

# Ecological networks implemented by participatory approaches as a response to landscape fragmentation - A review of German literature

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**Abstract:** This article analyses the role of stakeholder involvement, the conditions for and approaches to practical implementation of ecological networks in Germany.

The fragmentation of landscapes is seen as one major factor for biodiversity loss in Europe. The ecological network concept is an approach to counteract biodiversity loss through landscape fragmentation. This concept explicitly embraces people in their function as architects of nature and landscape on the one hand and users on the other hand. It contains the idea of connecting core nature conservation areas via corridors and/or other connecting elements. This means that “normal-use” areas (e.g. agricultural land, cultivated forest) that have no special conservation legislation are integrated into the network. There currently is a lack in knowledge on how to implement a “functional” ecological network on the ground. The involvement of different stakeholders is one of the key factors in the successful implementation of ecological networks.

There is a lack of knowledge among stakeholders with regards to the practice of ecological network implementation that includes obstacles, opportunities, best practice, and lessons learned. The attempt was made to clarify the influence of participatory approaches on ecological network implementation. The results are based on an assessment of publications and research reports. A conceptual framework was developed to systematically review the existent literature. In order to structure the analysis and embed the complex process of ecological network implementation in a broader context, a policy model, the so-called policy cycle was used. The analysis was coupled and contrasted with a survey of experts.

The results show that participatory and cooperative approaches play different roles in all the stages of the policy cycle, and it becomes clear that these approaches are needed in all of them in order to implement a well-accepted and “functional” ecological network.

**Keywords:** ecological networks, stakeholder involvement, participatory approaches, literature review, nature conservation

## Introduction

Landscape fragmentation is seen as one of the major factors contributing to biodiversity loss in Europe (SRU, 2002). Fragmentation is a product of economic activity, which includes land consumption for infrastructure, construction, production (agriculture, forestry, industry) and tourism. In the way landscapes are affected by fragmentation their unique character in providing a frame for economic activity on the one hand and from being a product of these on the other hand, becomes obvious. In Germany, fragmentation is a fast-growing process. Between 1997 and 2000, 129 ha per day were used for the construction of houses and roads, and from 2001-2004 the figures decreased slightly to 115 ha per day (BBR, 2005). The German government had set a target to reduce this usage to 30 ha per day by 2020 (Bundesregierung, 2002).

A current approach to counteracting biodiversity loss is the Natura 2000 concept. Sites of community interest (SCIs) have been designated all over Europe. It includes the idea of a “coherent” network (Article 10 of the Habitats Directive), but the term “coherence” here does not necessarily mean “functional connectivity”. The decision on the type of measure to be taken that ensures coherence lies at the discretion of each member state (for Germany at the level of the federal states) and the legal protection of the connecting elements is still not stipulated (Burkhardt et al., 2004). As a result, only a few corridors have been established in practice as a formal part of Natura 2000 (Ecological Networks Database Central and Eastern Europe, 2007). The ecological network concept however, is a concept that goes beyond this, and attempts to reach functional connectivity. According to Jongman and

Pungetti (2004), "Ecological networks can be defined as systems of nature reserves and their interconnections that make a fragmented natural system coherent, so as to support more biological diversity than in its non-connected form". The key elements of an ecological network are core areas, buffer zones, development areas for endangered habitat types and connecting areas (corridors or stepping stones).

This means that "normal use" areas (e.g. agricultural land, cultivated forest) without special conservation legislation are integrated into the network. The concept is in line with the current paradigm change from a segregative, static, preservation-oriented nature conservation to a more integrative and dynamic-innovative one (Weixelbaumer, 2006). It explicitly embraces people in their function as architects of nature and landscape on the one hand and users on the other hand.

There is a lack of knowledge in the successful practice of ecological network implementation on the ground. The implementation of this broader concept that includes normal use areas implies, in comparison to Natura 2000, which met with strong resistance from landowners in the past, the involvement of an even higher number of stakeholders with economic activities. Furthermore, conservation authorities have no legislative authority to impose measures in these areas. Thus in the implementation process, the preferences of a wide range of stakeholders, such as the government and administrations (at the national, federal, regional and local level), non-governmental organizations (NGOs), and different land users (e.g. in farming, forest industry, tourism, transport and business) must be brought together and possible synergies have to be found.

This is where this article focuses on raising the question what the existent literature may tell us about the role of participatory approaches for ecological network implementation. The article analyses the role of stakeholder involvement and the conditions for and approaches to practical implementation of ecological networks in Germany.

The first part of the article describes the materials and methods used. The results are based on an assessment of publications and research reports. The review of the literature is structured according to a conceptual framework. The article then provides essential background information on the institutional framework for ecological network implementation in Germany. The main section presents the key overall findings of the reviewed studies and reports. The role of participation for different policy stages is discussed. The article concludes with the discussion of current implementation difficulties and the role of participation as a factor that may help in solving these problems.

The findings are part of an interdisciplinary research project, which involves partners from the Netherlands, Croatia, Estonia, Switzerland, and the UK<sup>1</sup>.

## Materials and Methods

The data is based on a literature review and interviews with policy makers and key stakeholders.

A conceptual framework was developed to systematically review the existent literature for our purposes. German literature dealing with aspects of implementation of ecological networks and stakeholder involvement in our country were searched for and used in the research of this article. The scanned literature included scientific papers, conference proceedings, project reports, policy documents and web sites.

Most of the ecological network literature addressed natural scientific aspects such as ecology and physical planning (mapping) solely. Literature regarding stakeholder involvement in the implementation process of ecological networks in the sense of the German Conservation Act even if only implicitly is very rare. Thus, after discussions with experts in the field of ecological networking, the review was broadened to include the Natura 2000 implementation process. This was done under the assumption that at least some aspects of stakeholder involvement in the Natura 2000 program could be transferred to the functional ecological networks as well. Nevertheless, it should be pointed out that the differences within these concepts are relevant to the participation aspects. Natura 2000 has its basis in the EU legislation; it does not include the idea of creating corridors outside of nature conservation areas, while the ecological network concept has its basis in the German Federal Nature Conservation Act. This leads to differences in the range of stakeholders and possibilities of conflict solving.

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In order to accentuate the aspect of stakeholder involvement, studies dealing with participation and nature conservation or biodiversity protection in general were reviewed too.

Implementation on the ground occurs from the regional to the local level. Therefore, the main part of the reviewed literature dealt with implementation in this range. In order to structure the complex process of implementing ecological networks, the literature reviewed were arranged systematically according to the policy cycle concept. The policy cycle had been developed as a tool for policy analysis (Jann & Wegrich, 2003; Jann & Wegrich, 2005). It is based on the understanding that policymaking stages follow a certain logical and chronological process. The structure and stages that compose a policy cycle differ in number and terms in the political science literature. The cycle was simplified and adapted according to our subject to the following four stages: Problem formulation/Agenda setting, Planning, Implementation, and Monitoring and Evaluation.

Following the literature review, semi-structured interviews were conducted to validate the findings from the literature review.

The leading questions were grouped into three general themes that were stated in a relevant manner for the problem field of the ecological network implementation:

- Theme 1: stakeholder involvement in different sectors
- Theme 2: balance between socio-economic interests and ecological connectivity
- Theme 3: synergies between activities at the regional, national and international levels

Six interviewees from the national through to the local level (nature conservation authorities, landowner organization, NGOs dedicated to nature conservation and ecologists/scientists) were selected for the interviews so that the relationship between these levels and the stakeholders involved can be determined. The interviews were conducted in person or by telephone and lasted for a minimum of 30 minutes. The interview analysis was achieved by restructuring the interview protocols according to the thematic categories.

## **The institutional framework and the need for cooperation**

Germany has a federal structure composed of sixteen "Länder" (states). For the field of nature protection and landscape conservation the decision making authority lies at the "Länder" level. The federal government merely provides the framework legislation.

A legal framework for a nationwide ecological network was set out in Article 3 of the Federal Nature Conservation Act (BfN, 2002) as recently as 2002. Since then, a legal obligation beyond the EU Habitats Directive (Natura 2000) to establish a "functional" ecological network on at least 10 % of their territory exists for the German "Länder" (Ssymank et al., 2006). According to the federal law, the Federal Nature Conservation Act had to be transformed into laws at the German "Länder" level by April 2005, so that all the states have completed this process by now. Their nature conservation laws give varying degrees of consideration to the ecological network concept. A general problem is that no time limit was set for the completion of the ecological network implementation process. In November 2007 Germany's federal cabinet accepted the "National Strategy on Biodiversity", which now intends that by 2010 an ecological network (as defined by the Federal Nature Conservation Act) oriented towards functional connectivity is to be established (Bundesregierung, 2007).

The interviews revealed that the challenge to comply with both requirements the ecological network idea (that had made its way into German politics already in the mid 1980s) and the implementation of the EU Habitats Directive of 1992 (Natura 2000) shifted the attention largely to the legally binding Natura 2000 site selection, explaining the late creation of a legal framework for "functional" ecological networks at the national level. The task of harmonising the activities for both concepts (Natura 2000 and the ecological networks as defined by the German Conservation Act) will take some time, given their different origins. Till now, different working groups dealing with both concepts continue to exist within the German nature conservation agency (BfN) as well as at the individual "Länder" level. Thus, the potential synergies between both concepts (leading to an economy of personnel and financial resources) do not seem to be used optimally. The stipulation to establish a network on at least 10 % of the country's territory (Federal Nature Conservation Act) leads to no further undertaking of implementation efforts to create connectivity in some regions where the figure of 10 % has already been achieved through Natura 2000 activities. According to our interviewees this lack of action could also be attributed to a conflict avoidance strategy on the part of the authorities, which prefer avoiding

the risk of provoking any renewed potential for serious conflict with land users and land owners, as was caused by Natura 2000 in the past.

(Chilla, 2005) revealed a relevant point for ecological networks, when he stressed that in a more level system the scale dimension plays an important role for nature conservation targets. There must be good communication at all levels in order to reach synergies and coherent criteria from the local up to the international level. Due to the federalist structure cooperation is needed among the German Länder for establishing a national ecological network and also in contact with other countries to establish the pan-European network (PEEN). The federal nature conservation agency (BfN) has a coordinative function for the inner German cooperation process that lays the way to a national network. In order to reach inter-“Länder” coherence that leads to a national network, common site-selection criteria had to be developed. A working group for the implementation of Article 3 of the German Nature Conservation Act was created for the facilitation of this task. This was composed of members of the nature conservation authorities from the “Länder”. The group prepared a check-list of criteria for site selection (assessment of existing sites, demand for additional sites, search for suitable development sites) and a list with target species as a recommendation (Burkhardt et al., 2004). The importance of participation and stakeholder involvement on the local level was made note of by this working group, however no indication was given as to how this could be achieved. Research on international cooperation in the Natura 2000 process was done by Leibenath et al. (2007) comparing three Natura 2000 cooperation processes along the German Polish and German Czech borders. It was noted that cooperation was successful when permanent work groups had been developed, “epistemic communities” (networks of experts with corresponding thematic principles) existed and no contradicting infrastructure projects were planned.

## **The role of participation in the process of ecological network implementation**

In Germany the implementation of ecological networks on the ground usually occurs through single projects that range from the regional to the local level. There are several good project examples like the wild cat project (Mölich & Vogel, 2007), the otter project in the metropolitan region of Hamburg (Kölsch et al., 2007), the project for connecting and protecting biotopes on sand (Niedling et al., 2005), the project to connect areas around the river Lech (Riegel & Mittelbach, 2003), and the green belt project (Harteisen, 2007).

Regarding the different policy areas and sectors involved, the stakeholders, that drive the ecological network implementation forward the most are nature conservation administrations and conservation NGOs. Planning authorities such as transport departments and private landscape planning agencies are important partners. In order to implement ecological networks in any locality, land owners (e.g. farmers, private companies), land users and their organizations have to be won over as partners. They have to cooperate in order to make the ecological network work. Discursive processes between stakeholders at all levels are important for evolving shared understandings and establishing a consensus as to how potential losses due to activities for protecting common natural diversity are to be compensated and for ensuring that no parties are left feeling victimized (Oels, 2003).

There is uncertainty regarding which policy stage participation should take place at so that the implementation of ecological networks can advance most effectively. To clarify the influence of participatory approaches on the implementation of ecological networks the results from the literature review were organized according to the stages of the policy cycle. This broader policy concept makes the various linkages of the implementation phase to other policy stages more clear. The degree of stakeholder participation may vary in intensity (from passive participation to self-initiated mobilization) (Pretty et al., 1995). For the individual case the optimal intensity of participation, which leads to acceptance without increasing the costs for the participatory process too much, needs to be found. Nevertheless, important hints on the role of participation and cooperation and unused approaches for ecological network implementation within the policy cycle can be given.

### **Problem formulation/Agenda setting**

Problem formulation and agenda setting, occurs at the very beginning of the process of establishing ecological networks. A growing awareness of the problem has to exist before it can be set on the political agenda. Various authors have noted the considerable importance of information and its



communication for the acceptance of nature conservation through protected areas (Ermel & Seeburger, 1997; Prager, 2002; Stelzig, 2000). According to Kals (1999) the perception of responsibility seems to explain the motivation for pro-environmental commitment better than abstract or concrete biological knowledge. Therefore, emotional judgements have a strong influence on commitment. Schemel (1998) argued that the cognitive transfer of ecological knowledge must be supported by the creation of emotional relationship towards nature. A case study by Mölich and Vogel (2007) on an ecological network for wild cats also showed this emotional factor. A likable target species played an important role as a flagship figure. It changed the abstract concept of woodland connectivity into an easily comprehensible nature conservation target. The kind of species chosen for public relations is an important factor for winning local stakeholders over. The wildcat in that case study was highly adequate because of its need for huge woody areas and its low conflict potential compared to the lynx or the wolf and because it was not a synanthropic species.

Brendle (1999) who identified in his study factors for success in nature conservation projects and regional development in Germany, named two relevant aspects for this stage. Firstly there have to be for the stakeholders relevant problems, which means fragmentation and its nexus to biodiversity loss have to be obvious problems to them. Mölich and Vogel (2007) showed that a local concept (establishing a corridor within two woodlands) made sense to the stakeholders, because an obvious nationwide significance (in that case integration into the national wildcat trail plan) was given. Secondly dedicated people that really want to solve the problem are needed.

According to the interviewees the general problem for the ecological network concept lies in its low publicity and the lack of knowledge in biodiversity loss due to fragmentation in the general public.

## Planning

After the agenda setting, the planning phase for ecological networks takes place. This policy phase was renamed differently from the normally used term "policy formation" in "planning" because planning is an important step before implementation. This planning process in our sense leads to viable institutions, such as legal frameworks (the Nature Conservation Acts of the "Länder" include paragraphs on ecological network establishing) and the mapping of the ecological network, as a basis for implementation.

The planning instrument for ecological networks is in accordance to § 14 of the Federal Nature Conservation Act, landscape planning or independent sector planning by nature conservation authorities. This results in plans of different scales (landscape program at the "Länder" level, landscape structure plan at the regional level and a detailed landscape plan at the local level). Landscape planning in Germany is usually performed by private agencies. The planning process differs widely in the time scale and level of detail between the individual "Länder" (Hänel, 2006). For all "Länder" it can be said that the legal possibility exists for public authorities from other sectors and for NGOs to forward objections and suggestions, since all plans must go on public display. The problem is that real participation often does not take place due to a lack of resources (time and knowledge). As emphasized by the interviewees, there are actually enough plans from a technical point of view (landscape plans) but the difficulty lies in the implementation because the plans are not really taken into consideration by the local stakeholders. The interviewees reported on real world examples showing that planning does not necessarily lead to implementation (meaning to bring the network into functionality) when important participatory elements, e.g. cooperative planning, extension service are missing.

From the agricultural sector's perspective it was stressed that plans actually triggered the public's resistance. Based on the negative experiences of strong objections from local stakeholders during the site selection for Natura 2000, where no information or advice was given to the farmers in advance, a move towards ensuring earlier participation and guaranteeing ongoing dialogue and information exchange could be seen (Eben, 2007; Ellwanger et al., 2006). The establishment of supporting working groups consisting of all affected stakeholders right at the beginning is seen as an important measure. Kaiser (2004) described of such a cooperative approach to drawing up management plans in Lower Saxony, where a continuous working group (consisting of about 50 organisations) was established and a regular newsletter and protocols from all meetings were produced in order to guarantee the flow of information.

In a study by von Haaren et al. (2005) an integrated system of software components to support the participatory planning process of a landscape plan was tested. The authors came to the conclusion

that new media are a useful addition to traditional media and methods. The new media present a good means for disseminating information and promoting participation. It makes participation “qualitatively” better through the more precise remarks made by the public, but “quantitatively” the response rate was not higher, thus meetings and face-to-face discussions still remain essential.

The success of cooperative planning through information providing, engaging in public relations activities, holding discussions and mediation between different interests is according to Baranek et al. (2004) due to the improvement of the information basis, exchange of experiences and transparentness of the process, which lead to acceptance. According to Behrens et al. (2002) the strength of the cooperative planning lies in the indirect effects, which emerge alongside direct effects such as new jobs or products. Both authors stressed that there needs to be enough financial resources and organisational support as well as measures for knowledge improvement from the governments to ensure stakeholder involvement. During the planning process local stakeholders should be seen as experts for planning in the same way as scientists and landscape planners because of their expertise on the local conditions (Erdmann et al., 2004). Brendel (1999) stressed the importance of professional moderations and flexible project coordinators that are capable of making compromises. Böcher (2002) pointed out the importance of an organizational nucleus, meaning a group of cooperative stakeholders, within which information concentrates and reaches all relevant stakeholders of the planning process. Mölich and Vogel (2007) described in their case study of establishing an ecological network, an NGO as a catalyzer in the process. The NGO had the capacity to bring people with different interests together and raise the awareness on a target species. A project office was set up afterwards to manage the network activities during the implementation phase.

During the early stage of establishment, the basis for acceptance must be reached in order to secure contribution to the implementation process later on.

## Implementation

After the planning phase of the ecological networks the further implementation that lead to functional networks depends on the cooperation of all relevant stakeholders (Szekely, 2006). Local stakeholders must take the plans into consideration and consider them important in the process of interest weighing. Brendle (1999) stated that strong partners, meaning stakeholders that are well accepted in the region, that are powerful due to their financial, personnel and political resources (e.g. district administrators) are needed for implementation.

Implementation can be accomplished through different instruments, such as site designation by the law, long term agreements, protection by spatial planning (priority areas and provisional areas for nature conservation), land purchase, large-scale ecological projects or impact regulation measures under nature protection law.

However, in order to create a functional network from these on a spatial dimension secured areas further measures conducted by the local land users are often to be implemented. As project examples (Niedling et al., 2005; Riegel & Mittelbach, 2003) show an extension service can help in developing individual measures that lead to acceptance from local land users as a result of found win-win coalitions. The network can also be established by vectors (like sheep) and therefore do not always have to be set in stone by legislation on a spatial dimension, which also leads to higher acceptance. Acceptance is higher if a project shows early success, thus easier steps should be included in the beginning (Brendle, 1999). In the case of conflicts, Knierim (2001) suggested co-operative conflict management approach as the most appropriate resolution for land use conflicts.

Böcher and Krott (2002) pointed out the often underestimated influence of time on successful cooperation, which is important for confidence building. Ellwanger et al. (2006) stated the importance of continuity in terms of the people involved, which enables stakeholders to get to know each other and to understand each others' ideas and interests. Mölich and Vogel (2007) also revealed this important factor of “trust by continuity” when they described the existence of a good, functioning, informal network of authorities and NGOs interested in the wildcat problem already years before the concrete ecological network implementation phase.

According to Brendle (1999) project managers should have soft skills and enough work time and funding to create an atmosphere for cooperation. Lichtenberg (2003) described critical factors based on experiences with failed co-operative processes. He divided these into the internal drivers of actors, consisting of values and objectives supported by information about the specific benefits and costs of

conciliatory behaviour, and external drivers such as organisational and institutional stability, negotiating skills of the facilitator, and the number of actors.

A general problem in the implementation process is in the matter of financing the measures. Financial compensation is an important point for acceptance; as Hofinger (2001) and Prager (2002) have shown, cost-benefit considerations play an important role, especially for the stakeholder group of farmers. Ihl et al. (2006) showed that the insecurity of financial resources leads to acceptance decline even if stakeholder involvement in the planning process was a positive experience. Measures have to be financed by an amount that compensates landowners and land users for the direct costs of the measure (e.g. investment), the opportunity costs resulting from the measure (compensation for restrictions) and the transaction costs involved (for information, planning, administration, monitoring, evaluation). Helk (2006) argued against the backdrop of need for voluntary measures on agricultural land for a "pool solution" of compensation measures in the context of the impact regulation (Eingriffsregelung). This means that areas and financial resources for fulfilling legally binding compensation requirements would be pooled for establishing ecological networks. Farmers can provide land for environmental measures while parties causing negative impacts on landscape (like rout construction) would provide financial resources as compensation. Since parties causing negative impacts on landscape want to avoid using complex measures for compensation (long term commitment) the possible synergies between ecological network implementation and impact regulation measures are limited (Wolfart *et al.*, 2006).

## Monitoring and Evaluation

Monitoring and evaluation are important elements of policies and project adjustments in case of difficulties occurring during the implementation phase. This policy stage leads one again to the beginning of a new policy cycle, but equipped with better knowledge.

To monitor and evaluate nature conservation projects the 13 modules for facilitating successful implementation developed by Brendle (1999) are often used. Böcher & Krott (2002) saw a transparent strategy for monitoring implementation processes as an important factor, because stakeholders in a negotiation process are then compelled to implement what they have negotiated. Sanctions should be possible in the case of non-fulfilment. The evaluation process can occur in a participatory way leading to a social learning process among the local stakeholders. The participation measures (degree of participation) should also be included as an element of the monitoring and evaluation for revealing the correlation of participation and successful implementation. Various studies have evaluated the Round Table as an instrument used in implementing landscape plans (see Arzt *et al.*, 2002; Oppermann *et al.*, 1997). A comprehensive evaluative study on collaborative planning processes had been performed by (Oels, 2003).

## Conclusions

In the literature dealing with ecological networks, stakeholder involvement and participation has been mentioned as an important factor for implementation, but we did not find studies dealing explicitly with this aspect, let alone analyzing it systematically. Nevertheless, we can conclude from the literature dealing with stakeholder involvement and nature conservation in general that participatory approaches help in finding ways how the dual roles of landscape as "frame" for and "product" of economic activity can strengthen each other. It becomes clear that a sustainable implementation of ecological networks needs stakeholder involvement in all policy cycle phases to reach acceptance by the various stakeholder groups.

Due to Germany's federal structure, many different terms and varying legal frameworks for ecological network planning and implementation exist. Until now, ecological network implementation only occurs in single projects. For supra-regional projects, the communication structures become confusing and cost intensive due to the plurality of different stakeholders. Against this backdrop, cooperation and stakeholder involvement becomes even more relevant. The literature review showed factors for the different policy stages having to do with participation and relevance for successful implementation; those factors were also underlined by the interviews.

In the beginning of the implementation process, when the problem is formulated and the agenda is set, awareness of the problem of biodiversity loss and the will to find solutions is the central point. Knowledge about fragmentation and the concept of ecological networks is still quite limited among the

non-nature conservation stakeholders and the general public. Thus, acceptance (e.g., for cost-extensive measures like green bridges) and commitment to ecological network projects on the ground is still a problem. Hence, scientific research integrating local knowledge and public relation on the ecological network concept as a basis for planning and acceptance are important measures. Schools are seen as a good context for reaching the broader public. The importance of emotional factors for success, like a likable flagship species or certain constructions of regional identity, should be kept in mind.

During the planning phase, the participation opportunities scheduled by law with respect to the public display of landscape plans do not seem to generate actual participation, because local stakeholders do not have the resources (time and knowledge) they need to present their concerns. Due to a lack of financial resources, very little support for projects is available in terms of communication and mediation skills. As the Natura 2000 example showed, such support is often not provided until real problems come up. Carefully planned and clearly understandable project targets, with planners open to stakeholder concerns and established participatory institutions (working groups, round tables, news letters etc), will promote real participation and as such acceptance and commitment during implementation. There is currently no clear strategy as to how the planning documents for ecological networks (which at least exist in some of the "Länder") should be disseminated among the local and regional stakeholders in order to motivate them to implement the concepts by establishing their own projects.

During the implementation phase, much depends on single persons whether projects are conducted to implement ecological networks. The "principle of voluntariness," rather than setting all network areas in stone by law (e.g. designation of reserves), seems to be very important for improving acceptance and land users' and owners' (e.g. private firms, farmers) willingness to participate. There are several implementation examples which reached high levels of stakeholder involvement and acceptance by using direct communication. An advisory service is helpful to support existing local ideas and develop case-specific measures that lead to functional networks and win-win-coalitions. In our opinion an institution is needed that would combine the top-down and bottom-up initiatives. Ecological network implementation needs support from above to coordinate initiatives above the local level in order to establish a coherent network, to create greater awareness and to provide financing, but it also needs local knowledge, commitment and activities on the ground.

Monitoring and evaluation can provide important suggestions for further projects and should integrate stakeholder perceptions in order to lead to a social learning process.

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