborer avec les auteurs et les éditeurs de guides de randonnées. Toutes les autorités et les associations concernées (Office des forêts, bureaux du Landesrat, secours alpin, Bund Naturschutz, Association fédérale pour la protection des oiseaux, Fédération allemande de ski, Association fédérale des chasseurs, Fédération bavaroise des agriculteurs, Association pour la protection de la montagne, Amis de la nature, etc.) participent à cette action commune. En outre, l'initiative est accompagnée de travaux scientifiques consacrés à la « Perturbation de la faune sauvage par les skieurs ».

### **Bilan**

Ces mesures sont très bien comprises et acceptées par les randonneurs à ski, en particulier dans le périmètre de l'espace protégé. Leur impact positif, notamment sur les populations de tétraonidés, a été documenté à plusieurs endroits, y compris dans les montagnes allemandes de moyenne altitude.

### **Informations complémentaires**

Informations sur le projet « Le ski de randonnée respectueux de la nature » sur le site du DAV :

[http://www.alpenverein.de/template\\_loader.php?tplpage\\_id=51](http://www.alpenverein.de/template_loader.php?tplpage_id=51) (de)

Informations sur les initiatives du Parc national de Berchtesgaden :

[http://www.nationalpark-berchtesgaden.bayern.de/01\\_nationalpark/01\\_aufgaben/09\\_management/06\\_skibergsteigen/index.htm](http://www.nationalpark-berchtesgaden.bayern.de/01_nationalpark/01_aufgaben/09_management/06_skibergsteigen/index.htm) (de)



## Relations publiques

### **Exemple de l'association française de défense de l'environnement FRAPNA: le kit de jeux «Nature sans frontières»**

Les enfants sont les acteurs et les décideurs de demain. Il est donc important de leur apprendre de manière simple et ludique l'écologie et les principales modalités de fonctionnement des systèmes naturels. C'est précisément le but du kit de terrain pédagogique «Nature sans frontières».

Tous les êtres vivants sont obligés de se déplacer dans leur milieu de vie pour trouver des partenaires, se reproduire, se nourrir, rejoindre leurs habitats saisonniers, bref pour pouvoir accéder à leurs ressources vitales. Or, de multiples barrières entravent la mobilité de nombre d'espèces, en particulier les routes, les clôtures et les voies de chemin de fer. Ces barrières interrompent les liaisons naturelles existant entre les habitats, mais on peut les franchir de différentes manières.

Le kit de terrain « Nature sans frontières » est axé sur la pratique. Il permet aux enfants et aux jeunes de se familiariser avec les exigences de déplacement de quelques espèces exemplaires, de reconnaître les barrières auxquelles elles se heurtent et les possibilités de franchissement qui s'offrent à elles. Ces jeux tous publics se prêtent aussi bien aux activités en classe qu'aux excursions en plein air.

Le kit comprend un carnet théorique avec illustration de la problématique, un mode d'emploi avec des solutions (80 pages), un cahier d'activités avec des consignes pour les observations, des expériences, diverses activités (60 pages) et plusieurs jeux (jeu de cartes, jeu de plateau, planches d'identification, silhouettes d'oiseaux...). En outre, un jeu interactif destiné aux enfants est proposé sur Internet.

Ce kit de jeux a été conçu entre 2005 et 2008 dans le cadre d'une campagne d'éducation à l'environnement consacrée aux corridors écologiques. Un club d'enfants a été créé en parallèle (Nature sans frontières), auquel les classes et les groupes peuvent transmettre leurs observations et leurs expériences. En outre, le Club publie régulièrement une revue (3 fois par an). Le site Internet fournit des informations sur l'actualité et sur les points saillants de la campagne.

### **Informations complémentaires**

Page d'accueil de la campagne d'éducation à l'environnement :  
<http://www.frapna-haute-savoie.org/> (de)

## "Lumière verte pour les corridors écologiques", de la région frontalière franco-suisse du bassin lémanique

Le sentier pédagogique « Feu vert aux corridors écologiques » a été développé dans le cadre d'un projet transfrontalier Interreg IIIA par les organisations de défense de l'environnement Pro Natura Genève, Appollon 74 et FRAPNA Haute-Savoie. Ce sentier conduit des rives de l'Arve (Suisse) aux hauteurs du Salève. De nombreux panneaux réalisés en collaboration avec les écoles de la région et expliquant l'importance des corridors écologiques ont été installés le long du sentier. Dans le cadre de cette coopération, les enseignants et les écoliers ont mené une réflexion approfondie sur le thème de la mise en réseau des habitats. L'initiative a vu la participation de 20 classes.



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Le sentier est axé sur deux thèmes principaux. D'une part, il souligne l'importance de la protection des habitats existants, d'autre part il montre comment réduire la fragmentation du paysage pour faciliter la mobilité des animaux. D'autres outils éducatifs ont été élaborés dans le cadre du projet, notamment une brochure et une exposition itinérante.

Une campagne d'information s'adressant tout particulièrement aux responsables de l'aménagement du territoire et aux administrations communales a été organisée en marge de l'initiative. Un manuel d'aide à la décision a été rédigé et des actions d'information organisées, toujours à l'intention des administrations communales. L'un des objectifs de ces manifestations était d'illustrer le caractère multifonctionnel des corridors, qui ne revêtent pas seulement un rôle écologique et social (espaces de loisirs et de détente), mais qui ont aussi une fonction économique (par ex. gestion durable des bandes de verdure le long des routes).

### **Bilan**

On ne peut attendre un effet écologique direct de cette mesure. Néanmoins, l'excellente coopération mise en oeuvre, le grand intérêt manifesté par les nombreuses classes participantes et la fréquentation assidue des initiatives organisées la journée et le soir à l'intention des responsables des communes et des administrations témoignent du grand intérêt suscité par cette mesure, et plaident en faveur de son impact écologique indirect.

### **Contacts**

Interlocuteur de FRAPNA Haute-Savoie : Damien Hiribarrondo

<http://www.frapna-haute-savoie.org/> (fr)

## «Running Wild – Courir pour le chat sauvage», Allemagne

En septembre 2006, le BUND Deutschland a organisé avec la Fédération sportive de Thuringe la première course intitulée « Running Wild – Courir pour le chat sauvage ». Cette manifestation visait à montrer la nécessité de rétablir les connexions entre les forêts de Thuringe, de Bavière et de Hesse pour permettre aux chats sauvages de se déplacer sur de grands espaces. L'initiative a permis de faire connaître au grand public le corridor de migration des chats sauvages, dont l'aménagement est planifié entre le Parc national de Hainich et la forêt de la Thuringe.



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La course a été organisée par divers organismes régionaux, notamment des associations sportives, des organisations de défense de la nature et de l'environnement, des administrations et des entreprises. Elle était parrainée par une célébrité sportive de la région.

La course des chats sauvages fait partie d'un projet BUND Deutschland intitulé le « Réseau de sauvetage du chat sauvage », qui se propose d'aménager à l'échelon national 20 000 km de corridors de migration pour les espèces animales menacées, notamment le chat sauvage, le blaireau et la martre. Les organisations écologistes et les volontaires ont défini un parcours des chats sauvages, qui devra à l'avenir inspirer la planification écocpatible des voies de communication, des zones habitées et des zones industrielles.

Les études menées dans le cadre du projet ont montré que de petites populations de chats sauvages vivent dans des territoires isolés. On a réalisé une analyse approfondie des obstacles entravant leur propagation. À l'avenir, ces territoires fortement isolés devront donc être mieux connectés pour pérenniser les populations de chats sauvages. On envisage notamment la création de liaisons couvertes de broussailles et d'arbres (d'environ 50 m de largeur sur 20 km de longueur) pour permettre la propagation du chat sauvage du Parc national de Hainich vers la forêt thuringeoise. D'autres corridors devront être aménagés à plus longue échéance afin de relier les espaces boisés de Thuringe, de Bavière, de Hesse, de Basse-Saxe et du Bade-Wurtemberg.

La course des chats sauvages est une composante essentielle du projet. Elle a favorisé l'information du public, et a permis de lui présenter le corridor destiné à la faune sauvage tout en attirant son attention sur les chats sauvages, leurs besoins et leur importance. Les courses organisées sur diverses distances étaient assorties d'un riche programme parallèle, qui a permis de mieux sensibiliser le public à la diversité biologique et à l'importance des liaisons écologiques dans le paysage.

## Bilan

En septembre 2006, la première course Running Wild a vu la participation d'environ 250 coureurs et 2 000 visiteurs. Compte tenu du succès remporté par la manifestation, deux autres courses sur le thème des chats sauvages ont eu lieu en 2008, l'une en Thuringe et l'autre en Hesse.

La course organisée en juin 2008 par le BUND Waldeck Frankenberg conduisait du massif du Rothaargebirge vers le Burgwald-Kellerwald. Elle visait à présenter au public le corridor pour chats sauvages, dont l'aménagement est prévu entre les deux territoires. La course a reçu le prix MUNA pour l'environnement de la fondation Deutsche Bundesstiftung Umwelt (DBU), dans la catégorie communication environnementale. Le vaste projet de mise en réseau des biotopes apporte une précieuse contribution à la protection des espèces et de la nature, tandis que la course des chats sauvages est un excellent outil de communication pour sensibiliser le public au problème de la fragmentation écopaysagère. L'organisation des courses au niveau territorial accroît la sensibilité de la population à l'égard du thème. Elle permet de communiquer des informations détaillées, tout en dégagant des ressources financières complémentaires pour la protection des chats sauvages. Enfin, l'association BUND Thuringe propose une initiative de parrainage des chats sauvages, qui permet aux personnes intéressées de soutenir financièrement le « Réseau de sauvetage des chats sauvages » dans le Land de Thuringe.

## Informations

« Running Wild – la course des chats sauvages »  
<http://wildkatzet3.bund.net/index.php?id=79> (de)

## Gestion des eaux

### Projet LIFE – Paysage de rivière torrentielle du Lech, Tyrol, Autriche

Les cours d'eau sont une composante essentielle du réseau écologique. Ils constituent des éléments de liaison linéaires naturels de plusieurs kilomètres de longueur et, grâce aux écosystèmes qui les bordent, offrent d'importants corridors de propagation aux espèces animales et végétales. Souvent, les cours d'eau ne peuvent plus s'acquitter pleinement de cette fonction naturelle car ils sont soumis à de fortes restrictions de leur extension territoriale et de leur dynamique.

Ceci concerne entre autres les nombreuses rivières de l'espace alpin. Enfin, les cours d'eau sont un excellent moyen pour développer la coopération transfrontalière, car ils traversent parfois plusieurs pays, et il n'est pas rare qu'ils forment des frontières naturelles délimitant les territoires nationaux. Ajoutons que les mesures relatives aux cours d'eau contribuent à la mise en œuvre de la Directive-cadre sur l'eau de l'UE : le rétablissement de la perméabilité des cours d'eau fait partie intégrante de cette Directive, et il a un caractère obligatoire pour les États membres.



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Les mesures visant les cours d'eau, en particulier leur revitalisation, sont souvent des actions de grande envergure : non seulement elles mobilisent de nombreux acteurs et divers intérêts, mais elles sont également très coûteuses.

Le projet LIFE Tiroler Lech a été mis en œuvre dans le site Natura 2000 de la Lechtal de 2001 à 2006. Ce projet prévoyait entre autres la construction d'ouvrages de protection contre les crues, des mesures de revitalisation et des actions de protection de la nature. Parmi les objectifs visés, signalons la conservation et la remise en état des habitats fluviaux semi-naturel et dynamiques, ainsi que l'amélioration de la protection contre les crues. Par ailleurs, le projet visait le développement ciblé d'espèces animales et végétales menacées et sensibles aux perturbations, ainsi que la sensibilisation de la population à la protection de l'environnement. Il avait également pour objectif de réunir le plus grand nombre d'organisations possibles représentant les intérêts les plus divers. De nombreuses mesures individuelles ont été mises en œuvre dans le cadre du projet. Signalons les plus importantes :

- Extension du lit des rivières qui, à travers l'élimination des corrections, a permis de rétablir les habitats fluviaux semi-naturels.
- L'ouverture des barrages de retenue des alluvions fluviales aménagés sur les affluents avait pour but d'améliorer le bilan des matériaux charriés, et donc d'élever le niveau du lit. Cette opération se proposait de stopper l'abaissement du lit et de la nappe phréatique.
- Grâce à l'adoption de mesures de moindre envergure, les affluents du Lech ont été revitalisés et reconnectés au cours d'eau principal.
- Des projets de protection et de réintroduction des espèces ont visé certaines espèces cibles, notamment : le Coenagrion hylas, le tamarin d'Allemagne, le sabot de Vénus, le petit gravelot à collier, l'oedipode des torrents et le chabot.
- La création de plates-formes d'observation et de sentiers de découverte - notamment intégration du belvédère d'observation dans le sentier ornithologique – vise à promouvoir le tourisme respectueux de la nature. En outre, certaines mesures de gestion permettent de protéger les espèces cibles du projet, en particulier le sabot de vénus.
- Le centre d'information est le point de départ d'excursions et de manifestations visant à sensibiliser le public. En outre, il fournit des informations sur le projet et sur le milieu de vie du Lech.

## Bilan

Le projet LIFE a été le point de départ de toute une série de coopérations mobilisant divers partenaires autour du thème de la protection contre les crues, de la revitalisation du cours d'eau et du tourisme. Ainsi, le Parc naturel Tiroler Lech a été créé en 2005. Par ailleurs, le projet INTERREG « Mise en réseau des habitats le long des cours d'eau sur le modèle du Lech » s'est inspiré du projet LIFE. Sur la base des structures existantes, d'autres mesures ont été adoptées en faveur du réseau écologique, notamment un programme de protection des oiseaux nidifiant sur le gravier de l'Halblech et des mesures générales d'information du public, qui visent à souligner l'importance des éléments de liaison dans le paysage. Signalons à cet égard l' « Aktion Lechfloss 2005 ». Par ailleurs, des propositions d'actions destinées à d'autres cours d'eau transfrontaliers ont été développées dans le cadre du projet INTERREG, qui pourraient être transférées à d'autres projets.

## Informations complémentaires

Informations sur le projet LIFE Tiroler Lech :

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

Informations sur le projet INTERREG IIIB Mise en réseau des habitats, sous-projet Cours d'eau

<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](http://www.lsn.tirol.gv.at/it/doc/fliessgewaesser_it.pdf) (it)

## Transports

### Gestion raisonnable du fauchage des bords des routes, Isère, France

Les fauches tardives permettent aux plantes de fleurir, de fructifier et de former des graines, ce qui en fait une source d'alimentation et un abri pour les insectes et les animaux de petite taille.

La qualité des habitats des bandes de verdure et des bords des routes dépend d'une multitude de facteurs. La fauche est le facteur le plus facilement maîtrisable. En retardant le fauchage des bandes de verdure jusqu'à la fin de l'été ou en utilisant des techniques de fauche en mosaïque appliquées à de petites surfaces, on peut par exemple améliorer l'habitat des papillons diurnes.



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### Exemple du département français de l'Isère

Dans le département de l'Isère, les services d'entretien des routes et l'administration départementale (le Conseil général) ont engagé depuis 2004 un partenariat avec l'association de défense de la nature GENTIANA, afin de réaliser un projet intitulé « Fauchage raisonné, nature protégée » sur les bords des routes et les bandes de verdure du département. Cette opération vise à préserver la biodiversité en éliminant l'usage des produits chimiques et en pratiquant un fauchage plus raisonnable. Au préalable, la diversité des espèces animales et végétales sur les bords des routes départementales a été recensée dans le cadre d'une étude approfondie réalisée par GENTIANA. La gestion du fauchage répond au mot d'ordre « faucher autant que nécessaire mais aussi peu que possible », qui doit notamment tenir compte de la sécurité des usagers des routes. Le fauchage ne doit pas être pratiqué avant la floraison et la germination de la majorité des espèces florales.

### Bilan

L'installation de panneaux sur les sites stratégiquement et écologiquement remarquables du réseau routier permet d'attirer l'attention du public sur cette opération et de l'en informer. L'impact positif de cette mesure sur la faune et la flore a déjà été documenté. En outre, les coûts ont été réduits grâce à une meilleure planification des périodes de fauchage et du matériel employé, ainsi qu'à la diminution de la charge de travail.





## Informations complémentaires

Informations sur le « fauchage raisonnable », assorties de fiches d'information et d'exemples, sur le site de l'association Gentiana :

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

## Divers .

### Diagnostic de la pollution lumineuse, Isère, France

L'expression pollution lumineuse désigne la présence dans le ciel nocturne de lumière diffusée par des sources lumineuses artificielles. Ce phénomène a plusieurs conséquences, dont celle de perturber le cycle de croissance des plantes exposées à un milieu éclairé artificiellement. Les sources diffuses de lumière blanche comportent un pourcentage élevé de bleu ; elles peuvent entraver gravement la navigation et l'orientation des insectes à activité nocturne et des oiseaux migrateurs.



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Les animaux nocturnes possèdent des organes sensoriels adaptés à leur mode de vie, si bien qu'ils sont très sensibles à la lumière artificielle. Ceci explique notamment la fréquence des accidents nocturnes impliquant le gibier. Les animaux s'efforcent donc d'éviter les sources lumineuses : une rue très éclairée peut par exemple constituer une importante barrière et contribuer à la fragmentation de l'habitat.

Les chiffres montrent que les sources de lumière artificielle ont considérablement augmenté ces dernières années : dans les Alpes suisses, les surfaces éclairées ont été multipliées par deux de 1992 à 2000, et l'intensité de l'éclairage a également augmenté. En France, le nombre de sources lumineuses s'est accru de 30% ces dix dernières années, tandis que la durée de l'éclairage doublait dans les communes de moins de 5 000 habitants.

### **Exemple du département de l'Isère- France**

La pollution lumineuse est essentiellement provoquée par les sources lumineuses dont la conception ou l'installation laissent à désirer. Elle peut être évitée sans entraîner de conséquences négatives, en particulier pour la sécurité des transports.

Le département de l'Isère aide les communes souhaitant réaliser un diagnostic de l'éclairage public. Un cahier des charges est mis à leur disposition pour garantir la qualité de l'analyse. Depuis 2004, une douzaine de diagnostics ont été réalisés. Le coût de cette mesure s'élève de 2 000 à 10 000 € selon la taille de la commune, le nombre de sources lumineuses et les données disponibles. Il est possible d'obtenir des aides publiques, qui peuvent couvrir jusqu'à 80% de la somme engagée. Sur la base de certaines estimations, les communes peuvent réduire leurs coûts énergétiques de 20 à 40% grâce à des investissements ciblés.

Les études susmentionnées permettent notamment d'analyser le nombre et les caractéristiques des sources d'éclairage public ; les gros points lumineux sont cartographiés, et des solutions proposées pour les sites problématiques (par ex. éclairage des monuments, des pistes de ski, des discothèques, des monuments naturels).

### **Bilan**

Outre son impact positif sur les animaux à activité nocturne, cette mesure est bénéfique pour la santé humaine, et elle permet de réduire les coûts grâce à un éclairage mieux conçu et évitant les sources lumineuses superflues.

### **Contacts et informations complémentaires**

Interlocuteur : ADEME (Agence de l'environnement et de la maîtrise de l'énergie)  
<http://www2.ademe.fr> (fr, en)

L'organisation Dark Sky fournit des informations détaillées sur la pollution lumineuse  
<http://www.darksky.org> (en)

## Signalisation des lignes électriques et aménagement des pylônes électriques

Chaque année, des centaines d'oiseaux meurent par électrocution ou suite à une collision avec une ligne électrique. De plus, les lignes électriques aériennes fragmentent les paysages et réduisent les grandes surfaces ouvertes, qui sont utiles pour les migrations des oiseaux.



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De tels accidents peuvent être évités, ou en tout cas limités grâce à une bonne coopération entre, d'une part, les associations de protection des oiseaux et de la nature et, d'autre part, les exploitants de lignes électriques.

Pour analyser la situation au niveau régional, il est nécessaire de recenser, collecter et analyser les chiffres des oiseaux morts. À partir de là, des mesures spécifiques peuvent être adoptées :

- Enterrer les lignes électriques dans les régions particulièrement risquées.
- Éliminer les pylônes électriques particulièrement dangereux (par ex. modèles dont la partie supérieure est ouverte, qui peuvent constituer un piège pour les oiseaux nidifiant dans les cavités).
- Enterrer les nouvelles lignes de 20 000 volts ou – si cela n'est pas possible – les équiper de dispositifs de sécurité ad hoc.
- Prendre en compte les biotopes dans la planification et la réalisation des travaux de coupe et de déboisement des tracés des lignes électriques aériennes (périodes de nidification, etc.).
- Aménagement de tracés raisonnables et respectueux de la nature.
- Signalisation des lignes particulièrement dangereuses (par exemple à l'aide de boules de signalisation de couleur rouge)

### Informations complémentaires

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