



European
Commission

Natura 2000 and spatial planning

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ABSTRACT

Spatial planning which reconciles nature conservation with other policies' objectives can be a useful tool for implementing the EU nature legislation. However, a thorough exploration of the potential role of spatial planning and its instruments for the implementation of Natura 2000 has not yet been made either at EU or Member State level. In order to bridge this knowledge gap, this study provides an insight into the role and functions of spatial planning policies at EU and Member State level in relation to Natura 2000 and Nature Directives more generally. The key areas of analysis in this study are the notion and rationale of spatial planning, its instruments and governance processes, the mechanisms for integration of Natura 2000 in spatial planning processes and in sectoral policies, the EU-legal frameworks, cross border-cooperation and relevant spatial planning technologies.

RÉSUMÉ

La planification spatiale, qui concilie la protection de la nature et les objectifs d'autres politiques, peut être un outil pratique pour mettre en œuvre la législation de l'UE relative à la nature. Cela étant dit, aucune enquête approfondie sur le rôle potentiel de la planification spatiale et de ses instruments dans la mise en œuvre de Natura 2000 n'a encore été réalisée au niveau de l'UE ou des États membres. Pour pallier ce manque, la présente étude examine le rôle et les fonctions des politiques de planification spatiale au niveau de l'UE et des États membres par rapport à Natura 2000 et aux directives sur la nature de manière plus générale. Les zones d'analyse clés de cette étude sont la notion et les raisons de la planification spatiale, ses instruments et ses processus de gouvernance, les mécanismes liés à l'intégration de Natura 2000 dans les processus de planification spatiale et dans les politiques sectorielles, les cadres juridiques de l'UE, la coopération transfrontalière et les technologies de planification spatiale pertinentes.

KEYWORDS

Natura 2000, spatial planning, EU legislation, GIS, cross-border cooperation

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Summary

Background

The recently finalised fitness-check of the Nature Directives (Birds and Habitats) confirmed that the EU nature legislation is still fit for purpose and that the main problems (lack of full achievement of their targets) relate to their insufficient implementation. One of the key elements of the effective implementation of the Natura 2000 network and Nature Directives generally is integration of their objectives and requirements into other sectoral policies, such as transport, agriculture, tourism, energy, and urban development. This process is to a certain extent regulated by the Directives themselves. Suffice it to say that Article 6 of the Habitats Directive requires establishment of active conservation measures (which may impact other policies such as agriculture or forestry), prevention of environmental damage by all sectors, and assessment of plans and projects (including transport and energy infrastructure or zoning plans) which may negatively impact the Natura 2000 sites. In addition, Article 10 of the Directive encourages the Member States to improve the ecological coherence of the network and connectivity between the sites and also outside of protected areas.

In order to achieve these objectives, requirements of the Nature Directives have to be taken into account in the long-term spatial development plans and projects at national, regional and local levels in the Member States. This is because spatial planning addresses multiple policy goals and in principle is oriented towards balanced and sustainable territorial development. As a result, spatial planning policies are often perceived as an overarching and coordinating mechanism that can ensure balanced distribution of land-use functions and that can prevent potential conflicts in relation to land uses in and around Natura 2000 sites. Furthermore, spatial planning can maximise the contribution of the Natura 2000 sites to the sustainable development of the region.

Spatial planning and Natura 2000

Spatial planning, if oriented towards reconciling nature conservation with other policies' objectives, can be highly beneficial for implementing EU nature legislation. However, a thorough exploration of the potential role of spatial planning and its instruments for the implementation of Natura 2000 has not yet been made either at EU or Member State level. In order to bridge this knowledge gap, this study provides an insight into the role and functions of spatial planning policies at EU and Member State level in relation to Natura 2000 and Nature Directives more generally. The key areas of analysis in this study are the notion and rationale of spatial planning, its instruments and governance processes, the current and potential mechanisms for integration of Natura 2000 in spatial planning processes and in sectoral policies, the legal frameworks, cross-border cooperation and relevant spatial-planning technologies.

This study shows that spatial planning has an important role to play in coordinating and integrating policy objectives of different sectors and therefore allows the formulation of long and medium-term objectives and strategies for sustainable territorial development. Moreover, the study shows that spatial-planning policy in many Member States has been deliberately shifted from focusing solely on economic development to a more integrated approach that seeks to deliver environmental

sustainability, including the achievement of nature conservation objectives. The experiences of the Member States have shown that, in contrast to traditional sector-oriented statutory spatial planning, an integrated spatial-planning approach is needed to achieve cost-effectiveness and sustainability of territorial developments.

While the scope of spatial planning may differ per country, the responsibility for the coordination of the various sectoral developments such as transport, agriculture, tourism, energy and urban development is allocated to a specific part of the government. Such an approach obviously creates challenges for effective integration of nature protection. However, case studies of best practices from across Europe presented in this study provide an idea of how this hurdle can be addressed.

The two main functions of spatial planning identified in the study, i.e. regulatory and development functions, have direct implications for the implementation of the Nature Directives. The first function is related to modification and approval of land-use developments promoted by different sectors. This approval process is often based on legal mechanisms such as the appropriate assessment of impacts on Natura 2000 (according to Article 6(3) of the Habitats Directive). The development function of spatial planning meanwhile relates to the development of concerned territories or sectors and can be used as a positive tool on the path towards the sustainable development of an area or a branch of economic activity, that might include the integration of nature objectives.

Land-use pressures resulting from ongoing urbanisation, land abandonment and agricultural intensification will continue to have an impact on the coherence of Natura 2000 sites. These impacts include loss of habitats and a decrease in the quality of species' habitats. Through integrated spatial planning a number of measures can be applied to reduce these impacts. In this context, the most common measures include segregation or integration of land-use functions for specific sectoral developments.

As illustrated by this study, spatial planning is a dynamic and a complex governance process that involves a number of interactions between different tiers of governmental authorities and across policy sectors. This process still faces a number of challenges and is often influenced by the spatial planning systems and traditions of the Member States. To develop an integrated spatial-planning approach that will allow Natura 2000 objectives to be streamlined within different categories of spatial plans, the study finds that following key aspects need to be taken into consideration:

- the context-specific factors of spatial planning in different Member States e.g. planning cultures and institutional practices that influence spatial planning;
- the multi-level coordination and collaboration across governmental levels and sectoral departments;
- the existing ecological and spatial knowledge base which underpins the planning processes;
- adequate planning instruments to integrate Natura 2000 in spatial plans;
- early consultation with relevant stakeholders during the preparation of spatial plans in order to reconcile conflicting social-economic interests;
- the administrative and knowledge capacity of local authorities (e.g. urban planners, infrastructure planners and agencies) to address ecological requirements (e.g. habitat connectivity, favourable conservation status);
- the current gaps between strategic and operational levels of planning (e.g. between national spatial plans, sectoral plans on transport, energy, etc. and local land-use plans).

Legal frameworks for Natura 2000, spatial planning and sectoral policies

This study addresses the potential synergy between spatial planning, sectoral policies and Natura 2000 policy. Although spatial planning is the remit of the Member States, the EU, through its policy and funding opportunities, influences the spatial planning that is implemented by the Member States. Various sectoral policies at EU and Member State levels recognise the importance of including Natura 2000 in the development plans of sectors and in spatial plans at different governmental levels (e.g. the Marine Strategy Framework Directive (MSFD), the Water Framework Directive (WFD), the Marine Spatial Framework (MSF) and the Floods Directive). Progress in the implementation of the WFD, MSFW and the Floods Directive has resulted in a number of successful planning practices that enhance collaboration between EU policy sectors and advance an integrated spatial-planning approach to Natura 2000. In this context the SEA and EIA Directives are seen as key legal instruments for assessing the impact of these sectoral plans and spatial developments on Natura 2000 areas. The key challenges for the implementation of the Directives are using up-to-date ecological knowledge for SEA and EIA assessments. Also, specific impacts per sector need to be considered to ensure that effective mitigation and compensatory measures to prevent or reduce these impacts are formulated and implemented adequately. Furthermore, monitoring the effect of these measures for nature will increase insight on effectiveness.

The EU funding programmes for 2014-2020 also provide a variety of instruments that can be used to improve the functionality and the connectivity of Natura 2000 and to develop better synergy between sectoral policies and spatial-planning processes of the Member States. Some of these measures include development of integrated spatial plans, management plans and investments to allow the protection of Natura 2000 and enhance its effectiveness across the Member States.

Cross-border experiences

The spatial relations between Natura 2000 areas across borders can be summarised in three main types of cross-border relations: trans-boundary Natura 2000 area, Natura 2000 areas on each side of the border, or areas on one side of the border. The main challenges for Natura 2000 areas across borders are to ensure joint management of trans-boundary parks, safeguarding the connectivity across the border between Natura 2000 sites and to ensure that plans/projects or the management of areas on the 'other side' of the border do not threaten the coherence between the sites.

The review of the current experiences presented in this report reveals that, although initiatives on cross-border cooperation exist, spatial planning across borders remains a rather complex and ad-hoc process. Cross-border cooperation requires considerable coordination efforts from the Member States involved. Such coordination is needed in order to develop shared methodological approaches and administrative practices for effective management of Natura 2000 sites within the border areas. Some of the key issues in developing such approaches are the differences in spatial-planning practices at cross-border level, the lack of shared objectives, the different management approaches to Natura 2000, the funding opportunities and the stakeholder involvement in designing sectoral developments and plans. Particularly important is the achievement of a horizontal level of coordination and collaboration between the cross-border institutions for spatial planning and nature conservation. Aspects that hinder cross-border cooperation include the lack of EU strategic guidance and the costs associated with cross-border cooperation. In addition, the benefits of cross-border collaboration need to be made more visible to the Member States so that a higher degree of commitment to this process can be achieved.

GIS technology and remote sensing

Nowadays, geo-spatial information technologies (GIS) play an important role in spatial planning processes as they provide a reliable information basis for decision-making processes. However, harmonisation of data is needed, as is the development of common standards for information from different data sources so that the various spatial planning tools can be made operational for Natura 2000 planning. Recently developed technologies facilitate and enable effective public consultation processes through web-based information platforms and discussion forums. In addition, these new technologies hold the potential for early engagement of different experts, thus ensuring that the available data can be accessed and interpreted in the right way.

Towards an integrated spatial-planning approach for Natura 2000

This study shows that, in order to introduce and implement an integrated spatial planning approach to Natura 2000 which secures a balance between sectoral policy objectives and Natura 2000 policy, the following aspects need to be taken into consideration at EU and Member State level:

- Natura 2000 needs to be an integral part of long-term strategies for spatial planning and territorial development. These strategies should address the relationship between sectoral developments and the need for improving and maintaining the functional connectivity of Natura 2000 areas;
- The spatial-planning systems of the Member States need to be further enhanced with regard to the implementation of the Nature Directives. Natura 2000 provisions should be more explicitly embedded as a priority objective within long-term spatial plans (e.g. 5-10 years) at regional and local level;
- The preparation of spatial plans and projects for specific sectoral developments needs to be based on ecological principles and knowledge. These plans should therefore ideally be developed by interdisciplinary teams of experts;
- SEA, EIA and appropriate assessment instruments are key instruments for ensuring knowledge-based prevention, mitigation and compensation of sector-specific impacts on Natura 2000 areas. These instruments need to be further enhanced with specific ecological knowledge and assessment criteria, for specific sectoral developments (e.g. sectoral guidelines);
- Early stakeholder participation and consultation in the spatial-planning process is a key factor for ensuring the quality and legitimacy of, and public support for spatial plans;
- The use of expert-based tools such as new GIS technologies can be effective in integrating Natura 2000 issues in the spatial planning process.

Incorporating Natura 2000 in spatial planning is a challenging process. Therefore continuing efforts should be made to raise the awareness of the role of spatial planning policy and its instruments in protecting and managing Natura 2000 areas. Sharing best practices across the Member states, utilizing the opportunities of the EU funding programmes and involving relevant actors and their knowledge are important steps forward in this process.

Résumé

Historique

Le bilan de qualité des directives sur la nature (Oiseaux et Habitats) qui a été récemment effectué est venu confirmer que la législation de l'UE relative à la nature est encore adaptée à son objet et que les principaux problèmes (concrétisation imparfaite des objectifs) sont liés à une mise en œuvre insuffisante. Un des éléments clés pour permettre une mise en œuvre efficace du réseau Natura 2000 et des directives relatives à la nature consiste à intégrer les objectifs et les exigences dans d'autres politiques sectorielles, comme le transport, l'agriculture, le tourisme, l'énergie et le développement urbain. Un processus régulé dans une certaine mesure par les directives elles-mêmes. Il suffit de constater que l'article 6 de la directive « Habitats » exige la mise en place de mesures de conservation actives (pouvant avoir un impact sur d'autres politiques comme l'agriculture ou la sylviculture), la prévention des dommages environnementaux dans tous les secteurs et l'évaluation des programmes et des projets (y compris les programmes de transport, d'infrastructure énergétique ou de zonage (PLU ou SCoT)) pouvant avoir un impact négatif sur les sites Natura 2000. Par ailleurs, l'article 10 de la directive encourage les États membres à renforcer la cohérence écologique du réseau et la connectivité non seulement entre les sites mais aussi à l'extérieur des zones protégées.

Pour atteindre ces objectifs, les exigences de la directive relative à la nature doivent être prises en compte dans les programmes et les projets de développement spatial sur le long terme aux niveaux national, régional et local dans les États membres. En effet, la planification spatiale vise des objectifs multiples et œuvre, en principe, pour la mise en place d'un développement territorial équilibré et durable. De ce fait, les politiques de planification spatiale sont souvent perçues comme un mécanisme global de coordination qui permet une distribution équilibrée des fonctions d'aménagement du territoire et qui peut éviter les conflits éventuels liés aux aménagements du territoire dans les sites Natura 2000 et les environs. Qui plus est, la planification spatiale peut permettre de maximiser la contribution des sites Natura 2000 au développement durable de la région.

Planification spatiale et Natura 2000

La planification spatiale, si elle vise à concilier la protection de la nature et les objectifs d'autres politiques, peut être très utile à la mise en œuvre de la législation de l'UE relative à la nature. Cela étant dit, aucune enquête approfondie sur le rôle potentiel de la planification spatiale et de ses instruments dans la mise en œuvre de Natura 2000 n'a encore été réalisée au niveau de l'UE ou des États membres. Pour pallier ce manque, la présente étude examine le rôle et les fonctions des politiques de planification spatiale au niveau de l'UE et des États membres par rapport à Natura 2000 et aux directives sur la nature de manière plus générale. Les zones d'analyse clés de cette étude sont la notion et les raisons de la planification spatiale, ses instruments et ses processus de gouvernance, les mécanismes actuels et potentiels liés à l'intégration de Natura 2000 dans les processus de planification spatiale et dans les politiques sectorielles, les cadres juridiques de l'UE, la coopération transfrontalière et les technologies de planification spatiale pertinentes.

Cette étude démontre que la planification spatiale a un rôle important à jouer dans la coordination et l'intégration des objectifs des différents secteurs. Elle permet de formuler des objectifs et des stratégies à long et moyen termes pour le développement territorial durable. Par ailleurs, l'étude montre également que la politique de planification spatiale telle qu'elle est appliquée dans de nombreux États membres ne s'arrête pas au seul développement économique mais repose sur une approche plus intégrée visant à atteindre une durabilité environnementale et à concrétiser des objectifs de protection de la nature. Les expériences des États membres ont démontré que, contrairement à la planification spatiale réglementaire traditionnelle par secteur, une approche intégrée de la planification spatiale est nécessaire pour garantir la rentabilité et la durabilité des développements territoriaux.

Alors que l'ampleur de la planification spatiale peut varier d'un pays à un autre, la responsabilité de la coordination des différents développements sectoriels, comme le transport, l'agriculture, le tourisme, l'énergie et le développement urbain, incombe à une partie spécifique du gouvernement. Une telle approche n'est pas sans poser de difficultés à une intégration efficace de la protection de la nature. Cela étant dit, les études de cas des meilleures pratiques appliquées à travers l'Europe présentées dans cette étude nous éclairent sur la façon dont nous pouvons éviter certains écueils.

Les deux fonctions principales de la planification spatiale identifiées dans l'étude, à savoir les fonctions de régulation et de développement, ont des implications directes sur la mise en œuvre des directives relatives à la nature. La première fonction concerne la modification et l'approbation de l'aménagement du territoire encouragé par différents secteurs. Ce processus d'approbation repose souvent sur des mécanismes juridiques comme l'évaluation correcte des impacts sur Natura 2000 (conformément à l'article 6(3) de la directive « Habitats »). La fonction de développement de la planification spatiale renvoie au développement des territoires ou secteurs concernés et elle peut également servir en faveur du développement durable d'un secteur ou d'une branche de l'activité économique qui pourrait inclure l'intégration des objectifs liés à la nature.

Les pressions sur l'aménagement du territoire dues à l'urbanisation en cours, à l'abandon de terres et à l'intensification des activités agricoles vont continuer à avoir un impact sur la cohérence des sites Natura 2000. Ces impacts incluent la perte d'habitats et la baisse de la qualité des habitats. Une planification spatiale intégrée permet d'appliquer un certain nombre de mesures pour réduire ces impacts. À cet effet, les mesures les plus communes incluent la ségrégation ou l'intégration des fonctions d'aménagement du territoire pour des développements sectoriels spécifiques.

Comme cette étude le montre, la planification spatiale est un processus de gouvernance dynamique et complexe qui implique un certain nombre d'interactions entre différents niveaux des autorités gouvernementales et les secteurs publics et privés. Ce processus doit faire face à de nombreux défis et il est souvent influencé par les systèmes de planification spatiale et les traditions des États membres. Pour développer une approche intégrée de la planification spatiale qui permettra d'intégrer les objectifs de Natura 2000 dans différentes catégories de programmes de planification de l'espace, l'étude estime que les aspects suivants doivent être pris en considération :

- les facteurs spécifiques au contexte de la planification spatiale dans les différents États membres, comme les cultures de la planification et les pratiques institutionnelles qui influencent la planification spatiale;
- la coordination et la collaboration verticale à travers les différents niveaux du gouvernement et dans les départements sectoriels;

- les connaissances écologiques et spatiales actuelles qui sous-tendent les processus de planification;
- les instruments de planification adéquats pour intégrer Natura 2000 dans les programmes de planification spatiale;
- la consultation précoce des parties prenantes pendant la préparation des programmes de planification spatiale afin de lisser les éventuels intérêts économiques conflictuels;
- le capital administratif et de connaissances des autorités (comme les urbanistes, les gestionnaires d'infrastructures et les agences chargées des infrastructures) pour gérer les exigences écologiques (connectivité de l'habitat, état de conservation favorable);
- les divergences actuelles entre les niveaux de planification stratégiques et opérationnels (notamment entre les programmes de planification spatiale nationaux, les programmes sectoriels liés au transport, l'énergie, etc. et les plans locaux d'aménagement du territoire).

Cadres juridiques pour Natura 2000, planification spatiale et politiques sectorielles

Cette étude examine la synergie potentielle entre la planification spatiale, les politiques sectorielles et la politique liée à Natura 2000. Même si la planification spatiale relève de la compétence des États membres, l'UE influence la planification spatiale mise en œuvre par les États membres à travers sa politique et ses offres de financement. Différentes politiques sectorielles au niveau de l'UE et des États membres reconnaissent l'importance d'inclure Natura 2000 dans les programmes de développement de certains secteurs et dans les programmes de planification spatiale aux différents niveaux du gouvernement (comme la directive-cadre « stratégie pour le milieu marin » (DCSMM), la directive-cadre sur l'eau (DCE), la directive-cadre sur la planification spatiale pour le milieu marin (DCPSMM) et la directive sur les inondations). La progression de la mise en œuvre de la DCE, de la DCPSMM et de la directive sur les inondations a débouché sur des pratiques de planification qui renforcent la collaboration entre les secteurs politiques de l'UE et permettent la mise en place d'une approche intégrée de la planification spatiale pour Natura 2000. Dans ce contexte, les directives sur l'évaluation stratégique environnementale (ESE) et sur l'évaluation des incidences environnementales (EIE) sont considérées comme des instruments juridiques clés pour évaluer l'impact de ces programmes sectoriels et de ces développements spatiaux sur les zones Natura 2000. Les principaux défis pour la mise en œuvre des directives concernent l'utilisation de connaissances écologiques récentes pour les évaluations des directives ESE et EIE. Par ailleurs, les impacts spécifiques par secteur doivent être pris en compte pour permettre la formulation et la mise en œuvre adéquates de mesures d'atténuation et de mesures compensatoires visant à prévenir ou réduire ces impacts. En outre, le suivi de l'effet de ces mesures sur la nature permettra de mieux comprendre leur efficacité.

Les programmes de financement de l'UE pour 2014-2020 offrent également plusieurs instruments qui peuvent être utilisés pour améliorer la fonctionnalité et la connectivité de Natura 2000 et pour développer une plus grande synergie entre les politiques sectorielles et les processus de planification spatiale des États membres. Certaines de ces mesures comprennent le développement de programmes intégrés de planification spatiale, des programmes de gestion et des investissements pour permettre la protection de Natura 2000 et améliorer son efficacité dans tous les États membres.

Expériences transfrontalières

Les relations spatiales transfrontalières dans les zones Natura 2000 peuvent se résumer en trois types de relations principales : zone transfrontalière Natura 2000,

zones Natura 2000 de chaque côté de la frontière ou zones d'un seul côté de la frontière. Les principaux défis pour les zones transfrontalières Natura 2000 sont la gestion commune des parcs transfrontaliers, la préservation de la connectivité transfrontalière entre les sites Natura 2000 et veiller à ce que les programmes/projets ou la gestion des zones situées « de l'autre côté » de la frontière ne mettent pas en péril la cohérence entre les sites.

L'analyse des expériences présentée dans ce rapport révèle que, même si des initiatives sur la coopération transfrontalière existent, la planification spatiale transfrontalière demeure un processus ad hoc et relativement complexe. La coopération transfrontalière exige des efforts de coordination considérables de la part des États membres impliqués. Une telle coordination est nécessaire pour développer des approches méthodologiques et des pratiques administratives communes afin de gérer efficacement les sites Natura 2000 dans les zones frontalières. Pour développer de telles approches, il faut prendre en compte les différences dans les pratiques de planification spatiale au niveau transfrontalier, l'absence d'objectifs communs, les différentes approches dans la gestion de Natura 2000, les possibilités de financement et l'implication des parties prenantes dans la conception de développements et de programmes sectoriels. Il est particulièrement important de mettre en place une coordination et une collaboration horizontales entre les institutions transfrontalières pour la planification spatiale et la conservation de la nature. Parmi les aspects qui entravent la coopération transfrontalière, citons le manque d'orientation stratégique de l'UE et les coûts associés à la coopération transfrontalière. Par ailleurs, les bénéfices de la collaboration transfrontalière doivent devenir plus visibles pour les États membres afin de stimuler leur implication dans le processus.

Technologie de l'information géographique et télédétection

De nos jours, les technologies de l'information géographique (TIG) jouent un rôle important dans les processus de planification spatiale car elles fournissent une base d'informations fiable pour les processus décisionnels. Cela étant dit, il est nécessaire d'harmoniser les données et de développer des standards communs relatifs à l'utilisation d'informations provenant de sources variées de manière à ce que les différents outils de planification spatiale puissent être utilisés pour la planification de Natura 2000. Les technologies récemment développées facilitent et permettent l'utilisation de processus de consultation publics efficaces via des plateformes d'information et des forums de discussion Internet. Par ailleurs, ces nouvelles technologies offrent la possibilité d'engager différents experts afin que les données disponibles puissent être consultées et interprétées correctement.

Vers une approche intégrée de la planification spatiale pour Natura 2000

Cette étude montre que, pour introduire et mettre en œuvre une approche intégrée de la planification spatiale dans le cadre de Natura 2000 qui permette de créer un équilibre entre les objectifs de politique sectorielle et la politique Natura 2000, les aspects suivants doivent être pris en compte au niveau de l'UE et des États membres :

- Natura 2000 doit faire partie intégrante des stratégies de planification spatiale et de développement territorial à long terme. Ces stratégies doivent porter sur les développements sectoriels et le besoin d'améliorer et d'entretenir la connectivité fonctionnelle dans les zones Natura 2000;
- Les systèmes de planification spatiale des États membres doivent continuer à être améliorés en ce qui concerne la mise en œuvre des directives sur la nature. Les dispositions Natura 2000 doivent être définies de façon plus explicite comme des objectifs prioritaires pour les programmes de planification spatiale à long terme (5-10 ans, par exemple) au niveau régional et local;

- La préparation des programmes et projets de planification spatiale pour les développements sectoriels spécifiques doit se baser sur des principes et des connaissances écologiques. Dans l'idéal, ces programmes devraient être développés par des équipes d'experts interdisciplinaires;
- Les directives ESE, EIE et les instruments d'évaluation appropriés sont des outils clés basés sur la connaissance pour permettre la prévention, l'atténuation et la compensation des impacts spécifiques à certains secteurs sur les zones Natura 2000. Ces instruments doivent continuer à être améliorés avec des connaissances écologiques spécifiques et des critères d'évaluation pour les développements sectoriels spécifiques (orientations sectorielles);
- La participation et la consultation précoces des parties prenantes dans le processus de planification spatiale sont essentielles pour garantir la qualité et la légitimité des programmes de planification spatiale et le soutien du public pour ces derniers;
- L'utilisation d'outils d'expertise, comme les nouvelles TIG, peut permettre d'intégrer les questions liées à Natura 2000 dans le processus de planification spatiale.

Incorporer Natura 2000 dans la planification spatiale est un processus difficile. Des efforts continus doivent être faits pour expliquer l'importance de la politique de planification spatiale et de ses instruments dans la protection et la gestion des zones Natura 2000. Il est donc important de partager les meilleures pratiques des États membres, d'exploiter les opportunités offertes par les programmes d'investissement de l'UE et d'impliquer les acteurs pertinents.



1 Introduction

The Natura 2000 network is an important mechanism to protect biodiversity in Europe. The network is legally based on the provisions of the Birds (1979) and Habitats (1992) Directives – collectively known as ‘Nature Directives’ – which are the cornerstones of European biodiversity policy. As such, the two Directives play an important role in achieving the long-term EU policy target formulated in the Biodiversity Strategy to 2020, i.e. ‘halting the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restoring them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss’. Furthermore, Natura 2000 sites form the backbone of the EU’s Green Infrastructure. As regards the situation of protected habitats and species outside the network, Article 10 of the Habitats Directive calls for the Member States to manage features of the landscape which are of major importance for wild fauna and flora in order to improve the connectivity between sites in the Natura 2000 network and in the wider countryside.

According to the mid-term review of the EU Biodiversity Strategy, the Natura 2000 network has been largely completed for terrestrial and inland water habitats, covering about 18 % of the land surface. The marine network coverage has increased to 6 %, still well below the 10 % global target. The latest report on the state of nature in the EU-27 shows that the number of species and habitats in secure/favourable or improved conservation status has increased slightly since the 2010 baseline. Progress towards the target has been made but at an insufficient rate. Therefore, increased efforts are needed to meet the target by its deadline (EC, 2015). The recent Fitness Check of the Directives concluded that *‘Good integration of the Nature Directives with planning and impact assessment procedures is crucial. Strategic spatial planning combined with best practice and joined-up SEA, EIA and AA procedures can help to identify potential conflicts early in development cycles, thus helping to avoid economic, social and biodiversity impacts’*. Furthermore, the Fitness Check underlined the need to increase efforts to improve the connectivity of Natura 2000 through the development of Green Infrastructure, as so far there is little evidence that Member States have taken additional measures to implement Article 10 of the Habitats Directive (Milieu et al., 2016). The need for sustainable economic development that delivers environmental benefits has also been addressed in the European Semester initiatives that have been running since 2011 as new instruments for coordination and communication between the EU and the Member States (CEC, 2016a).

The implementation of a conservation network like Natura 2000 is particularly challenging due to the high population density and dynamic land use in Europe. Good spatial planning practices therefore play a pivotal role in the avoidance of land-use conflicts and the creation of synergies between different land uses.

Many spatial developments take place in and around Natura 2000, including agricultural and forestry management, water management, urban development, infrastructure development, development of energy facilities, and climate adaptation measures. As a result, developments pursued by different policy sectors have an impact on the coherence and functionality of the Natura 2000 network.

In order to achieve better integration of the Natura 2000 objectives in sectoral developments, the coordinating and cross-cutting roles of spatial planning policy are

important. With its key functions being to develop and control land uses, spatial planning consists of a range of procedural, organisational and participatory instruments that may be helpful for integrating Natura 2000 objectives in different economic developments.

Spatial-planning frameworks and instruments, however, differ per Member State as well as the degree to which these frameworks embed Natura 2000 objectives in the planning processes. Furthermore, spatial planning provides an overarching perspective on the territorial development across the Member States that may allow the development of coordinated measures for the effective implementation of Natura 2000 objectives at different spatial scales and across borders.

With this in mind, the current study aims to provide better insight and evidence on the role of spatial planning in the effective implementation of the Natura 2000 policy. Different aspects related to spatial planning in the EU are reviewed, such as definitions, legislation, funding, cross-border cooperation and GIS decision-support tools.

Chapter 2 reviews key definitions of spatial planning and the role of spatial planning for Natura 2000 implementation. Chapter 3 discusses the past and future land-use trends that have affected or may affect the spatial coherence of the Natura 2000 network and how spatial planning can address these. In Chapter 4 the relations between EU legislation, Natura 2000 and spatial planning are reviewed. Chapter 5 highlights how different EU funds can be used to achieve better synergy between Natura 2000 and spatial-planning objectives. Chapter 6 presents key challenges and opportunities in cross-border cooperation between Member States in order to achieve better spatial planning at cross-border scale and shows how such cooperation may be beneficial for Natura 2000. Chapter 7 discusses key GIS tools and approaches developed to support decision-making and practice in spatial planning for Natura 2000.

The study is based on exploration and compilation of current knowledge and information about spatial planning and Natura 2000, as provided by the Member States' policy documents, the European policy frameworks and by scientific literature.



2 Spatial planning and Natura 2000

Key messages

- The integration of the Birds and Habitats Directives' provisions in spatial planning processes of the Member States is indispensable for the effective implementation of Natura 2000.
 - Articles 3, 6 and 10 of the Habitats Directive form the legal framework for the incorporation of Natura 2000 in spatial planning.
 - Many Member States have become aware of the role of spatial planning as a key mechanism for integrating Natura 2000 in sectoral developments.
 - National, regional and local authorities need sufficient administrative and knowledge capacity to be able to effectively integrate Natura 2000 conservation goals in their spatial plans.
 - Effective incorporation of the Natura 2000 objectives in spatial planning requires multi-level governance based on coordination and collaboration among the competent authorities across scales and policy sectors.
 - An integrated spatial-planning approach should consider land-use development trends and pressures on Natura 2000 and foresee mitigation of impacts on the connectivity and functionality of the Natura 2000 network.
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2.1 Introduction

With its legal, technical and coordinating aspects, spatial planning has an important role to play in achieving better integration of the Natura 2000 objectives into sectoral developments (UN, 2008; CEC, 2011). Moreover, spatial planning serves as a mechanism for achieving balanced territorial development across the Member States by enhancing cooperation between the authorities responsible for spatial development and those responsible for sectoral policies and Natura 2000.

This chapter discusses the relation between Natura 2000 and spatial-planning policy. It provides, among other things, a short overview of the policy context, definitions of spatial planning as understood in different Member States, and a description of the functions of spatial planning. The chapter sheds light on the mechanisms through which spatial planning can support the implementation of Natura 2000 and elaborates on the role of an integrated spatial-planning approach.

2.2 The quest for integrating Natura 2000 objectives in spatial planning

2.2.1 Policy background

Integration of Natura 2000 objectives in spatial planning is seen as an effective instrument to reconcile nature protection and economic development. The quest for this integration process has been reflected in a number of policy frameworks and legislation on environment and spatial planning, and needs to be taken into

consideration in the future course of action in implementing Natura 2000 policy in the Member States (EEA, 2011; Simeonova & van der Valk, 2016).

The *EU Compendium of Spatial Planning Systems and Policies* dating from 1997 and its successor, the *European Spatial Development Perspective* published in 1999, have both addressed the need for balanced territorial development in Europe that addresses both sector-based economic developments and the protection of natural resources and biodiversity. As a result, spatial planning has been widely perceived as a cross-cutting and coordinating policy that allows the spatial impacts of sectoral developments to be addressed and conflicts between different stakeholders to be prevented (CEC, 1999).

Among policy makers there is a growing understanding that environmental concerns such as biodiversity conservation are not the sole responsibility of the environmental sector alone but that they must be a shared responsibility of the sectors promoting economic developments. With a view to achieving more sustainable development, a number of EU documents since the 5th Environmental Action Plan in 1992 and the Cardiff Summit in 1998 have emphasised the need for integrating environmental issues in sectoral policies such as agriculture, transport, energy, urban development, etc. The quest for this policy integration, referred to as the Environmental Policy Integration principle (EPI), has been strongly emphasised by the European Commission and is now partly reflected in some of the sectoral policies at EU and Member State levels (CEC, 2004; EEA, 2005; Jacob et. al., 2008).

More recently, the EU Territorial Agenda 2020 (2011), the Biodiversity Strategy to 2020 (2011), and the Green Infrastructure Strategy (2013) have provided strong incentives for making more rapid progress in integrating ecological concerns in territorial governance processes. These policy documents reveal the need for cross-sectoral implementation of Natura 2000, by making it an integral part of the spatial planning strategies, plans and sectoral developments (Council of the European Union conference, planning for biodiversity, 2011). Environment and spatial development are strongly related. Territorial imbalances induced by competing demands for land uses can have negative impacts on nature while at the same time spatial planning can steer land uses that safeguard the environment and make these complementary to each other (CEC, 2004; UN, 2008). As Natura 2000 might have an effect on many sectors, there is a strong need to integrate its objectives in all aspects of spatial planning and development (EEA, 2011).

Meanwhile, the Birds and Habitats Directives have brought about far-reaching consequences for the spatial-planning policies of the Member States. The key challenge has been to adequately address developments in and around Natura 2000 areas so that they do not have a significant effect on protected nature (CEC, 2011). This goal requires transformation of the more traditional spatial-planning practices, often predominated by economic development objectives, into an inter-sectoral planning process that considers effective nature-conservation strategies, such as those for restoring landscape integrity and connectivity, and the ecological knowledge needed (see Case Portmarnock Baydoyle SPA/SAC).

2.2.2 An integrated spatial-planning approach

For the purpose of this study integrated spatial planning is understood as a process aiming at regulating land use – at national, regional and local level – which reconciles multiple sectoral objectives (including biodiversity protection) in a way that ensures sustainable development. In contrast to ‘traditional planning’ or ‘statutory planning’, where the impacts of plans and project on environment (including biodiversity) are addressed only in the later stages of planning, integrated planning takes into account

different societal and environmental needs from the outset of the planning process and is based on knowledge input from planners and environmental experts.

Integrated spatial planning can be seen as the key to envision the potential synergies between different land-use functions during the initial phase of a plan preparation. It serves as a tool for optimising the possible locations of economic and conservation activities such as preserving sensitive areas or habitat restoration, ensuring connectivity between Natura 2000 areas. Spatial planning, therefore, enables the creation of a strategic vision on combining sectoral developments in such way that a territory is seen as interconnected areas transcending separate administrative territorial units and borders (CEC, 1999; Stead & Meijer, 2009; Vigar, 2009; Simeonova & van der Valk, 2009; CEC, 2011).

Since the start of the implementation of the Nature Directives, the Member States have been challenged to integrate and sufficiently address the Birds and Nature Directives in their spatial-planning practices. Furthermore, while the challenge of integrating the interests of Natura 2000 in spatial planning and sectoral developments is evident at all governmental levels (national, regional and local), the need for this integration becomes particularly apparent during the adoption of the local-land use plans (EEA, 2011) (see the example in Box. 2.1.).

The experience generated within the Member States regarding these challenges proves that an integrated approach to spatial planning is necessary to achieve sustainability of territorial developments and to conserve nature as part of Natura 2000. Spatial planning that does not properly take into account different needs, or lack of spatial planning altogether, may be a source of many environmental, economic and social problems. Developments in natural or semi-natural areas can lead to landscape and habitat fragmentation, animal mortality and an increase in natural hazards such as floods or wild fires. Apart from environmental damage, spatial chaos related to bad planning may also cause damage to the aesthetic value of a landscape, increase the costs of development and maintenance of infrastructure (transport, water supply, sewage collection and treatment etc.), endanger food security (by turning fertile land into uses other than agriculture), negatively impact well-being of people by causing alienation (e.g. in remote and badly connected settlements) and conflicts (e.g. in relation to desired land-uses of certain areas), and affect their health (e.g. by not providing sufficient recreational areas or by promoting car usage). Furthermore, the absence of a clear and integrated planning approach in dealing with land-use developments and property rights, and the lack of consistent application of environmental legislation by spatial planning, have been the cause of many complex and long-term problems (European Parliament, 2009, see box 2.2.).

All of these impacts have tangible financial implications in the form of costs to the public sector, businesses and citizens as well as opportunity costs related to loss of benefits which could have been produced by coordinated and integrated planning (e.g. planning in river basins can be done in such way as to ensure flood protection and drinking water supply at optimised costs). Good spatial planning can, on the other hand, save money and improve people's well-being. In that respect, the sixth EU report on economic, social and territorial cohesion emphasises e.g. that 'compact cities can offer major savings in terms of infrastructure and travel time, so reducing the damaging environmental effects of built-up areas and high energy consumption'.

Box 2.1 Challenge of urban development along the Spanish coast

An example of inadequate planning is the case of extensive urbanisation of the Spanish coast in the last decades. The European Parliament report of 2009 found that due to inappropriate planning practices and neglect of relevant national laws, extensive environmental damage took place in the coastal areas of Spain. This damage resulted mostly from excessive urban developments along the coasts, including holiday resorts, and caused irretrievable loss of biodiversity and the environmental integrity of many regions of Spain. The report found that apart from environmental impacts, uncontrolled development has also resulted in negative aspirations about Spain's development and its broader economic and political interests. Unnecessary and unwarranted infrastructure projects have directly affected citizens' property rights and as a result have led to 'financial and emotional catastrophe for many families'. In many cases these developments have also contributed to 'tragic and irretrievable loss of cultural identity and heritage'. The report finds that these problems were due primarily to the absence of supra-municipal planning or of regional planning guidelines placing reasonable limits on urban growth and development.

The benefits of an integrated spatial-planning approach as opposed to traditional spatial planning include:

- promotion of (win-win) solutions that create synergy between sectors
- avoidance of duplication of development priorities and costs during the policy-making process across sectors and scales
- ensuring coherence between different policies
- achieving cross-cutting policy-making processes, ensuring complementarity and coordination between sectoral policies
- optimisation of the efforts of policy makers to achieve common policy goals rather than focussing on one individual sector alone
- enhancing innovation and knowledge on policy-implementation approaches
- achieving greater understanding of the mutual benefits between sectoral policies and their effect on the environment and nature

Box 2.2 The urban development project of Atanasovsko lake protected area in Bulgaria

The increased suburbanisation process in Bulgaria has had severe consequences for the protection of the Natura 2000 areas. The post-socialist period is characterised by pro-growth strategies that have promoted many new investment projects in the suburban areas. Many of these developments, which include tourism and the housing sector, have generated direct threats to nature areas. These spatial developments are seen as a vital source of income for local authorities, investors and landowners, as they lead to improvements in the local economy, partly through the creation of jobs, infrastructure and public services. Local authorities often fear that if they favour nature conservation they might compromise the much-needed economic development opportunities in their territory. The implementation of the Natura 2000 objectives has required planners and developers to formulate new ways of planning that illustrate the mutual benefits of nature and economy and that are cost-effective. The urban development project in close proximity to the Atanasovsko Lake Natura 2000 site on the urban fringe of the city of Burgas has been an interesting example of these planning dilemmas. This project illustrated the need for a transformation of the rigid planning culture inherited from the past towards integrated spatial planning. The investment project of the Municipality of Burgas for the intensive urbanisation of the area around Atanasovsko Lake has been in development since 2006. During this process planners were confronted with the challenges of being advocates of local economic development which was supported by the local authorities but also pushed for by landowners. Due to the strictly regulatory spatial-planning process and lack of experience in dealing with diverse actors and sectoral interests in planning, the urban development plan has not been fully based on an integrated planning approach. The latter was characterised by a lack of sufficient analysis of the possible alternatives for the proposed urban development during the initial phase of the plan. Subsequently the appropriate assessment of the plan, the consultation process and the compulsory public hearings were not realised effectively in terms of soliciting opinions of experts, including ecologists and planners and the broad public. Although the preparatory plan did address the importance of the Natura 2000 area protection, it did not succeed in formulating sufficient alternatives, impacts and the necessary measures. One of the key reasons for this was not the lack of commitment but insufficient administrative capacity and experience in new forms of urban planning practice that promote an integrated planning approach. The Atanasovsko Lake project has raised the awareness of the local community on the important trade-offs that need to be considered between valuing local natural resources and achieving local economic prosperity. Although the final project plan did not fully integrate the biodiversity objectives because ecological information was only included at a late stage of the planning process and the environmental assessment of the plan, the planners and environmental experts have been forced to engage in a dialogue. On the other hand, the crucial role of the local authorities as an intermediary between the different stakeholders and the local community (including landowners) has been made explicit and has set a new trend in the future planning practice of the city of Burgas (*Simeonova & van der Valk, 2016*).

In addition to the need for a better understanding of the concept and the role of an integrated spatial-planning approach described above, there is also a need to provide specific planning instruments and decision-support tools to implement such an approach. One of the most recent studies of the OECD (*Silva & Acheampong, 2015*) identifies three key groups of instruments that are of relevance for integrated spatial planning. These include legislative, financial and incentive-based instruments. Additionally, other studies identify a number of governance approaches that can help improve collaboration in the spatial-planning processes; these include structural organisational changes and communicative planning (*Hertin, & Berkhout, 2003; Simeonova & van der Valk, 2009*).

While the regulatory instruments aim to restrict specific developments through e.g. zoning regulations and obligations on reducing environmental impacts, the financial

instruments can regulate developments e.g. through property taxes, compensation measures for landowners, or contracts with private and public actors.

The incentive-based instruments may support redevelopments and restoration of land or conservation easements. These include: 1) enhancement of the collaboration between competent authorities by restructuring planning departments to be able to collaborate more effectively with other departments; 2) developing dedicated coordination bodies for joint preparation of plans and strategies; 3) establishing a communication process around a spatial plan that involves equal participation of all affected stakeholders, governmental agencies and experts.

Furthermore, decision-support tools based on spatial technologies can provide broad support to an integrated planning approach (see chapter 7).

2.3 Legal aspects addressing the relation between spatial planning and Natura 2000

The designation of the Natura 2000 sites is one of the main obligations of the Birds and Habitats Directives, which introduced a comprehensive and legal protection regime for endangered habitats and species of European interest.

Some 233 habitats and 1,500 species of animals and plants of 'Community interest' are listed in Annexes I, II, IV and V of the Habitats Directive; and the ultimate goal of both pieces of legislation is to ensure the long-term sustainability of the species known as having 'favourable conservation status' (FCS). The target of both directives (specifically set out within the Habitats Directive and reflected, not in the same words, in the Birds Directive) is therefore defined in positive terms, oriented towards a favourable situation, which needs to be defined, reached and maintained. FCS is assessed on different spatial and jurisdictional scales, at the national scale (or by biogeographical region within the country where two or more regions are present) and should consider the habitat or species both within the Natura 2000 network and in the wider countryside.

The most important articles of the Habitat Directive that have specific implications for spatial planning and sectoral policies are article 6 and article 10.

The four key provisions of Article 6 play an important role in the consideration of Natura 2000 in plans and projects by requiring both preventive and proactive measures to conservation and planning (see Box 2.3).

Box 2.3 Article 6 Legal provisions

- Article 6(1): For special areas of conservation, Member States shall establish the necessary conservation measures involving, if need be, appropriate management plans specifically designed for the sites or integrated into other development plans, and appropriate statutory, administrative or contractual measures which correspond to the ecological requirements of the natural habitat types in Annex I and the species in Annex II present on the sites.
- Article 6(2): Member States shall take appropriate steps to avoid, in the special areas of conservation, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated, in so far as such disturbance could be significant in relation to the objectives of this Directive.
- Article 6(3): Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.
- Article 6(4): If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted. Where the site concerned hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.

Article 6 determines the relation between the conservation of the habitats and species and other types of land uses (sectoral developments). Paragraphs 6(1) and 6(2) require that, within Natura 2000, Member States: (1) take appropriate conservation measures to maintain and restore the habitats and species for which the site has been designated to a favourable conservation status; (2) avoid damaging activities that could significantly disturb these species or deteriorate the habitats of the protected species or habitat types. Paragraphs 6(3) and 6(4) lay down the procedure to be followed when planning new developments that might affect a Natura 2000 site.

According to the provisions of Article 6(3), an appropriate assessment is required to enable evaluation of the potential impacts of plans and projects on the Natura 2000 sites and to identify possible modifications to plans and projects so that adverse effects on Natura 2000 sites can be avoided. One of the key benefits of the appropriate assessment at a plan level is that it requires decisions to be made on the content of the plan and thus also limits future potential conflicts related to projects which may arise from the plan (N2K Group, 2014).

This requirement relates to different types of plans and programmes such as strategic plans (spatial or sector related plans) or detailed land-use plans (detailed zoning plans).

Article 6 plays a key role for integrated spatial planning, as it directly requires the integration of Natura 2000 objectives in sectoral developments and in spatial plans. The mechanisms for formulating and implementing the needed conservation measures vary among the Member States. In compliance with Article 6(1), developing

management plans for Natura has been widely used by the Member States. Although management plans for Natura 2000 sites are only suggested in the Habitats Directive, these plans seem to be a preferred option for many Member States and have been made obligatory in some Member States. Management plans are also preferred by some of the Member States as a binding mechanism for stakeholder involvement in the management of Natura 2000 between public and private actors and as an awareness-raising tool for the local communities. In several Member States management plans are required for all Natura 2000 sites, while in other Member States these are only required for some sites, for instance only for SCIs but not for SPAs (e.g. Cyprus). In other countries these are required only for areas where there are conflicts between land-use practices and conservation objectives that need to be resolved (e.g. some regions in Austria, Finland), or for those sites that are selected on the basis of a specific set of criteria (e.g. Rheinland-Pfalz, Germany).

Other measures, such as statutory (land acquisition), administrative (restrictions of activities) or contractual agreements (with landowners), are also successfully applied in order to comply with the provisions of the Nature directives. In many countries a combination of the different options is used.

Article 10 requires that:

"Member States shall endeavour, where they consider it necessary, in their land-use planning and development policies and, in particular, with a view to improving the ecological coherence of the Natura 2000 network, to encourage the management of features of the landscape which are of major importance for wild fauna and flora. Such features are those which, by virtue of their linear and continuous structure (such as rivers with their banks or the traditional systems for marking field boundaries) or their function as stepping stones (such as ponds or small woods), are essential for the migration, dispersal and genetic exchange of wild species."

In compliance with Article 10, a number of initiatives have taken place in the Member States during the last decade. These initiatives are related to the development and maintenance of ecological corridors and stepping-stones that allow the establishment and restoration of the habitat connectivity between the Natura 2000 areas. The development of such ecological corridors is an essential part of ecological networks, and is aimed at enhancing the migration and survival of protected species. The development of ecological corridors takes place in some countries as a centralised activity at national level and in other countries is based on individual project initiatives. National ecological networks have been generated in several Member States. In other Member States (e.g. in the Netherlands, France) sector-specific comprehensive plans have been developed, introducing mitigation and conservation measures that support ecological connectivity and are specific to the sector, e.g. the transport and agriculture sectors. The development of ecological corridors as part of the idea for EU TEN-G initiative is still a subject of scientific and political debate.

2.4 Understanding spatial planning, its definitions and functions

2.4.1 Definitions of spatial planning

According to the United Nations Economic Commission for Europe (UN, 2008), spatial planning is seen as a key instrument for establishing long-term, sustainable frameworks for social, territorial and economic development both within and between countries. Its primary role is to enhance the integration between sectors such as

housing, transport, energy and industry, and to improve national and local systems of urban and rural development, also taking into account environmental considerations. Spatial planning is therefore concerned with 'the problem of coordination or integration of the spatial dimension of sectoral policies through a territorially-based strategy' (Cullingworth and Nadin, 2006; UN, 2008). More complex than simple land-use regulation, it addresses the tensions and contradictions among sectoral policies, for example conflicts between economic development, environmental and social-cohesion policies. The key role of spatial planning is to promote a more rational arrangement of activities and to reconcile competing policy goals with a view on sustainable development.

The coordinating and integrating role of spatial planning is recognised in almost all Member States (Faludi & Waterhout, 2002; UN, 2008). Spatial planning is used as a policy instrument to identify long or medium-term objectives and strategies for territories, dealing with land use and physical development. Spatial planning is in most cases shaped as a distinct sector of government activity which coordinates sectoral policies (CEC, 1999; Koresawa and Konvitz, 2001). Various definitions of spatial planning exist (UN, 2008). Among these, one of the most commonly used definitions in Europe is provided by the Compendium of European Spatial Planning, namely: "*Spatial planning refers to methods used largely by the public sector to influence the future distribution of activities in spaces. It is undertaken with the aims of creating a more rational territorial organisation of land uses and the linkages between them, to balance demands for development with the need to protect the environment and to achieve social and economic objectives.*" (CEC, 1997)

This definition views spatial planning as going beyond traditional land-use planning; rather it refers to integration between sectoral policies. This means that spatial planning can address impacts of other policies on land use by providing the means to define, manage, prevent or mitigate these impacts. Another definition of spatial development is the definition provided by the European Conference of Ministers Responsible for Spatial/Regional Planning and promulgated by the Council of Europe. Spatial planning is formulated as: "*evolution of the territories in all their dimensions (economic, social, environmental and physical)*", and the planning itself refers to the methods used for distribution of people and activities in spaces at various scales, as well as for the location of the various infrastructures, recreation and nature areas.

Therefore, spatial planning can be oriented towards the achievement of multiple goals (Box 2.4).

Box 2.4 Goals of spatial planning

- Promote territorial cohesion through more balanced social and economic development of regions, and improved competitiveness;
- Sustainable urban functions and balanced relationship between the town and countryside;
- Promote more balanced accessibility;
- Develop access to information and knowledge;
- Reduce environmental damage and impact of sectors;
- Enhance and protect natural resources and natural heritage;
- Enhance cultural heritage as a factor for development;
- Develop energy resources while maintaining safety;
- Encourage high-quality, sustainable tourism;
- Limit the impact of natural disasters.

Based on the definitions of spatial planning discussed above, its role can be defined in three key areas of policy intervention. So spatial planning is: 1) *coordinating*: a coordinating policy among other sectoral policies, 2) *strategic*: it provides a long-term vision on national, regional and local developments and 3) *methodological*: it provides methods (controlling, expert based, collaborative etc.) to manage land-use changes and prevent potential negative impacts of sectoral policies on land and nature.

While the definition of spatial planning does not differ significantly among countries in Europe, the scope of spatial planning varies greatly from country to country. Some countries focus on the strategic aspects of planning as an overarching policy, while others formulate planning as an interdisciplinary activity and yet others highlight the importance of land-use-planning laws and procedures (Box 2.5).

Box 2.5 Meanings of spatial planning in different Member States

- *Austria*: Spatial planning in Austria is mainly a competence of the regions (*Länder*) and is coordinated by the Austrian Conference on Spatial Planning (ÖROK). According to the Austrian spatial development concept (ÖROK), spatial planning should respond to the current development and socio-economic challenges such as internationalisation, competitiveness, ageing population and immigration, climate change, land use and resource consumption (ÖROK, 2011).
- *Belgium (Flanders)*: The spatial planning of Flanders is based on spatial strategies for the large urban regions. Since the 1970s, Belgium shifted away from a central state towards a new form of government in which the three regions - Flanders, Wallonia and Brussels - became autonomous. Spatial planning, housing, transport, the environment and regional economic development are the responsibility of the three regions. Each region has its own parliament, government and administration. Flanders, the second largest region, adopted a three-level planning system (region, province, municipality), with spatial structure plans as a strategy and spatial plans at each level. The development of an overall spatial framework for Flanders started to be implemented in 1997 when the Flemish government approved the Spatial (Structural) Plan for Flanders (Ministerie Vlaamse Gemeenschap, 1997). The plan aims for an integrated approach (e.g. urban development and nature).
- *Bulgaria*: Spatial planning in Bulgaria is referred to as: "a process of organising and controlling land uses at national, regional and local level". The National Concept for Spatial Development addresses the need to establish a link between the strategic and regulatory levels of spatial planning by identifying interactions between the National Regional Development Strategy and the legal acts concerning land-use planning (National Center for Regional Development, 2012). There are three scales of planning regulated by the Spatial Planning act: national, regional and municipal. The National and Regional plans have a strategic character, while the local land-use plans implemented by the municipalities have a legal status.

- *Denmark*: According to the Danish Planning Act: "*Spatial planning ensures the interests of society with respect to land use and contributes to protecting the country's nature and environment, so that sustainable development of society with respect to people's living conditions and for the conservation of wildlife and vegetation is secured.*" The Danish spatial planning system has a strongly decentralised division of tasks. The municipal councils are responsible for comprehensive land-use regulation at the municipal level with legally binding guidelines for property owners. The regional councils prepare a strategic plan for spatial development in each region. The minister for the environment is responsible for upholding national interests through a national plan. The planning system is heterogeneous, as there are many variations between municipalities in terms of the layout of spatial plans, their content and the planning instruments used.
- *France*: Until the early 1980s land-use planning was performed by the central administration with the main objective of ensuring balanced development throughout the territory in order to lead the country into modernity and progress. Nowadays it is responsibility of the regions and municipalities (Geppert, 2015). Spatial planning legislation is influenced by regional development policy rather than physical planning. In fact, the meaning of "*aménagement du territoire*" goes beyond spatial planning and includes the objective of achieving a balanced distribution of economic activities (Faludi & Waterhout, 2002). In 1999 the Spatial Planning and Sustainable Development Act called for balanced development of the entire national territory, combining social progress, economic efficiency and environmental protection.
- *Germany*: The Federal Spatial Planning Act of Germany refers to spatial planning as: "*a guiding vision towards sustainable spatial development which brings social and economic demands made on an area into line with its ecological functions and, on a large scale, results in a stable order with equivalent living conditions in the subspaces*" (2008, art. 1(2)). The spatial planning system is hierarchically structured, consisting of four spatial levels (federal, supra-national; regional, municipal). Key principles used for spatial planning include: subsidiarity, local self-government, mutual feedback between spatial scales.
- *Netherlands*: In the Netherlands spatial planning is a prominent policy and a governance process that deliberately steers societal developments and the environment. "*Planning is focused on achieving the best possible balance between physical space and society's needs and results in decisions related to the planned functions and use of the land.*" (VROM, 2004) A distinction is made between planning as a strategic process and planning as a policy implementation process. The former provides a legal framework for the assessment of (conflicting) spatial claims for land use. Dutch planning is based on national, regional and local scales. It tends to be more decentralised towards the regional and local authorities. The provincial plans and the local land-use plans are compatible and coordinated by the regional and local authorities.
- *Poland*: The scope of spatial management in Poland follows the three levels of territorial division of the country (state, voivodships and communes). It also comprises activities involving management/development and building-up of an area. Any action within spatial management should aspire to introduce spatial order and ensure sustainable development. The spatial order is understood as a target state of spatial planning, where the conflicts resulting from developmental processes are minimised and where a harmoniously composed landscape is achieved by preserving its local cultural and environmental identity.
- *Portugal*: Portugal uses the definition of planning of the Council of Europe's Regional/Spatial Planning Charter: "*it is an administrative policy and technique that takes places under an interdisciplinary and integrated approach aiming to achieve a balanced regional development and the physical organisation of the territory according to a strategy*" (DGOTDU, 2000). Planning takes place at national and local level, while the regional scale has been introduced during the last few years but has not been yet fully enforced by all regions.

- *Slovenia*: In the Spatial Planning act of Slovenia (2007) spatial planning is defined as: "the mechanism that enables coherent spatial development by the consideration and harmonisation of different development needs and interests with public benefits in the areas such as: environmental protection, conservation of nature and cultural heritage, protection of natural resources, defence and protection against natural and other disasters." Spatial planning takes place at national, regional (inter-municipal) and local levels. The spatial planning act requires a hierarchically based compliance between the national, regional and municipal plans. It provides guidance on the content of these plans, including the aspects of strategic environmental assessment of the different plans (Ministry of Environment, Spatial Planning and Environment, 2007).
- *Spain*: In Spain planning is perceived as: "a public domain dealing with the spatial structure and management of public and private activities, with a physical impact on a territory." Spatial planning is a competence of the 17 autonomous regions which have their own spatial planning laws and plans. Spatial planning regulates the location of infrastructures, the organisation and structure of settlements and the protection of natural resources and the environment (Benabent, 2006). The regional plans serve as reference to the Master Plans of the municipalities.

The planning systems reflect the history, socio-economic development and regulatory capacity of the countries. Planning processes may differ in relation to their overall objectives, impact assessment, public consultation and decision-making (Newman & Thornley, 1996). As illustrated by the above definitions of spatial planning in different Member States (Box 2.4), spatial planning varies in the scope of policy issues it considers: there are different degrees of centralisation-decentralisation of competences and powers, and different levels of planning and types of actors involved. With regard to this, five types of planning systems can be identified which may have different implications for the integration process of Natura 2000 in sectoral policies, namely British, Napoleonic, Germanic, Scandinavian and Central and Eastern European (Newman & Thornley, 1996) (Box 2.6).

Box 2.6 Member States' families of spatial planning traditions (Newman & Thornley, 1996)

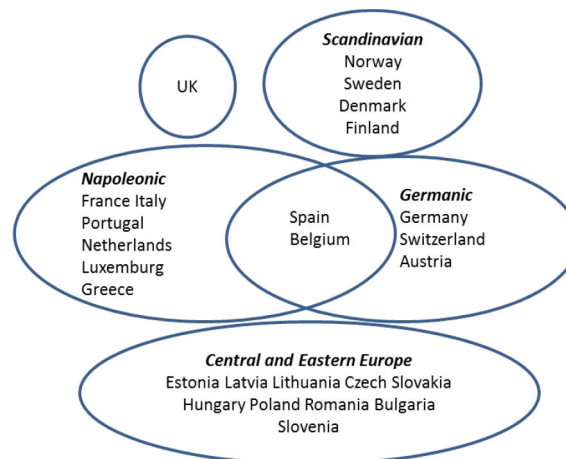
The *British family* has a legal system of evolving cases reflected in the planning system, where each planning permission is considered 'on its own merits'. The appeal system ensures central control over local decisions. The planning system has three elements: the plan-making function, the developmental function and regulatory function. These three functions are carried out in different departments. The UK spatial planning framework is fragmented and asymmetric, as the four constituent territories (i.e. England, Northern Ireland, Scotland and Wales) have their own frameworks. The planning process is carried by regional and local authorities, with the exception of sectoral developments of national significance where the national authorities take decisions.

In the *Napoleonic family*, there is a tendency to prepare a national code of planning regulations and to create a hierarchy of plans, starting from higher levels, where there is mostly expression of development policy, and going down into more detailed plans of a smaller scale. The combination of centralised vision and responsiveness to local pressures creates a complexity of interactive arrangements. The recent moves toward decentralisation and a greater regional presence have influenced planning which takes place within an array of multi-level arrangements and cooperation. The Napoleonic family is large and there are variations in planning systems of the countries. France and the Netherlands present a more systematic approach where planning procedures and tasks are clearly described. Belgium and Spain have a federal element in their planning systems, whereas Italy and Greece have more fragmented and complex spatial planning structures and procedures.

The comprehensive codification of law in the *Germanic family* (Germany, Switzerland, Austria) is expressed in the planning system by the rigorously formulated planning regulations. A strong constitution and a federal system result in a strong regional level of planning, with its own laws, plans, guidelines and agreements in order to achieve consensus between and within levels of hierarchy. This results in considerable variation in the planning process between regions but within a strong national framework.

The *Scandinavian family* (Nordic: Norway, Denmark, Finland, Sweden) is one of the most decentralised systems in Europe. The national level is reduced to a minimum in terms of responsibilities and involvement in planning. It has comparatively weak regional planning, and strong local planning focusing on municipalities. Local planning involves negotiations between the municipality and the developers. Also, members of this family exhibit a high degree of similarity in their planning systems.

The *Central and Eastern European family* represents a transformation from a centrally planned system in the socialist era towards a market-oriented system and this is reflected in the current reforms of spatial planning. The transformation process is oriented towards the shift of responsibilities to local governments. Members of this family have a strong national planning policy, which is however often disconnected from the local level of planning.



2.4.2 Trends in the spatial planning systems of the Member States

One of the ongoing trends of spatial planning across the Member States is the stronger influence of European Union policies such as the European Spatial Development Perspective (ESDP), the cohesion policy and regional funds, the Nature Directives, WFD, MSFW, climate change policies, Urban Agenda. These policies call for integration of the sustainable development principle in spatial planning. This principle is to a varying degree embedded in the Member States' spatial planning systems and planning practices. For example, in north-western countries such as France, Germany and the Netherlands, spatial planning approaches have been developed at national, regional and local level which better correspond with the principle of environmental sustainability and allow for the consideration of nature conservation concerns such as the ecological integrity of landscapes and Natura 2000. In the UK more traditional land-use planning is present, where nature conservation initiatives have been taking place at the level of individual plans and projects. In the Nordic countries the planning systems are strongly rooted in the municipal level, and lack a comprehensive national planning. Similarly, the spatial planning systems of Mediterranean countries are oriented towards the local level, the core activity being urban regeneration and where environmental issues often remain to a certain extent isolated from spatial planning.

In Central and Eastern Europe the spatial planning systems have been transformed from poorly centrally managed to decentralised ones. This transformation was led by the post-communist transition to market economies where land-price deregulation and land restitution have been critical factors. This transition has led to the allocation of new and more competences in spatial planning and nature conservation to the local authorities. It has also led to an influx of new actors in planning such as landowners, private developers and local communities. Likewise, in the Western European countries these actors are playing a crucial role in decision-making about competing claims for land uses for sectoral developments and nature.

Another evident trend in the spatial planning across the EU is the shift of responsibilities and competences from national to regional and local governments. This is in line with the general subsidiarity principle and the on-going decentralisation of the political systems in many Member States. This trend is prominent in both Western and Eastern parts of Europe and is creating a number of challenges and opportunities. For example, in the last few years in the Netherlands most responsibilities for nature conservation have been shifted to the provincial authorities, which have to ensure the funding and competence needed for the formulation of specific projects related to the implementation of nature policy and legislation. For many countries, the key challenge in this process is the extent to which regional and local authorities are prepared to address the complexity of nature-compatible spatial planning. The capacity of the local authorities to achieve a balance between economic pressures and conservation objectives differs across Member States. It also depends on the expertise and competences of planners and other local experts, as well as on the available planning instruments, political commitment and support of local communities. Furthermore, regional and local authorities more often need to take the leadership for envisioning spatial developments and for being an intermediary in involving multiple actors from different sectors. However, the decentralisation process also provides opportunities to the regional and local authorities. They can address competing interests at local level closer to the community and the affected actors. Moreover, local authorities have a better understanding of the socio-economic context of the local developments and can design tailor-made solutions that are suitable to this local context and to the community. For example, in some countries such as the Netherlands innovative approaches to spatial development and nature conservation have emerged based on this decentralisation principle. One such approach is the *Red for Green planning* approach which focuses on developing public-private partnerships between the regional and local authorities, NGOs and the housing sector in order to design and implement spatial developments that would contribute to both the national ecological network and the property development sector. A key element of this approach is to agree upon the compensation and mitigation measures for conserving nature areas and for improving the ecological coherence between nature areas by acquiring the support and financial contribution from property developers. In this way a cumulative quality for the region as a whole and a better quality of nature can be achieved.

2.4.3 Functions of spatial planning

The spatial planning systems have two key functions that are essential for nature conservation activities, namely regulatory and development functions (UN, 2008):

- *Regulatory* function: the government (at local, regional, national levels) controls and authorises (or refuses to authorise) activities in relation to different sectors (urban development, transport, energy, agriculture, tourism, etc.)
- *Development* function: the government develops tools and strategies for provision of services and infrastructure, including preservation of national resources and biodiversity as well as incentives for investments. This function is related to the strategic and visionary role of spatial planning.

The role of spatial planning in implementing the objectives of the Birds and Habitats Directives relates to both the regulatory and development functions. The regulatory function corresponds for example to the provisions of Article 6(2)-(3) of the Habitats Directive, whereas the development function fits into the establishment of conservation measures for Natura 2000 sites as required by Article 6(1) and ensuring the overall coherence of the network as provided by Article 10.

As several previous studies have shown, a number of environmental benefits can be achieved for Natura 2000 if spatial planning successfully integrates multiple land uses and functions, including:

- Ensuring compliance of spatial plans and projects with nature legislation
- Promoting regeneration and the appropriate use of land, buildings and infrastructure
- Conserving important environmental, historic and cultural assets and landscapes that are part of Natura 2000
- Addressing potential environmental risks (e.g. floods, drought, wild fires, climate change) that have impact on biodiversity
- Ensuring sustainable tourism developments near Natura 2000
- Promoting the use of previously developed land ("brownfield") and minimising development on "greenfield" land
- Ensuring measures for defragmentation of natural habitats across transport or urban infrastructure (green bridges and other mitigation measures to restore connectivity)
- Safeguarding biodiversity while introducing energy efficiency developments in proximity or within the Natura 2000 areas.

2.5 Spatial planning governance across sectors and scales

Spatial planning strategies and plans are developed and implemented at all governance levels (national, regional and local) and are related to different sectoral policies. Hence, a clear distribution of responsibilities is needed between the different levels of administration. The 'good governance' of planning involves a variety of collaborative actions and synergies between governmental levels (*vertical*) and across policy sectors (*horizontal*) (see Box 2.7; Figure 2.1). Effective spatial planning aims at streamlining and coordinating territorial developments while avoiding the duplication of policy measures and efforts by actors such as government departments, commercial developers, communities and individuals (CEC, 1999; Albrechts et al., 2010).

Box 2.7 Levels of spatial governance

Vertical level:

National level

At the national level, governments are responsible for developing framework policies that both initiate and guide the decision-making process, setting the conditions for planning at regional and local levels. Major tasks include the adoption of legislation, coordination with other sectors and between regions (including cross-border cooperation), monitoring of policy implementation and identification of gaps in planning and implementation. National authorities are also responsible for supporting regional and national authorities in particular through capacity building. Ministries and national agencies are often responsible for the development of large infrastructure projects within different sectors (energy, transport, water etc.) which require spatial planning interventions and a national vision.

Sub-national level (federal and provincial states)

Some Member States (e.g. Spain, Belgium, and Germany, UK) have federal or provincial states which are responsible for their territorial development. These autonomous states are assigned spatial planning competences, usually under the national spatial planning law. Some have their own planning laws.

Regional level

The main task of spatial planning at the regional level is the preparation and coordination of long-term regional spatial strategies and projects implemented in the region.

Local level

Local governments prepare both general and detailed land-use plans for the territory of a municipality and are responsible for ensuring a proper assessment of the impacts of plans and projects on biodiversity.

Horizontal level (across sectoral policies):

Spatial planning policy plays an overarching role in territorial development at national, regional and local levels (vertical tiers of government) as well as across policy sectors (horizontal interaction between governmental agencies responsible for different sectors). The key sectors in which spatial planning plays an important role include agriculture, transport, forestry, tourism, energy and urban planning. The interaction between the competent authorities of these sectors takes place differently in each Member State. This process is not based on a unified approach and is highly dependent on the synergy achieved between policies, legal frameworks and the administrative practices of the Member States. The extent to which collaboration takes place between competent authorities is essential to achieving such synergy and for the integration of conservation and management objectives of Natura 2000 and the sectorial developments. To enhance this horizontal synergy, some countries use integrated strategic plans and spatial visions at national and regional level. These plans set the key priorities that will guide the integration between Natura 2000 and sectoral developments in spatial plans for the lower levels of government (e.g. plans for national ecological networks or landscape plans). Others rely on the legal provisions such as the SEA, EIA and appropriate assessments procedure. Yet other countries have developed coordinating bodies or collaborative structures aiming to establish better interaction between governmental agencies and guide the integration process within different sectors. The key challenges of the horizontal level of spatial planning in addressing Natura 2000 are overcoming the traditionally divisional organisational structures and fragmented responsibilities between agencies that implement the different policies and considering ecological principles during the preparation of spatial plans.

The competent institutions overseeing the formulation and implementation of spatial plans can apply a number of mechanisms (formal and informal) to coordinate and integrate sectoral developments and nature conservation objectives. Vertical coordination occurs through spatial planning documents and legislation implemented by administrative institutions overseeing planning at national, regional and local level. At the horizontal level in most countries, the competent authorities aim at more efficient interaction and coordination between sectoral strategic plans and the spatial plans. Some examples from the Member States include (Silva & Acheampong, 2015):

- *UK*: The 2011 Localism Act, under the so-called 'duty to cooperate' arrangement, local planning authorities, county councils and public bodies have a legal duty to engage actively in plan preparation in the context of strategic plans.
- *Ireland*: An advisory regional authority has been established to carry regional planning tasks which can support voluntary collaboration between local authorities, along with state-sector agencies responsible for infrastructure and services.

- *Austria*: Representatives of federal, state and local governments cooperate on a voluntary basis to meet the need for coordination of sectoral plans and spatial planning.
- *Netherlands*: Public-private partnerships set up between regional, local and private actors for regional urban developments and nature protection projects.

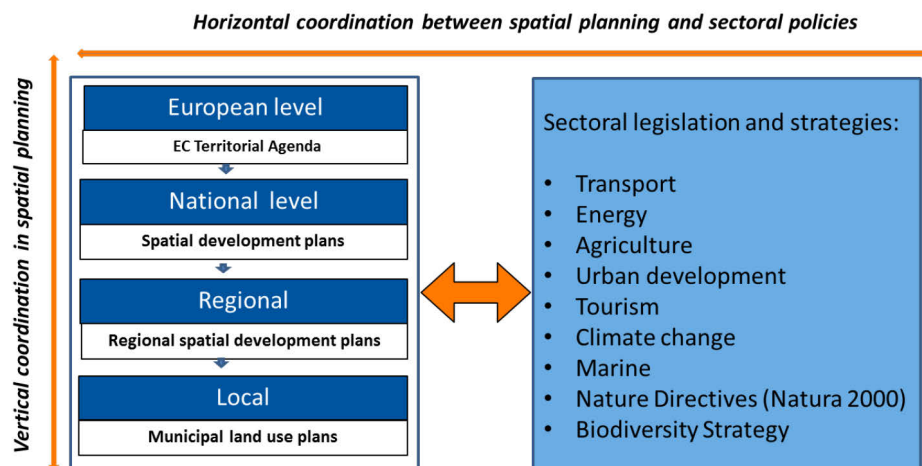


Figure 2.1 Hierarchy of spatial plans and applicability of relevant EU policies

In some Member States fundamental reforms have been made to the body of planning law to enable more coordinated operation of their planning systems (e.g. Germany, Netherlands) (Albrechts et al. 2010; Reimer et al. 2014). In other Member States the planning legislation has not kept pace with the current socio-economic trends such as developments in the land market and in the housing sector. For example, in some countries the spatial planning laws have not been upgraded for decades (e.g. in Italy since 1942; in Belgium; France since the 1990s), or have been more recently introduced but not yet effectively implemented (e.g. Bulgaria's spatial planning act issued in 2001). In Poland there are inconsistencies in the spatial planning regulations at different scales of planning that hamper effective coordination between national, regional and local level of spatial development. This has been indicated in the EU Semester's country report as a key impediment to the implementation of new investments in the construction sector at local level and to the adequate upgrade of the zoning plans related to current development needs (CEC, 2016b).

The implementation of the integrated spatial-planning approach depends not only on development of relevant laws, policies, guidance, procedures and incentives, but also on collaboration between different public institutions and stakeholders. Traditionally, most countries have authorities with restricted sectoral responsibilities related to spatial planning, which makes integrated planning very challenging. Integrated planning requires 'breaking the silos' and thinking in terms of common goals. As the experience of the Member States shows, such changes in working are more difficult to achieve than solving technical problems with individual plans or projects. Identifying and engaging the whole range of actors and potentially affected stakeholders is crucial to ensure the integration of Natura 2000 in spatial plans. Relevant stakeholders can include those directly involved in the spatial planning decision-making process, such as local authorities (politicians and civil servants), other tiers of government, and industry and private investors, but could also include academics, experts, community and non-governmental organisations. To meet these challenges much more emphasis

needs to be put on spatial planning as a strategic and multi-level governance process based on collaboration between competent authorities. For example, strategic spatial plans developed at national or regional level could serve as a mechanism for fostering collaboration between public authorities and individual actors in developing shared visions on spatial developments (Albrechts et al., 2010; Healey, 2007). An example of such a strategic plan is the National Defragmentation Programme of the Netherlands, which is aimed at reconnecting nature areas across transport networks (see case *Defragmentation of natural areas in the Netherlands*).

2.6 Spatial plans as a key mechanism for meeting Natura 2000 objectives

Spatial planning is normally carried out through a hierarchy of plans (see figure 1.1) and the accompanying legal and institutional organisations at different levels. These plans provide the basis for the integration of social, economic and environmental issues into land-use allocation and activity distribution decisions at the various spatial scales. In principle, higher-level instruments such as national plans provide the overall framework and guidelines for planning at the regional level. The middle-tier plans (i.e. regional plans) in turn provide the basis for the creation of detailed local land-use plans which determine permitted physical activities in particular locations and provide the basis for development control and management.

The EU Compendium of Spatial Planning and Policies (1997) identifies the following types of plans:

1. national policy plans
2. regional plans
3. local master plans
4. statutory detailed land-use and zoning plans

While there are a number of guidance documents provided by the European Commission regarding the assessment of sectoral impacts on Natura 2000, explicit guidelines about how Natura 2000 objectives should be addressed in different categories of spatial plans have not been developed to date. Table 2.1 provides examples of most common types of spatial plans in the Member States and their objectives regarding spatial development and Natura 2000.

The practices of the Member States differ substantially in this regard. In some cases the strategic level of planning (e.g. national or regional development strategies, integrated spatial plans, sustainable development strategies, etc.) seems to provide sufficient direction for sectoral developments. In other cases these strategic plans do not substantially influence spatial planning interventions.

Table 2.1 The process of spatial plan preparation and the implementation of Natura 2000

Policy objectives of the plan (horizontal)				
Type of plan	Spatial planning objectives	Natura 2000 implications	The planning process	Example
National				
<i>Strategic policy documents</i> (e.g. national spatial planning strategy or national territorial development plan)	<ul style="list-style-type: none"> Provides a framework for administrative spatial division in regions and urban areas, sectoral developments (e.g. infrastructure of national significance). Sets baseline conditions for territorial development with indications of different sectoral objectives and trends. Oriented to sustainability goals i.e. achieving growth and innovation, public services, conserving resources. Promotes inter-governmental coordination. 	<ul style="list-style-type: none"> Refers to national policy on nature conservation and biodiversity such as management of protected areas and or development of green infrastructure and national ecological networks. Can be subject to SEA. 	<ul style="list-style-type: none"> This level of planning is based on development of a general <i>National Concept of Poland</i>: The NSDC is a strategy that provides guidance for the countries' territorial development. In some countries mainstream of national and regional these strategies have a legal status while in others these are used as a reference document for regional and local developments. The strategic plans should be in compliance with the national spatial planning legislation. The process of planning includes the national authorities such as competent sectoral ministries, agencies and consultation bodies. Decisions are made about strategic developments of national significance and protection of national landscapes and nature. 	<ul style="list-style-type: none"> <i>National Spatial Development</i> vehicle for strengthening the territorial dimension into the development policies. It ensures implementation of the developmental goals at lower governmental levels and secures a unified territorial approach. It is based on five desirable characteristics of the Polish territory: competitiveness, innovation, internal cohesion, biological richness and diversity, security and spatial order. It reconciles the objectives of the spatial policy and the regional policy, combines strategic planning with the programming of measures under development programmes and operational programmes co-financed from the EU.
Supra-national (federal states)				
<i>Spatial development plan</i> (e.g. federal states' spatial plans: e.g. Spain, Belgium, Germany)	<ul style="list-style-type: none"> Serves as a framework for spatial planning of the federal state. Provides key trends of sectoral developments. Serves as basis for the development of regional plans. Facilitates inter-regional coordination. 	<ul style="list-style-type: none"> Refers to nature conservation policy objectives and in some cases specifies the needed conservation measures or protection status of natural areas and ecological connectivity (regional ecological networks). 	<ul style="list-style-type: none"> Some Member States have sub-national level of planning where a strategic planning process takes place for a territory of federal states. The process is similar to the national strategic planning but involves the federal authorities. Can have legal implications, based on the national spatial planning laws. Cooperation and coordination between the federal states and region is a key goal of the federal spatial plans. 	<ul style="list-style-type: none"> <i>Federal spatial plans in Germany</i>: Spatial planning in Germany relies on specialist cooperation between federal states instead of hierarchical and centralised decision-making. The Federal Regional Planning Act formulates the principles and goals of spatial planning as well as guidelines on sustainable spatial development. It requires the federal Länder to establish comprehensive planning programmes for their territory but mainly leaves the concrete design in terms of content up to them and to the regional planning authorities. The federal ministry responsible for spatial planning implemented so-called spatial-planning demonstration projects. These range from innovative approaches to intra-regional cooperation, regional land management, integrated transportation, the application of new information technologies and the regional protection of open spaces and landscape. In each case, an attempt is made to integrate the sustainability concept with the projects' diverse dimensions (ecological, economic, social) and to design them as part of an open and transparent planning process. During the 1990s, the majority of the federal Länder agreed on new spatial planning programmes for their respective territories. This was done for the first time in the new federal <i>Länder</i>. Their statements are supplemented and put into concrete terms by regional plans.
Regional				
Regional development plan (e.g. provincial development plan, regional development strategy)	<ul style="list-style-type: none"> Forms basis for regional development based on key socio-economic trends of the regions. Gives guidance to the local authorities for spatial developments. Formulates regional development priorities for e.g. provinces, 	<ul style="list-style-type: none"> Some regional plans serve as guiding document for steering sectoral developments in and around Natura 2000. Can impose restrictive measures for local developments and plans. 	<ul style="list-style-type: none"> Strategic/Statutory process The process of regional planning complies with the regional development policies of the EU in realising more balance and cohesive territories between the EU regions. It involves regional authorities. The scope of regional plans differs per Member State, however the 	<ul style="list-style-type: none"> <i>Flemish ad Dutch Structural plans</i> In Flanders and in the Netherlands regional planning plays an essential role in implementing key sectoral developments. The process of decentralisation has granted provinces and regions more autonomy in decision-making about spatial development. In the Netherlands this is particularly the

Policy objectives of the plan (horizontal)				
Type of plan	Spatial planning objectives	Natura 2000 implications	The planning process	Example
	<ul style="list-style-type: none"> districts. Promotes inter-regional and cross-border cooperation. 	<ul style="list-style-type: none"> Further delineates the national ecological networks and details developments in and around Natura 2000. 	<p>main aim is to provide a frame for decision-making regarding spatial developments: transport, nature, housing, cultural heritage, tourism and socio-economic development of the region as a whole.</p> <ul style="list-style-type: none"> Outlines funding for regional development and sets priorities for the national operational programmes at regional level. Can have legal implications for municipal spatial plans. The process involves regional authorities, provinces in consultation with municipalities. Regional level planning may cover the jurisdiction of a single regional or local government authority and/or combine a number of territories below the national level. Regional plans may focus on 'functional planning regions', 'metropolitan/city regions'. 	<p>case regarding the implementation of the national nature policy and conservation measures.</p> <ul style="list-style-type: none"> The regional plans are called 'structural plans' as they map the structure of the region and the general division of the functional and administrative areas of the region. In the Netherlands the structural regional plan complies with the priorities of the national spatial planning strategy and translates these into guiding planning interventions for the municipalities. In Flanders, as in other regions in Belgium, the region is the body fully responsible for implementing environmental protection measures. Nature conservation measures are developed under regional legislation.
Local				
<ul style="list-style-type: none"> Master plan or urban spatial development strategy 	<ul style="list-style-type: none"> Determines spatial developments of urban (suburban) areas, including distribution of land uses for sectoral activities (public utilities, infrastructure, services, overall environmental quality and nature. Identifies key development trends of the municipalities and sets directions for spatial planning and land uses at local level. 	<ul style="list-style-type: none"> Identifies environmental and sustainability criteria. Refers to nature conservation policy objectives at local level. Complies with national nature and biodiversity policies by addressing conservation measures needed in the long term. 	<p>The strategic planning includes development of strategy for specific urban areas, cities and towns which are under the jurisdiction of the local authorities. These plans can be supported by local political bodies and are often used to develop a shared vision on urban development.</p> <ul style="list-style-type: none"> Local authorities are responsible for the development of the local plans and their implementation. Local authorities are also responsible for soliciting public opinion on the plans and conducting appropriate assessment of the detailed land-use or zoning plans in compliance with the Habitat Directive. Local authorities are responsible for involving other relevant actors in the process of finding solutions to local competing claims for land use. 	<p><i>Spatial development strategy of Rotterdam 2030</i></p> <ul style="list-style-type: none"> Many cities and towns in Europe including Rotterdam have recently developed integrated spatial development plans. The urban strategies represent a shared vision of the city's development in the long term. The new strategy for Rotterdam outlines the priorities for the development of the urban area and its surroundings in terms of economic growth, infrastructure, services to citizens, environmental quality and landscape conservation. The municipal authorities adopted this spatial development strategy and made it available for consultation. It contains a survey of concrete plans the local authorities intend to carry out. The spatial development strategy complies with the social programme and the economic vision, and visualises their spatial effects. The Plan identifies key spatial developments that the municipalities have to implement in their master plans and in the detailed zoning plans.
<ul style="list-style-type: none"> Local land-use plan or detailed zoning plan 	<ul style="list-style-type: none"> Designates specific land-use functions for a specific territory based on a project level. Maps zones for special land uses, sensitive areas and areas of conservation. Identifies restrictions and/or permits proposed developments. 	<ul style="list-style-type: none"> May be subject to appropriate assessment, SEA and EIA. May need to address the conservation and management measures for Natura 2000 and, if need be, also mitigation and compensation measures for Natura 2000. 	<p>The statutory plans such as master plans and land-use plans aim to allocate land-use functions for developments.</p> <ul style="list-style-type: none"> Local authorities are responsible for implementing the conservation measures together with relevant local actors in compliance with the Nature Directives. 	<p><i>Maasvlakte integrated coastal zoning</i></p> <ul style="list-style-type: none"> Based on integration of functions, the Municipality of Rotterdam developed the Maasvlakte zoning plan. The plan aims at expansion of Rotterdam's harbour by reclaiming 2000 ha. from the North Sea. The expansion for the port's activities will see development of 25,000 ha. of protected marine sea bed and 750 ha. designated as protected land and recreational areas. Sustainability is a priority in the construction and use of the Maasvlakte, both in terms of design and the companies that are allowed to be established there. The plan is a joint collaboration between the Municipality of Rotterdam with 6 Ministries, the city region of Rotterdam, the Port of Rotterdam, and two Provinces.

2.7 Towards an integrated spatial planning approach

A number of factors affect the implementation of the integrated spatial planning across Europe (CEC, 2004; Stead and Meijers, 2009; Simeonova & van der Valk, 2016). One of these factors is the fact that currently there is no unified approach across the Member States for integration of Natura 2000 into spatial planning and into different sectoral developments.

Presently, integrated spatial-planning practices have been developed and applied in some countries, which has led to successful conservation practices for nature and biodiversity. Some spatial-planning systems in the Member States have been recast as mechanisms to improve coordination and integration between sectors and the use of integrated spatial planning has become one of the main objectives of spatial-planning policy. For example, such an approach to spatial planning can be found in the planning systems in Austria, Denmark, Germany, Netherlands and the Nordic countries (CEC, 1997).

Other Member States have already succeeded in developing comprehensive plans for establishing National Ecological Networks (NENs), including Natura 2000, which have subsequently been embedded in the spatial planning process at all levels of government (e.g. France, the Netherlands, Germany, Estonia and more recently Spain and Portugal) (see Case Green infrastructure in Estonia; EPIC WebGIS Portugal). The NENs serve as basis for developing a coherent spatial structure of protected areas of nature at national level, including Natura 2000. In some of the Member States (e.g. Netherlands, Germany) the NENs plans have played a crucial role in reshaping spatial developments embedded in sectoral plans such as in the transport, agriculture and energy sectors. NENs do not always have a legal status. For this reason planners may not be obliged to modify the spatial plans or projects due to presence of the NENs, but in some cases may at least be obliged to take the NENs measures into account in the assessment and planning process.

In contrast to the Western European countries, in the Eastern European countries progress in reshaping the spatial planning systems to better integrate nature conservation is even more challenging due to the rapid socio-economic and legal reforms that have taken place in these countries during the last two decades, these being the transition to a market economy and accession to the EU (see example of Slovenia, Box 2.8).

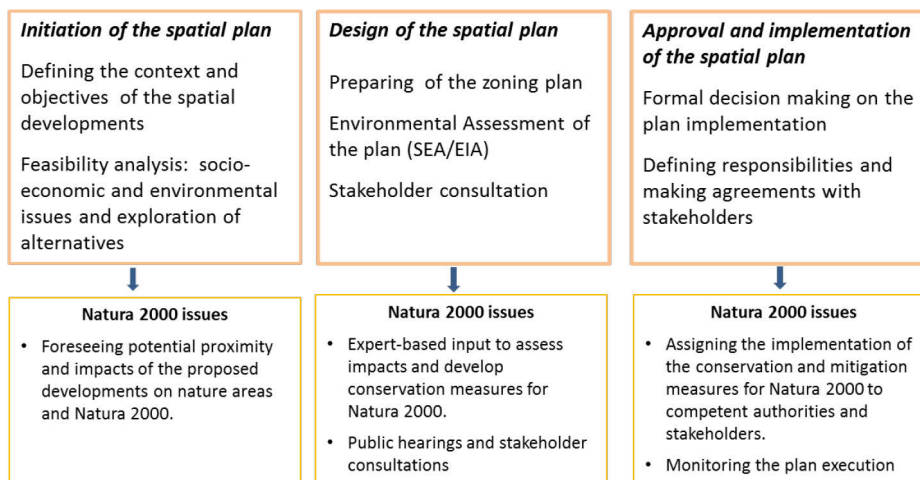
Box 2.8 Spatial planning and Natura 2000 in Slovenia

Slovenia's complex two-tier spatial-planning system imposes a substantial administrative burden on municipalities. Preparing a municipal spatial plan is a long and demanding process, which requires time, professional experience, substantial financial resources and consultations with various groups of stakeholders. This is further complicated by the fact that 37% of Slovenia's territory is designated as Natura 2000: the highest share of the EU. Unspoiled nature and biodiversity offer unique assets for Slovenia's long-term development, but this potential often goes unrealised, owing to a lack of strategic management capacity as municipalities struggle individually to comply with time-consuming, technical and administrative procedures. The lack of collaboration among municipalities leaves many of them unable to fulfil the regional growth objectives and to achieve an integrated and balanced development that meets broader interests than only the economic ones. Spatial planning procedures could be streamlined both at national and local levels. They could also be stabilised: frequent changes in spatial-planning policy and procedures are impeding an integrated planning approach. Municipalities need more technical assistance and training, not only to abide by spatial planning procedures but also to develop a broader vision of spatial planning at a relevant scale. A cross-checking mechanism should be introduced to link spatial plans with strategic plans and regional development plans.

The key challenge for all Member States is to implement and maintain this integration process in a way that resources, competences and responsibilities are shared across various spatial scales and governmental levels (Stead & Meijer, 2009; Simeonova & van der Valk, 2009; Vigar, 2009). While in most of the countries the integration of environmental objectives such as nature conservation have been addressed in the strategic spatial plans (e.g. national territorial development plans or regional territorial development strategies), the actual integration process often lags behind at the local level of planning. This is despite the fact that in many cases the local level of spatial planning is the operational level where Natura 2000 objectives play a crucial role (see Box 2.9). This is the level at which municipal spatial plans are developed, including zoning plans, as well as the level at which management plans for Natura 2000 are developed.

Box 2.9 Integration of Natura 2000 in zoning plans

The preparation of the zoning plans may be a standalone process for the redevelopment or urbanisation of new territories or be based on the developments addressed in higher-level plans such as master plans or regional plans. Zoning plans may have a direct impact on the Natura 2000 areas as they determine the designation of land uses for different functions. In an ideal case they implement the conservation measures and enhance the connectivity between the Natura 2000 sites. The spatial-planning process usually takes place in three key phases: initiation of the plan, design of the plan and implementation of the plan. There are a number of opportunities within each phase of the land-use plan preparation and implementation to consider different aspects of Natura 2000 management and conservation.



Management plans can regulate the activities within the specific Natura 2000. They can also set conservation objectives for the site and thus facilitate appropriate assessments of future developments. As such, the management plans for Natura 2000 can be effective tools for spatial planning by ensuring integration of Natura 2000 conservation measures into different sectoral developments (as far as they are regulated by the management plans).

Although the European Union has no specific competency in spatial planning, its policy and legislation have influenced the planning systems of the Member States. Apart from Nature Directives, the SEA and EIA Directives, the Marine Strategy Framework Directive, the Water Framework Directive and the Renewable Energy Directive have

exerted the biggest impact on planning policies and practices (see chapter 4). The European Commission together with the Member States have also undertaken several initiatives which can serve as the basis for developing a more unified spatial-planning approach to nature conservation across Europe. One of these is the European Commission's recently adopted Strategy on Green Infrastructure (GI) (CEC, 2013), which serves as an example of a more comprehensive and integrated spatial-planning approach towards biodiversity conservation. Another important initiative is the 'No less loss' initiative (see chapter 4).

2.8 Conclusions

Integrating nature protection objectives with other sectoral developments goals through spatial planning holds a great potential for effectively reducing biodiversity loss and for ensuring compliance of different sectoral developments to nature legislation. However, spatial-planning systems of the Member States are complex and planning processes require robust data and effective collaboration and communication between different stakeholders and governmental levels.

As the current study shows, in order to develop a spatial-planning approach which integrates Natura 2000, it is necessary to ensure that the planning process (particularly at the level of a regional and a local land-use plan) allows the identification at an early stage of potential complementarities, possibilities for co-existence and contradictions between different land uses. As a result, spatial plans should envision the potential impact of sectoral developments on Natura 2000 such as the degree of habitat fragmentation, intensification of land-use functions or land abandonment.

Moreover, spatial plans can be used to identify and implement mutually beneficial solutions to achieve sustainable developments in different sectors and meet the objectives of the Natura 2000 network.

The integrated spatial-planning approach shown in this study is indispensable for envisioning and preventing impacts of sectoral land-use developments on nature areas and for allowing adequate procedures for assessing spatial plans and projects. Such an approach is also essential for addressing the potential conflicting interests of stakeholders at an early stage. An integrated spatial-planning approach should be taken into account during both the development of strategic plans for a territory and during the design and implementation of detailed spatial plans. For this to happen, however, it is necessary to ensure sufficient administrative capacity at different levels of administration. This capacity is needed regarding the provision of up-to-date knowledge, regarding conservation issues and the use of ecological principles as well as efficient collaboration between sectoral agencies. This collaboration process should focus on at least four key issues: the proactive participation of actors from different sectoral institutions and authorities including the public and private sectors; shared competences and responsibilities between governable levels; provision of needed expertise and knowledge; and decision-support regarding the assessment and mitigation of ecological impacts of sectoral developments.

Combining political will with knowledge: the Catalan system of open spaces

The challenge

Due to its geographical position in the northeast of Spain, between the Pyrenees and the Mediterranean, Catalonia is a region with a rich biodiversity. At the same time, it has a history of intensive developments that have caused landscape fragmentation. This is the case in the metropolitan area of Barcelona. The extensive urban sprawl has created a conflict for the conservation of the remaining green and agricultural areas. Despite considerable awareness of the need for spatial planning to safeguard ecological connectivity within the area since 1986, the use of spatial-planning tools for this purpose failed to appear until the 21st century. As urban sprawl continued in the 1990s, the concerns about landscape fragmentation increased. In 1998, the Catalan parliament urged the regional government to prepare a strategic guideline that would ensure landscape connectivity between protected natural areas. This guideline was produced a year later, together with an assessment of the regional ecological connectivity. Shortly after, parliament also urged the regional government to ensure the ecological connectivity between two protected areas close to Barcelona. Only in 2003, after a new political coalition was formed in the regional government, were seven sub-regional spatial plans developed and the implementation process of these spatial plans accelerated.

Planning approach

The new government aimed for an accelerated spatial-planning process based on a new regional planning approach. In 2005, new general guidelines were adopted, in which spatial planning was structured around three systems: open spaces, settlements and transport infrastructures. The open-spaces system includes all areas which escaped urbanisation due to their intrinsic natural values (e.g. biodiversity, soil fertility), function (e.g. groundwater recharge, safeguard against natural hazards) or unsuitability for urban development. The new guidelines emphasise the values of open spaces and the services they provide. Open spaces should therefore be proactively planned, which goes beyond preserving protected areas. Open spaces should be integrated in a connected network to ensure their functionality and value.

Outcome

As a result of increased efforts between 2006 and 2010, all seven sub-regional spatial plans were adopted, having been subject to strategic environmental assessment and a public consultation process. The enforcement of the sub-regional spatial plans was perceived as a success. However, their implementation still had to be ensured through the municipal spatial plans for which additional actions were required. The regional government produced urban master plans for different districts, which have been a key tool for the implementation of the sub-regional spatial plans. As most of the municipal plans were adopted prior to the sub-regional plans and some contradictions between them were identified, a revision of the municipal spatial plans had to be carried out. The regional government implemented a new aid scheme for the modernisation of the

municipal spatial plans, and by 2010, 74% of the municipalities followed this scheme. For the municipalities that did not have a municipal spatial plan, the regional government implemented provisional spatial plans until the municipalities produced their own.

Why a best practice?

The Catalan planning approach towards a network of open spaces is an example of how natural areas can be valued in spatial planning. In the traditional spatial-planning process, protected areas were not considered important as these were thought not to be beneficial to society. The new practice increased the understanding - of both the local community and the regional and local authorities - that open spaces are valuable areas and that their functions need to be considered as one of the main components of spatial development. However, regional spatial planning alone is not enough to ensure effective implementation in the territory. This example shows that municipalities can be supported with aid schemes to ensure implementation at municipal level.

Key success factors

The newly developed sub-regional planning approach, leading to the development of spatial plans that embed ecological connectivity, became feasible as a result of a combination of knowledge and political commitment. Discussions on the need for ecological connectivity, which were supported by scientific studies undertaken by research centres and universities, could be acted upon due to a change in the government. This coincided with the planning of a green belt around Barcelona, and although the green belt was not fully implemented, many agreements between different stakeholders (e.g. regional authorities, municipalities, public bodies) were reached, which provided room for an environmental discourse.

Lessons learned

Nature conservation should be part of spatial planning and requires an interdisciplinary planning approach, employing relevant expertise, such as urban architects, environmental engineers and ecologists. Strategic spatial planning at regional and local level will be most successful if combined with knowledge and political commitment.



Connecting open spaces in Catalonia
(Pla territorial de les Comarques Gironines (2010))

Embedding Natura 2000 in spatial planning: Green Infrastructure in Estonia

The challenge

Just before the country's accession to the EU in 2004, Estonia had already pre-selected its Natura 2000 areas. However, sufficient connectivity between the individual Natura 2000 areas appeared not to be ensured. For this purpose, Estonia introduced the planning of green infrastructure (GI) i.e. a network of interconnected green areas. Ever since, GI has been embedded in the spatial-planning process at national, regional and local levels.

Planning approach

The planning of GI at regional level (counties) started in 1999, with the issuing of a governmental decree under the Spatial Planning Act. This initiated a plan for 'Green networks' and a plan for 'Valuable landscapes', both developed in close cooperation with all stakeholders. The provisions for stakeholder consultation and cooperation are outlined in the Planning Act, but their application may differ per county, depending on local needs. Usually, a wide variety of stakeholders from different sectors have been involved in implementing the plans, including local governments, regional environmental boards, regional forestry and hunting societies, road administrations, environmental NGOs, tourism enterprises and scientists.

Outcome of planning process

The plans for GI at county level were finalised in 2008 in all Estonian counties. Subsequently GI has been taken into account in the land-use plans at municipal level. These plans had an integrating function for sectoral policies, such as management plans for catchment areas, forests, national infrastructure and nature protection areas, including Natura 2000 sites. Subsequently, the new national spatial strategy 'Estonia 2030+' has emphasised the need for preservation of the GI at national level, when planning for large-scale developments such as transport infrastructure or mining.

Why a best practice?

Planning of GI in Estonia aims at promoting sustainable and holistic land-use development through realising sufficient connectivity between natural areas. The GI planning of Estonia has been successful at national, regional and local levels. The implementation of GI measures at regional and local levels followed a participatory-planning approach. The planning processes at regional level, for instance, included a wide variety of stakeholders from different sectors. These stakeholders could not only express their interests and perceptions regarding the proposed GI network, but were also encouraged to contribute their specific knowledge and experiences, e.g. foresters, hunters and road planners have contributed to identifying green corridors needed to support wildlife movements.

Key success factors

Key success factors are seen to be:

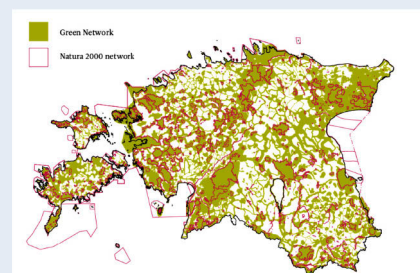
- national government's recognition and support for GI planning
- a flexible planning approach and involvement of different stakeholders
- the use of all available knowledge from both scientists and practitioners
- raised awareness among sectoral stakeholders and among local governments regarding the importance of ecological networks as part of land-use planning

Lessons learned

County and local governments have provided multiple arenas for stakeholder participation, both formal (i.e. legal provisions for participation) and informal (i.e. more interactive and inclusive forms such as joint green corridor mapping exercises). This has enabled integration of valuable practice-based knowledge from stakeholders in the real-life planning processes. However, in some cases, the focus on knowledge has somewhat overshadowed other inputs, such as stakeholders' interests. The preservation of GI areas is challenging, as outside protected areas there is no firm legislative basis for their protection. Also, the formulated goals of GI areas are not very specific yet, e.g. the goal is to promote sustainable land use and support landscape connectivity, rather than targeting specific species or habitats.

Recommendations for future projects

- Local governments' comprehensive plans need to devote more attention to specifying the boundaries of green infrastructure areas and the conditions for their designation and conservation.
- The Natura 2000 and GI networks can be complementary when revising GI plans and developing or updating nature conservation-management plans. This requires ensuring compatibility between several planning processes and types of plans at different planning levels.



The plan for a 'Green Network' in Estonia (Environment Agency, Estonia)



3 Land-use pressures: the present and future of Natura 2000

Key messages

- The key land-use changes affecting Natura 2000 are urbanisation, intensification of agriculture and land abandonment.
- In the marine area the extraction of non-living resources, tourism and recreation activities as well as the development of man-made structures is expected to increase further in the coming years.
- The two main approaches to solving land-use conflicts are segregation and integration of land-use functions

3.1 Introduction

There are over 27,000 Natura 2000 sites in the European Union, covering a wide range of different landscapes (see figure 3.1). Since the adoption of the Birds and Habitats Directives in 1979 and 1992 respectively, land use in the EU has changed considerably. Since then Europe has experienced an overall increase in built-up areas, woodland and forest. Land-use change within Natura 2000 sites appears to have been less pronounced than outside (EC, 2015). This chapter discusses the current and past land-use changes both in and around Natura 2000 sites and how spatial planning addresses them.

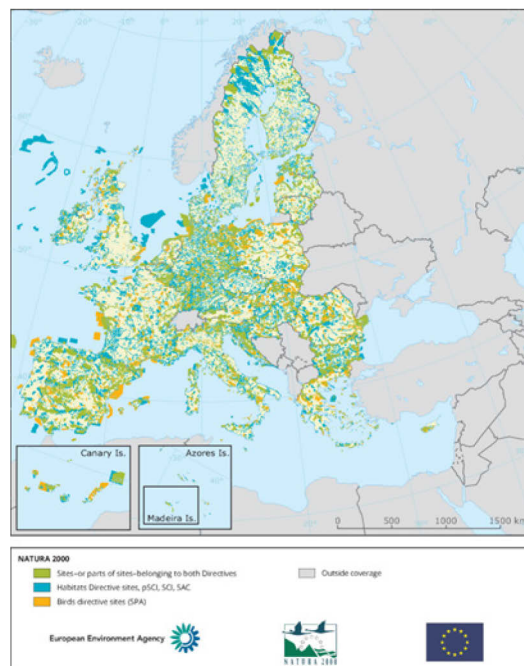


Figure 3.1 Natura 2000 in the EU (© EEA, 2016)

3.2 Current and past land-use changes

Presently, terrestrial Natura 2000 sites are mostly covered by forests (49 %) and agricultural land, either cropland or grassland ecosystems (see table 3.1) (EEA, 2015b).

Table 3.1 Land cover of Natura 2000 sites in the EU (EEA, 2015b)

Ecosystem type	Area	%
Woodland and forest	421.895	48.8
Cropland	147.545	17.1
Grassland	101.838	11.8
Heathland and shrub	70.769	8.2
Rivers and lakes	39.925	4.6
Wetlands	37.274	4.3
Sparsely vegetated land	36.753	4.3
Urban	5.044	0.6
Marine inlets and transitional waters	3.205	0.4

In the period 1990-2006 the key land-use trends in the EU were urbanisation and expansion of shrub land due to land abandonment (EEA, 2013). These land-use changes are also affecting Natura 2000 sites, where an increase in shrub land has also been observed and at the same time a decrease in agricultural area, mostly cropland and to a lesser extent grassland. Although the surface of Natura 2000 area taken up by urban areas and infrastructure is limited (only 0.6 %), many roads and urban areas are located in the vicinity of Natura 2000 sites. The diffuse pressure of urbanisation in almost all EU Member States has increased within the sites (EEA, 2010). Natura 2000 appears to decrease land-use change, as overall land-use change outside the terrestrial Natura 2000 sites is greater than inside (EEA, 2015b).

In marine areas, pressures have increased due to human use. Mineral extraction, freight transport, and off shore energy production have all increased in recent years. Only fishery and extraction of gas and oil have declined. Total catches in all EU fishing regions have been in steady decline; furthermore, the number of vessels has declined. Despite this overall reduction in fishery, only few reserves where no fishery is allowed exist. The extraction of gas and oil is decreasing as well – also from marine areas. However, this does not automatically result in less use of the marine environment. For instance, in the North-East Atlantic marine region the number of installations has increased, as smaller fields are being exploited (EEA, 2015a).

Habitat loss (in particular through urban sprawl, agricultural intensification, land abandonment, and intensively managed forests), pollution, over-exploitation (in particular fisheries), invasive alien species and climate change are key threats to biodiversity and continue to exert pressure causing loss of species and habitats and resulting in ecosystem degradation and weakening ecosystem resilience (European Environment Agency, 2015). The key pressures on Natura 2000 often stem from the agricultural and forestry sectors as 80% of the Natura 2000 sites fall under the management responsibility of these sectors. However, urbanisation, transport and mining activities also cause considerable pressures on habitats and species falling under the Habitats Directive and require a proper management approach for regulating land uses in and around the Natura 2000 areas (see Figure 3.2).

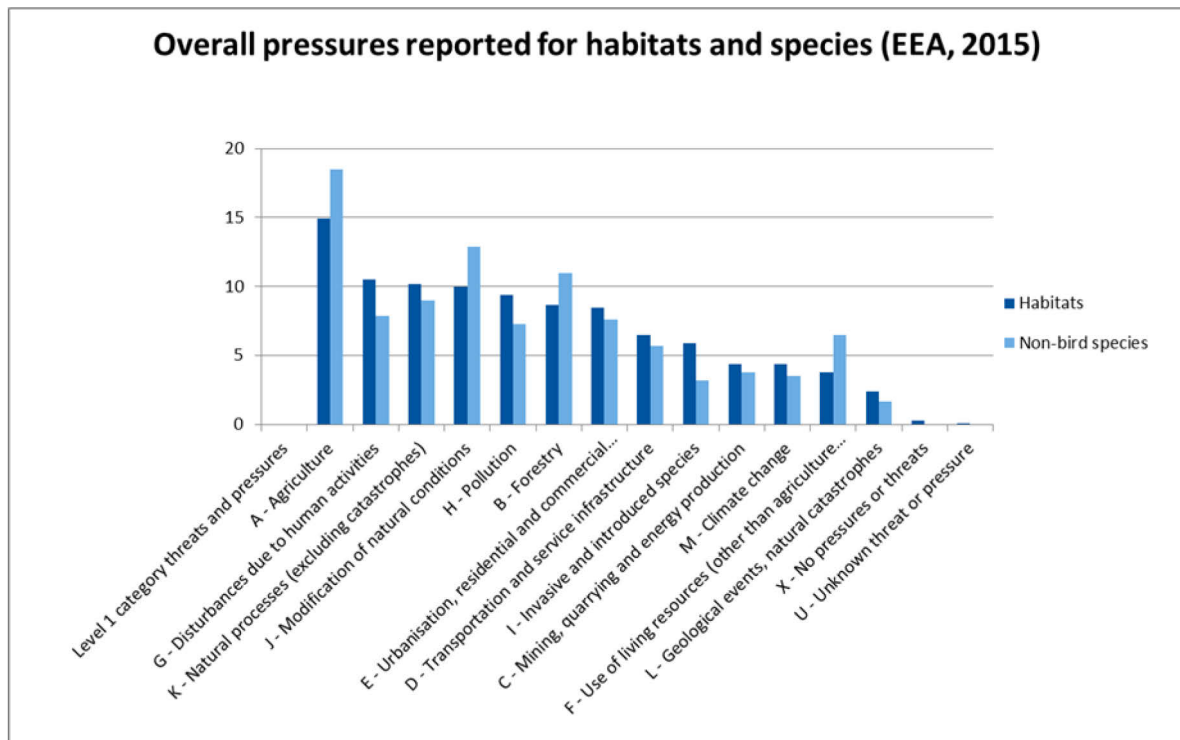


Figure 3.2 Overall pressures reported for species and habitats (© EEA, 2015c)

Studies that have reviewed future land-use development for Europe predict continued urbanisation and a combined process of agricultural intensification and land abandonment in the EU (Pedroli et al., 2015; (OECD, 2012); EEA, 2007). Land-use developments in Europe differ considerably from region to region. Predictions of the exact occurrence of land abandonment in Europe in different scenario studies vary considerably (Keenleyside & Tucker, 2010). The risk of land abandonment is highest in southern and northeastern Europe (Eurostat, 2013, figure 3.3).

Overall economic growth in Europe until 2050 is expected to be limited, and is currently estimated at between 1.5 and 2.5 % per year (OECD, 2014). The projections on population growth in the European Union diverge between a decrease to 450 million and a bigger increase to 570 million people (OECD, 2012; Mamolo et al, 2014). The uncertainties concerning demographic developments are large, but the impact on Natura 2000 sites is not so much determined by the absolute number of the EU population as by the growth of urban areas and transport infrastructure. Increased urbanisation is expected, particularly near cities in Eastern Europe.

Besides urbanisation, mobility and transportation and agricultural activities, several other trends will affect the ecological coherence of Natura 2000. The move to renewable energy (also in the forestry sector) and the adaptation of society to climate change will affect Natura 2000, also in relation to spatial planning. Energy production will be less dominated by fossil fuels, since fuel prices are expected to increase. The production of solar and wind energy will further increase, as production costs will become lower. This will have an impact on Natura 2000 sites as well. The marine and coastal areas in the Atlantic, Boreal and Continental regions in particular offer opportunities for the development of wind energy. A further increase of biomass production for renewable energy purposes is uncertain because of high costs involved. Given the ambitions to produce more renewable energy, including hydropower, the

number of dams is expected to increase. In the Balkan, Adriatic and Black Sea region in particular many new dams have already been planned (Schwartz, 2014). These trends will have important implications on Natura 2000 and spatial planning.

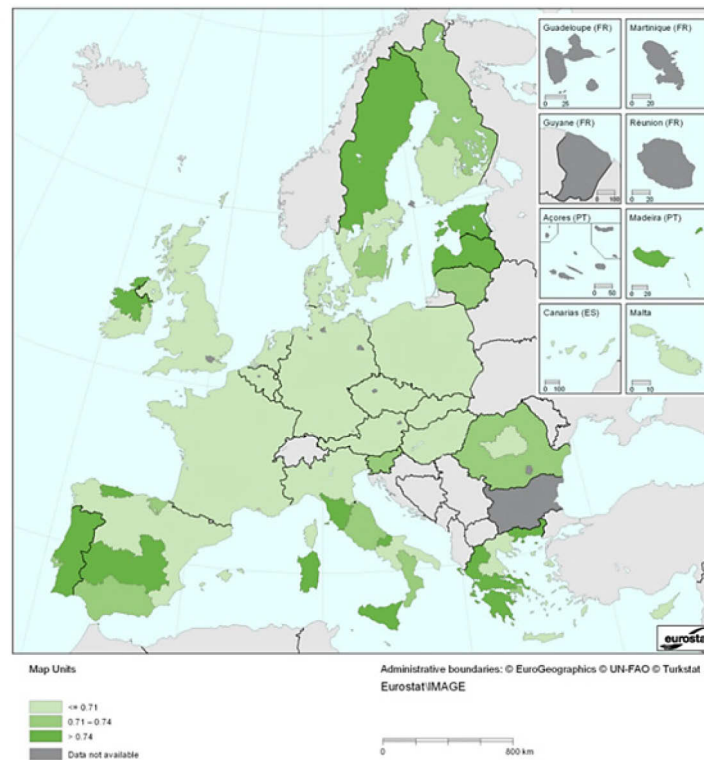


Figure 3.3 Risk of land abandonment in the EU (© Eurostat, 2013)

Climate change is expected to have considerable effects on the species and habitats occurring in Natura 2000 sites (EC, 2013). Measures taken to adapt to and to mitigate climate change might impact the Natura 2000 sites and their surrounding landscape. Measures to mitigate climate-change impact such as afforestation can, if properly planned, provide benefits for the connectivity and coherence of the Natura 2000 network. Climate-change adaptation measures, such as improved floodplains, can also contribute to this goal. Spatial planning has an important role to play to ensure synergies between climate-related actions and biodiversity conservation.

In the framework of the EU research project Volante, different land-use change scenarios were developed (Pedroli et al., 2015). Figure 3.4 shows a prediction of land-use change in and around Natura 2000 sites based on the Volante's baseline scenario. Although the modelling of future land use is an indicative process, the analysis confirms that the EU-wide trends of land abandonment and urbanisation will impact the surroundings of Natura 2000 sites. These trends might lead to decreased connectivity of the network and reduce species migration across agricultural habitats due to fragmentation of agricultural areas or forestation in peripheral areas. In non-peripheral regions the areas available to ensure connectivity between Natura 2000 sites are decreasing due to increased urbanisation. Spatial plans can be a key tool for identifying the expected impacts on the connectivity of Natura 2000 network and mitigating them accordingly.

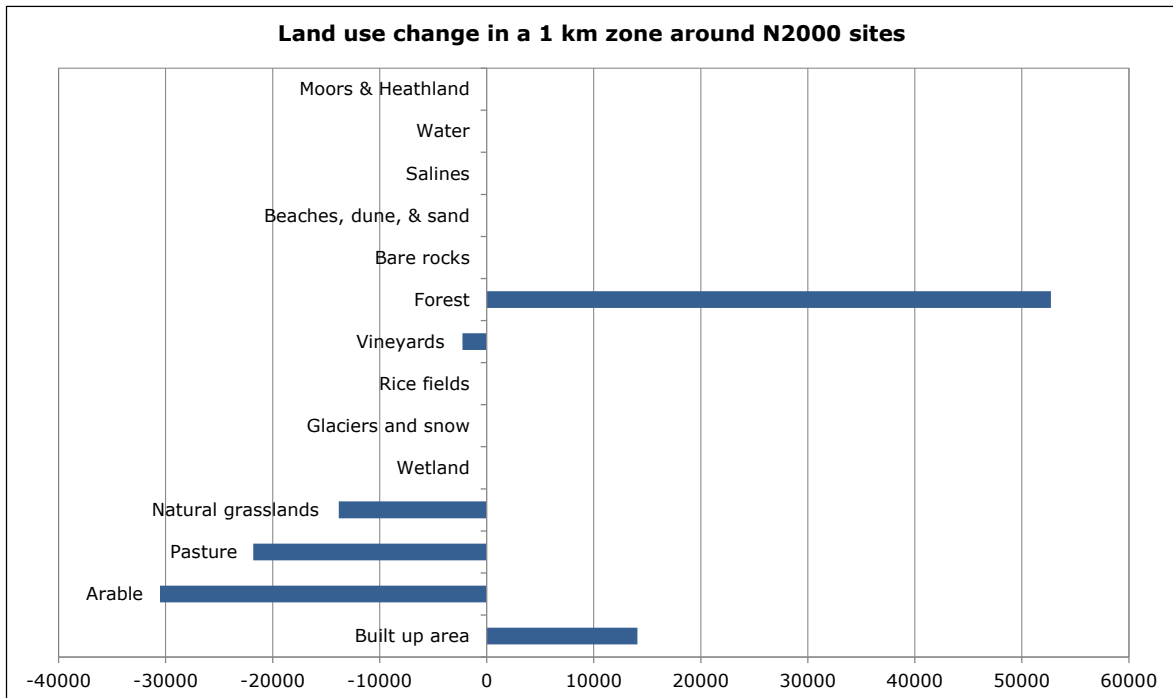


Figure 3.4 Predicted land-use change up to 2040 around Natura 2000 areas (based on Volante Base line scenario (derived from Pedroli, 2015))

In the marine area an increase is expected for almost all uses. Particularly expected to increase are the extraction of non-living resources, tourism and recreation and man-made structures. Only the use of the marine area for fishery (fish and shellfish), passenger ferry services, port operations and submarine cable and pipeline operations is expected to decrease. (EEA, 2015a). The effects of climate-change adaptation and mitigation might also result in increased land claims for coastal defence, flood protection and salt-water protection.

3.3 Spatial planning and its role in addressing land-use pressures on Natura 2000

Land-use changes affect habitats and species by exerting impacts on their composition, structure in time and space, and the functions sustaining biodiversity. Moreover, the survival of species populations depends on the quality of the habitat, the amount of available habitat, spatial distribution, and matrix or landscape permeability (Opdam et al., 2001; Kettunen et al., 2007). Kettunen et al. (2007) state: "When considering the ecological coherence of Natura 2000, it is important to note that the completed Natura 2000 network, defined by the Habitats Directive as the sum of all areas designated for conservation under the Birds and Habitats Directives (Article 3.1 of the Habitats Directive), is a collection of individual protected sites." This statement indicates that if these protected sites are meant to form an ecologically coherent network, an effective functional connectivity needs to be established and maintained between these sites and their surroundings.

The most important spatial impacts of sectoral developments on Natura 2000 areas affecting the ecological coherence of the network (including its functional connections) are:

- Loss in habitat quality due to change in land-use functions (agriculture, tourism, urban development) leading to either increased disturbance and pollution or cessation of management;
- Loss of amount of available habitat due to land abandonment (cessation of agricultural use, lack of restoration of areas used by sectors, brownfields) and intensification of land-use functions (agriculture, tourism, urban development);
- Change in landscape permeability for dispersing and migrating species due to loss in habitat and the creation of barriers for dispersing and migrating species by sectoral activities such as fragmentation by grey infrastructure (e.g. urbanisation, housing, transport, energy sector etc.).

Fragmentation leads to change in quality of the habitat, habitat loss and breaking habitat into smaller units, all of which reduce the population viability for species.

Spatial planning plays a key role in addressing land-use pressures on Natura 2000 in order to prevent the above-mentioned spatial impacts of sectors. Generally, two main strategies for land-use management can be applied to address conflicting land-use issues in spatial planning:

- Segregation of functions: The conflicting land uses are separated spatially to ensure that they do not affect each other. Often this will entail prohibition of particular socio-economic functions and creation of so-called 'no-go areas'. The ban on development of wind parks in Natura 2000 marine areas in the German part of the North Sea (see box 4.1) is an example of this approach. Temporary bans on activities can also be applied, for instance during the breeding season.
- Spatial integration: Here the conflicting land uses are integrated spatially by combining different socio-economic functions in the same area. Usually this entails that restrictions are specified for different land uses in order to minimise the conflicts or to optimise the mutual benefits. Examples are recreational co-use of nature areas, eco-tourism or implementation of agri-environmental measures in agricultural areas.

Often segregation and spatial integration are combined depending on the scale of planning, for instance by establishing buffer zones.

Spatial planning can integrate these different mechanisms of land-use management in long-term plans and strategies. Such plans can be developed at national or regional levels. For example, the national habitat defragmentation plan of the Netherlands aims at long-term coordinated restoration process of ecological connectivity across transport infrastructure. This plan foresees the implementation of effective mitigation measures, based on ecological knowledge and field-data research about the effects of transport developments on biodiversity (van der Grift et al., 2013) (see Case *Defragmentation of natural areas in the Netherlands*).

By means of spatial planning any mitigation measure can also be implemented in a more comprehensive and integrated way, which means finding the most optimal solutions for both the specific sectoral development and nature. This allows flexibility in developing more than one alternative to different types of measures and/or in combining series of measures for each sector. For example tailor-made solutions can be developed by regional and local authorities to ensure the spatial integrity of the Natura 2000 areas. These can include setting the conditions under which limited developments can take place, compensating nature as an alternative to a sectoral

development, or adjusting boundaries and buffer zones within the ecological network in order to enhance connectivity and the functionality of the network as a whole (No Net Loss principle). The final outcome of the combined scenarios of mitigation measures is to improve the overall quality of the ecological network and to achieve a cumulative effect for biodiversity conservation, such as enhanced population viability of target species.

3.4 Conclusions

The most important spatial impacts of sectoral developments on Natura 2000 areas are land abandonment (ceasing of agricultural use, lack of restoration of areas used by sectors, brownfields) and the intensification of land-use functions (agriculture, tourism, urban development, marine exploitation). These impacts may result in increased habitat fragmentation affecting the coherence of the Natura 2000 network due to a reduction in habitat quality or size and a decrease in the viability of species populations.

These impacts occur both in and around the Natura 2000 sites, although overall land-use change within terrestrial Natura 2000 sites is lower than outside. Also, in the future major land-use changes in the vicinity of Natura 2000 sites are expected to occur. In particular, in intensively used regions in Europe the pressure of urbanisation and infrastructural development will increase. Spatial planning addresses these land-use conflicts using two main strategies: segregation of functions and integration of functions.

Facilitating urban development near a Natura 2000 site: Portmarnock and Baydoyle SPA & SAC

The challenge

Portmarnock is located in Fingal, a county close to the city of Dublin. The entire county has experienced rapid urban expansion over the last 25 years, particularly in the vicinity of major towns and coastal areas. The county is one of the most important food regions in Ireland, as well as hosting a wealth of natural and cultural assets. The challenge for the entire county is to manage future growth of the area in a way that ensures the maintenance of its natural resources and agricultural production as well as accommodating the need for urban expansion. In the specific area of Portmarnock, the aim was to develop a high-quality urban area for up to 3,360 people next to a Natura 2000 site (Baydoyle SPA and SAC), which has been designated for its salt meadows, mudflats and large number of migratory birds.

Planning approach

From the outset, an integrated approach was developed that acknowledged the need to accommodate the multiple functions and uses of the area. The local land-use plan followed five principles as set out in the existing county plan for the entire county of Fingal on the development of green infrastructure. The principles refer to: biodiversity, landscape, sustainable water management and archaeological and architectural heritage. The planning team in Portmarnock South consisted of a broad range of experts. Throughout the process there was time for engagement with different stakeholders to ensure shared understanding. The public consultation consisted of two distinct phases. In the early stage of the project stakeholders were asked for their views on the development plan through provision and dissemination of information brochures. This consultation with the stakeholders and public allowed a joint vision of the development of the area at an early stage. In a later stage the draft plan was published for consultation.

Outcome of the planning process

The planning process resulted in a plan that enabled the development of urban area but at the same time strengthened both the natural as well as the recreational value of the area. The natural values were improved through the development of a quiet zone for the migratory birds, which is not accessible in the migration period, as well as an arable crop area to provide food for native bird species. Furthermore, green routes were developed to promote walking and cycling and the existing two archaeological monuments were kept in the open spaces. The Local Area Plan for Portmarnock South was approved by the Council in July 2013. The environmental assessment report of the plan indicated that there will be no likely significant effects on the Natura 2000 area bearing in mind the proposed measures for nature conservation.

Why a best practice?

Often it is difficult to reconcile the different demands for land use within one area. In the case of urban coastal developments in particular, there are many examples in which urban expansion along the coast

has led to negative effects on Natura 2000 sites. In Portmarnock it was possible to develop a well-balanced plan that enabled urban expansion but did not lead to negative effects on the nearby Natura 2000 site or other protected areas in the surrounding area.

Key success factors

One of the key success factors was the sufficient time taken for the preparatory phase of the plan. This ensured that there was enough room for internal and external consultations and a shared vision on the plan. Furthermore, the plan was developed by a multidisciplinary team in consultation with relevant external experts. Also, the local planners were supported by the existence of a county-wide plan for green infrastructure. This plan supported planners in having an integrated approach from the start of the planning process. The mutual benefits of the green infrastructure for nature and people were made visible. Furthermore, the engagement of key stakeholders from the start of the planning process enabled the development of a well-balanced plan that addressed different interests.

Lessons learned

It is of great importance to set up an inclusive planning process that ensures the involvement of relevant experts and stakeholders from the start of preparing a local land-use plan. Furthermore, the interests of all parties that may be affected by the plan need to be considered. A broad array of different functions needs to be addressed during the plan preparation, based on which a joint vision on the developments can be built.

Recommendations for future projects

- Early consultation with relevant stakeholders at the plan initiation phase;
- Ensure that the interests of stakeholders are considered;
- Regional plans play a guiding role in promoting a more nature-friendly planning process, i.e. a green infrastructure plan at regional level can support integrating Natura 2000 in a local land-use plan.



The local area plan of Portmarnock South (© Fingal County Council)

Defragmentation of natural areas in the Netherlands

The challenge

In the Netherlands, the problem of fragmentation of natural areas, including Natura 2000 sites, by transport corridors is widely recognised. One of the countries in Europe with the highest relative land take by transport corridors, the Netherlands was among the first to recognise the need for a systematic approach to preventing and restoring loss of habitat connectivity due to transport infrastructure. In the 1990s various studies identified, often independently, a multitude of 'bottlenecks' where defragmentation measures were considered the most urgent. Because the studies varied widely in research approach and scale, an overall prioritisation of defragmentation spots was impossible. Furthermore, the ecological benefit of individual measures was not always clear. This complicated decision-making and initiated societal pressure from a variety of lobby groups to 'have their bottleneck locations addressed first'.

Planning approach

The government started developing a national Long-Term Defragmentation Programme in 2001. It aims at identifying problematic spots, developing solutions and prioritising actions. In March 2005, it was approved by the Dutch Parliament and implementation started. All actions are planned to be finalised by 2018. As a multitude of stakeholders – i.e. road managers, nature managers, private landowners, national and provincial administrations, planners at the municipalities, water boards, NGOs – need to be involved, a regional planning approach was chosen in order to streamline implementation and coordinate measures. The Ministry of Transport is responsible for the planning and execution of the programme. Implementation of the programme is in the hands of the provinces and has been embedded in the regional spatial plans. The design and construction of the measures are carried out by the National Road Administration and National Railroad Administration and are being implemented in the regional and local spatial plans.

Outcome of the planning process

A first step in the planning process was to identify all spots where existing transport corridors impair the viability of wildlife populations. In a second step the identified spots were prioritised according to three criteria: (1) spots where defragmentation measures achieve relatively greater improvement of population viability based on model results; (2) spots pointed out in workshops by regional administrations and nature conservation groups, based on expert knowledge of the field situation; (3) spots situated in priority areas for sustainable regional development. This resulted in the identification of 208 locations where defragmentation measures were necessary. Currently, 99 bottleneck locations have been fully addressed. At 51 others measures have been taken, but additional measures are planned. So far the programme has succeeded in implementing two-thirds of all the measures.

Why a best practice?

The identification of bottleneck locations on the basis of population viability was an innovative approach, as most previous studies had simply identified intersection points of transport corridors with existing or proposed ecological networks as defragmentation spots. The new approach allowed for a clear and direct

link to biodiversity conservation goals and for prioritisation of actions on the basis of a quantitative comparison of the ecological benefits between locations. The (early) involvement of all stakeholders has proven to be highly beneficial to keep the execution of the programme on track and within budgets. The exchange of knowledge and practical experiences has been enforced through the initiation of expert networks. The programme is a unique example of an integrated approach to transport and spatial planning that embeds Natura 2000 and is based on a multi-level governance process.

Key success factors

- A scientific approach to developing the defragmentation programme: a transparent method to identify and prioritise bottleneck locations.
- A national coordination desk for supporting and coordinating the execution of the programme.
- Early tuning of actions between all national stakeholders through regular meetings organised by the national coordinator.
- Initiation of provincial platforms in which all regional stakeholders are represented to discuss solutions, the planning and finances.

Lessons learned

Only through a defragmentation programme that includes a standardised research method to assess bottleneck spots, could the need for defragmentation measures be properly assessed, priorities be set, and a regional planning approach become realistic. Government agencies at all levels should take the lead in the setup of a defragmentation programme, but the involvement of non-governmental organisations, research institutes and the public is indispensable for achieving the planned defragmentation objectives.

Recommendations for future projects

Defragmentation measures should be prioritised based on the expected increase of population viability due to mitigation measures. It is recommended that model simulations of the expected impact of measures on population viability be combined with expert knowledge. Monitoring of defragmentation measures to evaluate their effectiveness and efficiency needs to become standard procedure.



Defragmentation spots in the province of Utrecht: low priority (yellow), moderate priority (orange), medium priority (red), above medium priority (blue), high priority (black). In green the National Ecological Network. (© Alterra)



4 The potential synergy between sectoral policies, spatial planning and Natura 2000

Key messages

- For the effective implementation of Natura 2000 policy the synergies between different EU policies and legislation and the Nature Directives should be enhanced, especially at the regional and local level.
 - Implementation of the WFD, MSFW and Flood Directive has resulted in successful planning practices that apply an integrated spatial-planning approach to Natura 2000.
 - Better stakeholder participation, both formal as well as informal, is necessary to achieve further progress.
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4.1 Introduction

Experiences of the Member States and a number of policy evaluation studies have shown that successful Natura 2000 implementation depends on direct and indirect interaction with other policy sectors such as transport, urban development, agriculture, energy, etc. The activities of these policy sectors have implications for the effective protection of the Natura 2000 sites and the coherence of the network. As discussed in Chapter 2, spatial planning has an overarching and coordinating role in integrating different sectoral interests in a way that both economic development and Natura 2000 policy objectives are equally taken into consideration. This chapter analyses existing and potential synergies between Natura 2000, spatial planning and relevant sectoral policies based on the interactions between the policy objectives, specific legislative instruments, policy instruments and relevant practices.

4.2 Assessment of the synergy between policy objectives

The recently finalised fitness-check of EU nature legislation concluded that the Nature Directives are coherent with the rest of the EU environmental legislation. This coherence, however, is less obvious with regard to other sectoral policies, due to often contradictory objectives and interests of these sectors and Natura 2000. Based on an assessment of the EU policy objectives of selected key sectors, a number of potential synergies and conflicts have been identified that need to be considered while reconciling sectoral interests and Natura 2000 objectives during spatial planning processes (Table 4.1).

The key challenge in assessing the links between Natura 2000, sectoral developments and spatial planning is in identifying the spatial scales of intervention of the policy. Some policies cover large-scale developments whilst others focus more on regional or even local developments. For example, while the transport sector aims at relatively large-scale spatial developments in order to be able to develop an interconnected transport infrastructure network, the spatial dimension of the agricultural policy is much more regional, focussing on specific agricultural areas, village renewal in rural areas, or agriculture in more remote areas and even at farm level. Each of these spatial scales has a different spatial distribution and intensity of sectoral activities that should be considered for the protection of Natura 2000. While not all sectoral policies

yet have visible synergy with Natura 2000 policy and may not yet foresee direct conservation benefits, they all include unexplored opportunities for preventing and mitigating negative spatial impacts on Natura 2000.

Table 4.1 Potential synergies and conflicts between EU sectoral policy objectives and Natura 2000

Policy sector	Potential synergies		Potential conflicts	
	Compatible policy objective	Synergy	Conflicting policy objective	Conflict
Energy	Secure, competitive and decarbonised energy system: energy saving	Decrease the effects of fossil fuel extraction and transportation on Natura 2000 sites	Increase energy production through the use of nuclear energy and sustainable production of competitive fossil fuels	New installations and concessions for fossil fuels might have an adverse impact on coherence of the Natura 2000 network
	Increase energy production from renewable sources: promotion of biomass	Natura 2000 sites can provide biomass and the demand for biomass can support the required management of Natura 2000 sites to ensure conservation of semi-natural habitats (e.g. grasslands, forests) (Van Meerbeek, Ottoy, de Andrés García, Muys, & Hermy, 2016); BIOEUPARKS, 2016; Polish Society for the Protection of Birds (OTOP), undated)	Promoting biomass for biofuels	Intensification of production functions of certain habitat types (forest, grasslands); transformation of areas within and outside Natura 2000 sites to biomass producing crops increasing pollution (fertilisers, pesticides) Lupp et al., 2014)
	Increase energy production from renewable sources: promotion of wind energy (wind farms)	Wind farms in/near Natura 2000 sites can provide space for biodiversity and contribute to restoration of nature, particularly on degraded areas such as brownfields (EC, 2011)	Promotion of wind energy (wind farms)	Wind farms in/near Natura 2000 sites can lead to collision, displacement, barrier effect, habitat loss and degradation (EC, 2011; Gonzalez, 2016)
	Increase energy production from renewable sources: promotion of solar energy	Solar farms in/near Natura 2000 sites can provide space for biodiversity and use some revenues to support on-site conservation (Birdlife, 2011; Peschel, 2010)	Promotion of solar energy	Solar energy can lead to habitat loss, direct impacts on birds, mammals and insects, habitat fragmentation and/or modification (Birdlife 2011; Stoms 2013)
	Promotion of renewable energy: hydropower	On already degraded rivers updating of hydropower plants might that improve energy production and at the same time help to improve the ecology and natural functioning of the river (EC, unpublished)	Promoting renewable energy: hydropower	New and existing hydropower installations cause changes in river morphology and riverine habitats, constitute barriers to migration and dispersal of protected species, disruption of sediment dynamics, changes in flow regimes; cause injuries and deaths of individual animals, water chemical and temperature changes, displacement and disturbance (EC, unpublished, Jackson

Policy sector	Potential synergies		Potential conflicts	
	Compatible policy objective	Synergy	Conflicting policy objective	Conflict
Urban development	Sustainable and resilient cities	Regeneration of brownfields can provide new spaces for nature; development of green infrastructure can contribute to Natura 2000 sites in and near cities; retrofitting of urban infrastructure can provide opportunities for improved connectivity.	Economic development and competitiveness of cities	Urban development can lead to further habitat fragmentation and degradation and disturbance of biodiversity in Natura 2000 (2011)
Transport	Modal shift and integration of transport systems. Expand and improve transport infrastructure	New infrastructure can be planned with nature in mind; old infrastructure can be retrofitted to increase connectivity (Damarad & Bekker, 2003)	Ensuring safe transportation Minimising congestion	Road infrastructure leads to habitat fragmentation; traffic can cause disturbance and mortality; transport corridors can contribute to expansion of invasive alien species (Damarad, & Bekker, 2003).
Agriculture	Sustainable management of natural resources and climate action, with a focus on greenhouse gas emissions, biodiversity, soil and water	Agro-production focussed on agri-environmental practices and climate actions in and around Natura 2000 sites can contribute to the management of species and habitats and ensure connectivity between Natura 2000 sites	Viable food production, with a focus on agricultural income, agricultural productivity and price stability	The need for viable food production can lead to a further intensification of agriculture, leading to increase in pressures (pollution, disturbance) resulting in a loss of habitats and decrease in connectivity between Natura 2000 sites (Pe'er et al., 2014)
	Balanced territorial development with a focus on rural employment, growth and poverty in rural areas	Contribution to economic growth of regions, thus avoiding land abandonment and its negative effects on Natura 2000 areas and their surroundings		
Forestry	Sustainable forest management of EU forest, promoting sustainable forest management and reducing deforestation at global level	Diverse actions taken for forest ecosystems, ranging from one-off restoration actions to merging conservation with economic activities (e.g. wildlife management that includes the creation of suitable habitats)(Aggestam& Lovrić, 2014)		Intensive forest management and use (including removal of dead and dying trees, forest replanting with non-native species, forestry clearance, forest exploitation without replanting or natural regrowth (Winkel et al., 2015)

Besides the above-mentioned policies or particular sectors, two EU policy initiatives are of particular relevance for spatial planning and Natura 2000: the Strategy on Green Infrastructure (2013) and the No Net Loss Initiative.

The European Commission Strategy on green infrastructure¹ provides the foundation for the establishment of a Europe-wide green infrastructure network. Green infrastructure is understood in this strategy as a strategically planned network of natural and semi-natural areas. These areas combine different environmental features designed and managed to deliver a wide range of ecosystem services such as water purification, air quality, space for recreation, and climate mitigation and adaptation.

¹ COM(2013) 249.

This network of green (land) and blue (water) spaces aims to improve environmental conditions and therefore citizens' health and quality of life. The Natura 2000 network is considered to be the backbone of the green infrastructure of the EU; the scope of the green infrastructure is, however, much larger than Natura 2000 and includes many man-made features such as green walls, roofs and bridges developed often in urban landscapes. The key concept of green infrastructure as a strategically planned network anticipates the essential role of spatial planning in the design, development and management of this network. Such planning is a prerequisite to enable three main functions of green infrastructure: ensuring ecological connectivity, conservation of EU biodiversity and multi-functionality of landscapes and ecosystems.

In addition to the Nature Directives, the EU has also launched the No Net Loss Initiative to protect ecosystem services and the species and habitats that are not covered by EU legislation. The No Net Loss Initiative aims to avoid a net loss of biodiversity and ecosystem services. The underlying principle of No Net Loss is that any damages due to human activities should be balanced by at least equivalent gains. Due to economic developments, negative impacts on ecosystem services and biodiversity can occur. The first objective should be to try and avoid or prevent negative impacts. Where this is impossible, damage should be minimised and restoration attempted. Several Member States have developed a legislative framework that supports the No Net Loss Initiative (ICF GHK et al., 2013)

The role of green infrastructure and No Net Loss as key tools that present opportunities in enhancing synergy between sectoral developments and nature conservation in the EU has been recognised in the EU Biodiversity Strategy to 2020 (under target 2 action 6 and action 7 respectively). As a consequence, investments in green infrastructure have been made available through all major EU funds for the multi-annual financial framework 2014-2020. The further implementation of green infrastructure and no net loss principles and objectives can strongly be enhanced by their systematic integration into spatial planning processes of the Member States. This can also ensure mutual benefits to different sectors, while ensuring the coherence of Natura 2000 and delivery of its ecosystem services (EEA, 2011).

4.3 Synergies between spatial planning, EU nature legislation and other EU legislative instruments

EU policies and legislation contain a number of instruments that can support the integration of Natura 2000 in spatial planning processes of the Member States. In some cases there are specific requirements for integrating Natura 2000 in sectoral developments. In other cases synergy occurs through joint implementation of several legal provisions (see table 4.2).

Generally, the legislation in different sectoral policy fields addresses both the regulatory and the development functions of spatial planning. The regulatory function of spatial planning is addressed in the Environmental Impact Assessment (EIA) Directive and Strategic Environmental Assessment Directive (SEA). The SEA regulates the process of preparation of plans and programmes and sets out a framework for the future development of projects that require an assessment under Article 6(3) of the Habitats Directive. The EIA applies to specific projects for certain sectoral developments, but also to local spatial plans related to specific sectoral investments and projects. It requires an obligatory assessment of the potential impacts of these plans and projects on biodiversity and Natura 2000. While the EIA and SEA are commonly used instruments within the spatial planning process, they often take place at a stage when a spatial plan or a project has been already designed.

Based on the experiences generated by EIA and SEA procedures in spatial planning and nature conservation issues in different Member States, a number of challenges have been identified including: 1) applying ecological competences and criteria to adequately assess the impacts of different sectoral developments; 2) improving public consultations during the EIA and SEA processes, 3) ensuring adequate mitigation and compensation measures and monitoring their effectiveness and implementation in practice (Almer & Koontz, 2004; Border, 2005; Simeonova & van der Valk, 2016).

A second cluster of regulatory instruments are the instruments that primarily relate to the development function of spatial planning (see also Chapter 1). Several of the directives, such as the Floods Directive (FD), Water Framework Directive (WFD) and the Marine Strategy Framework Directive (MSFD), require the development of explicit (strategic) plans that incorporate Natura 2000 objectives in sectoral developments. For example, the Flood Directive requires the adoption of flood risk-management plans, which amongst others address the need for the maintenance and restoration of floodplains that can provide synergies by ensuring connectivity between Natura 2000 sites.

Table 4.2 reviews the legal requirements for Natura 2000, the sectoral plans developed under the various legislative frameworks as well as the most important measures under the FD, WFD, MSFD and MSP that have considerable spatial implications. The implementation of the described measures reduces existing pressures of spatial development on Natura 2000 sites as well as ensuring connectivity between Natura 2000 sites and surrounding areas.

For example, the marine spatial plans developed under the Marine Spatial Planning Directive contribute to the coherence of Natura 2000 network, in particular by reducing anthropogenic pressures, ensuring the conservation of Natura 2000 habitats outside Natura 2000 sites, ensuring the conservation of species that occur outside Natura 2000 sites and ensuring the migration of marine species and birds (BfN, 2006). For instance, according to the Spatial Plan for the German Exclusive Economic Zone of the North Sea, no wind farms will be developed within Natura 2000 (see Box 4.1). At present only a few of these plans have been developed and no EU-wide overview of the measures included in these plans is available (<http://www.msp-platform.eu>).

Box 4.1 Spatial Plan for the German Exclusive Economic Zone in the North Sea

In the development of the marine spatial plan for the German Exclusive Economic Zone in the North Sea, Natura 2000 areas as well as species and habitats of EU importance are taken into account in different ways. First of all the plan aims to avoid use conflict by keeping certain developments away from Natura 2000 areas. New offshore wind turbines are not allowed in Natura 2000 areas, except in the designated priority areas for wind energy. Furthermore, cables should preferably be placed outside Natura 2000 areas.

With regard to areas outside Natura 2000, Natura 2000 habitats should not be damaged or destroyed either. If habitats are found during detailed investigations, e.g. in the approval procedures for resource exploitation projects, approval of pipelines or submarine cables for energy production facilities, these habitats should be granted special consideration in the decision-making process.

Furthermore, the plan states that, as knowledge on the need for green infrastructure in the marine environment is lacking, it does not currently identify corridors or zones that are essential for connectivity. However, the plan does indicate that when deciding on the routing of pipelines and submarine cables and selecting sites for resource exploitation, dispersion processes and large-scale ecological interactions of species and habitats need to be taken into account.

Also, the climate-adaptation plans developed by Member States under the EU adaptation strategy can ensure synergy with Natura 2000. Natura 2000 sites can provide solutions for mitigating and adapting to climate change (UNEP, 2009; WWF, 2010; see also Table 4.2). Important functions of Natura 2000 sites in this respect are providing natural storage capacity for carbon, increasing capture of carbon dioxide by restoration of natural ecosystems, reducing the risks of and impacts from extreme events and reducing impacts of sea-level rise (EC, 2013). Furthermore, several other adaptation measures for nature can be taken (see Box 4.2).

Box 4.2 Main measures to adapt Natura 2000 to climate change

The following measures can be taken both at the network level and the site level:

- development of ecological networks that take into account climate change;
- identification and restoration of areas most favourable for the expansion of existing habitats and/or creation of buffer core areas to protect arriving species;
- allowing the natural development of coasts and rivers;
- retaining or restoring natural river profiles and floodplains to increase the potential for maintaining biodiversity and reduce the risk of flooding downstream;
- realignment of coastal defences to restore inter-tidal coastal habitats and natural transition zones between coastal and terrestrial habitats;
- reduction in the intensity of land use and establishment of landscape features such as headlands and hedgerows to enhance species dispersal

<http://climate-adapt.eea.europa.eu/eu-adaptation-policy/sector-policies/biodiversity>

The diversity of measures listed in the table above require specific actions by planners and decision makers at different scales. The key challenge, however, is to synchronise the processes of plan preparation and decision-making between the sectoral policies (horizontal level) and the different spatial planning scales (vertical level) (see Chapter 2). Moreover, studies have emphasised that the key impediments for achieving better synergy in the implementation of sectoral policies and legislation are the fragmentation of the decision-making processes as well as the fragmentation of competences and responsibilities between the governmental authorities responsible for the implementation of the sectoral legislation and spatial planning (CEC, 2004; Nilsson & Eckerberg, 2007; Mullally & Dunphy, 2015).

Table 4.2 EU directives supporting an integrated spatial-planning approach to Natura 2000²

Sectoral legislation	Legal provisions for Natura 2000	Sectoral Plans	Spatial measures that can contribute to joint implementation ¹
Water Framework Directive	Member States need to ensure that river basin management plans are in compliance with standards and objectives of the Natura 2000 sites ('protected areas') Art 4.1, Art. 6.1)	River Basin Management Plans	<p>Improving longitudinal continuity (e.g. establishing fish passes, demolishing old dams).</p> <p>Improving hydro-morphological conditions of water bodies other than longitudinal continuity (e.g. river restoration, improvement of riparian areas, removal of hard embankments, reconnecting rivers to floodplains, improvement of hydro-morphological condition of transitional waters, etc.).</p> <p>Improvements in flow regime and/or establishment of ecological flows.</p> <p>Drinking-water protection measures (e.g. establishment of safeguard zones, buffer zones etc.).</p> <p>Natural water retention measures.</p>
Floods Directive	Flood risk maps need to assess the risk of installations on Natura 2000 areas (i.e. protected areas as mentioned in the WFD) in case of flooding	Flood Risk Management Plans	<p>Measures to prevent the location of new or additional receptors (e.g. people property, roads) in flood-prone areas, such as land-use planning policies or regulation.</p> <p>Measures involving physical interventions, such as construction, modification or removal of structures or the alteration of channels, sediment dynamics management, dykes, etc.</p> <p>Measures to reduce the flow of natural or artificial drainage systems (such as overland flow inceptors and/or storage, enhancement of infiltration, etc. and including in-channel, floodplain works and the reforestation of banks) that restore natural systems to help slow down the flow of and store water.</p>
Marine Strategy Framework Directive	Protection of Natura 2000 sites is identified in the MSFD as a measure aimed at achieving or maintaining good ecological status (Art. 13.4)	Programmes of Measures	<p>Measures to reduce physical damage in marine waters</p> <p>Measures to reduce physical loss of seabed habitats in marine waters</p> <p>Measures to reduce interferences with hydrological processes in the marine environment</p> <p>Measures related to Spatial Protection Measures for the marine environment</p> <p>Measures to reduce biological disturbances in the marine environment from the extraction of species, including incidental non-target catches</p> <p>Measures to restore and conserve marine ecosystems, including habitats and species</p> <p>Improving longitudinal continuity (e.g. establishing fish passes, demolishing old dams)</p> <p>Improving hydro-morphological conditions of water bodies other than longitudinal continuity</p>

4.4 Stakeholder participation and institutional arrangements

In order to ensure effective integration of Natura 2000 in sectoral policies and in spatial planning processes, effective stakeholder consultation and institutional collaboration are essential. The role of stakeholder participation and collaborative practices between institutions is twofold: 1) to enhance involvement and collaboration between relevant actors (e.g. governments, agencies, businesses, academia, etc.) in the development and implementation of sectoral policies and spatial plans, and 2) to inform and involve the local community and solicit public opinion regarding spatial plans and projects (Healey, 1997; Randolph, 2004; Simeonova & van der Valk, 2009).

² The Marine Spatial Development Directive is not included due to the progress in implementation

In this section we provide a quick scan of the key EU policy and legal provisions³ regarding stakeholder participation and the institutional arrangements for collaboration with a view to the integration of Natura 2000 in sectoral developments and in spatial planning processes. First mandatory (formal) participation is reviewed, followed by informal participation and the institutional arrangements for collaboration.

4.4.1 Formal participation

Sectoral legislation refers usually to two types of stakeholder involvement, namely information provisions and stakeholder consultation:

- Information provision

Information forms the basis for any participatory approach. Numerous EU acts require that information be provided to a broad range of affected stakeholders. Examples are the EU's water and marine policies (WFD, FD, MSFD, and MSPD) or EIA and SEA directives. The EU policy documents on Natura 2000 explicitly address the need for information provision to a wide range of actors as a way to raise awareness on the environmental and socio-economic benefits of the Natura 2000 policy.
- Stakeholder consultation

Consultation as a specific form of participation is also required by most of the directives, i.e. the respective plans have to be made available for comments for the public and to certain stakeholders. The EIA and SEA Directives provide opportunities for consultation during the environmental assessment of development projects and of plans and programmes. The most common form of consultation during the EIA/SEA is formal public hearings (Rauschmayer & Risse, 2005; Blicharska et al., 2016). The key challenge with the public hearings is to achieve a good representation of stakeholders and to consider the opinions of all stakeholders in the decision-making about the plans and projects. This depends to a high degree on the competence of the authorities (often local authorities) organising and leading the public hearings. The effectiveness of public hearings in soliciting different interests is often determined by factors such as:

 - Understanding or motivation among local actors on the right to be involved in the design of a governmental plan or a project.
 - Bridging information gaps due to different access to information and level of awareness about acquiring information.
 - Leadership in conducting the public hearings on the side of the government.

4.4.2 Informal participation

In addition to formal stakeholder participation, informal participation is also crucial in the context of integrated spatial planning and Natura 2000. Best practices for informal consultation and stakeholder involvement in different sectors and at different spatial scales of planning has been shown to be particularly beneficial for the integration of nature conservation objectives in spatial planning and sectoral developments (Simeonova & van der Valk, 2016). Such best practices have been developed in the water policies (see Box 4.2). For example, the Water Framework Directive (WFD) and Flood Directive (FD) have provisions for both 'formal' and 'informal' participation. Both the WFD and FD give considerable flexibility to the Member States in terms of the organisation of informal participation. Other practices relate to voluntary agreements

³ Habitats Directive, Common Agricultural Policy (CAP), Water Framework Directive, WFD (2000/60/EC19), Floods Directive, FD (2007/60/EC), Marine Strategy Framework Directive, MSFD (2008/65/EC), Maritime Spatial Planning Directive, MSPD (2014/89/EU), EIA Directive (2014/52/EU), SEA Directive (2001/42/EEC), Renewable Energy Directive, RED (2009/28/EC) Environmental Liability Directive, ELD (2004/35/EC)

and consultations. These may include public and private partnership agreements and collaborations in implementing different sectoral developments in compliance with nature conservation objectives. Several of the cases presented in this report (*Embedding Natura 2000 in spatial planning: Green Infrastructure in Estonia, Facilitating urban development near a Natura 2000 site: Portmarnock and Baydoyle SPA & SAC, Improving forest connectivity through stakeholder involvement in Flanders*) illustrate the benefits of informal participation, consultation and collaboration and emphasise the need for these in the initial phase of the spatial-planning process (Reed, 2008).

There is a need to enhance not only the process of soliciting public opinion, but also actively involving all relevant actors in the planning process. Each sectoral policy has its networks of actors and organisational set-up that can contribute to the development of sectoral policy plans and strategies. However, these networks and set-ups are often fragmented and detached from each other and may be separate from the actors involved in the management of Natura 2000 sites (Healey, 1997; Sarvašová, Sálka, & Dobšínská, 2013). This requires leadership and skills on the side of the competent authorities in order to encourage the involvement of and consultation with a wide range of stakeholders during the development of new spatial plans (Booher & Innes, 2002; Healey, 1997; Beunen, 2006; Simeonova & van der Valk, 2016).

The success of participation and consultation may be country specific and depend on the planning cultures and traditions of the Member States as well as the commitment of individual actors to their involvement in public consultation processes (Healey, 1997; Beunen & Van Assche, 2013; Simeonova & Van der Valk, 2016). The example presented in Box 4.3 illustrates the specific context of the WFD and FD implementation in Germany.

Box 4.3 Participation according to the WFD and FD

Both the WFD and the FD require Member States to 'encourage' active stakeholder participation. A preliminary analysis of current strategies for involving the public in Flood Risk Management (FRM) planning in the 16 German *Länder* shows that a wide variety of approaches to participation have been applied, ranging from basic consultation in some *Länder* to flood partnerships, involving many non-state actors, in others. The 'baseline' level of non-state actor participation is lower in FD implementation compared with WFD planning: only 3 out of 16 *Länder* have implemented a flood-partnership model. In many EU countries, at the beginning of the WFD implementation process, participation in water management was evaluated as poor, especially in Southern and Eastern Europe (De Stefano, 2010). The most critical aspects were the lack of proactive information provided to non-governmental stakeholders and the poor quality of the participatory process.

Participatory practices in several sectors (i.e. urban development, agriculture, transport, etc.) have shown that both formal and informal approaches can be employed. Among these, the more informal collaborative approaches have proved to be of particular importance for facilitating an integrated spatial-planning approach. Informal stakeholder participation is oriented towards building trust among different actors and towards opportunities for making trade-offs between different interests of the sectors. The competent authorities as well as non-governmental parties have been given the flexibility to organise and lead participatory processes in order to ensure effective collaboration. They can choose from a wide range of techniques for participation, which

may include conventional tools, such as consultations and advisory committees, as well as more dialogue-oriented methods, such as focus groups.

In recent years, the EU nature-conservation policy has increasingly emphasised the need for stakeholder participation and collaboration between multiple actors in the management of Natura 2000 (Ferranti, Turnhout, Beunen, & Behagel, 2014). In addition to the policy and legal provisions for stakeholder participation, a number of institutional arrangements have been developed to address Natura 2000 in sectoral developments and in spatial planning. These arrangements are usually proactive initiatives of the national, regional or the local governments of the Member States and are based on collaboration and coordination between the governmental agencies and different sectoral actors including from the private domain. The cases *From planning to practice: Ecological corridors between Switzerland and France*, and *Providing strategic guidance to local authorities: Thames Basin Heaths Special Protection Area Delivery Framework* are examples of such initiatives.

These institutional arrangements are often based on several forms of collaboration between actors from different sectors. Among these the most commonly used arrangements include: 1) a formation of coordinating bodies represented by relevant actors that aim to guide the spatial planning process of an area and/or specifically of the Natura 2000 management, 2) establishment of expert teams, focus groups or task forces with engagement of actors from governmental, non-governmental or private bodies. These collaborations aim to share expertise on a spatial development or the design and implementation of conservation measures in an area (see for a successful example of NGO participation from Hungary (Cent, Mertens, & Niedziałkowski, 2013)), 3) joint elaboration of programmes and strategies for specific sectors, such as forestry and Natura 2000 based on the development of a shared vision (Sarvašová et al., 2013) or 4) development of specific partnership agreements such as public-private partnerships and public-public partnerships that are the responsible bodies for the development and implementation of a spatial plan and its conservation objectives (Randolph, 2004; Battisti et al., 2013). All these arrangements have strengths and weaknesses and can only be implemented by considering the specific local needs, institutional frameworks and the openness and commitment of the actors to be involved in such collaboration (Randolph, 2004).

4.5 Conclusions

The objectives of Natura 2000 are sufficiently embedded in current environmental legislation. The role of spatial planning in implementing these objectives is addressed via a number of sectoral plans with a strategic character, such as the WFD, MSFD and FD plans, as well as by a number of legal provisions such as the SEA, EIA and the Article 6 of the Habitat Directive. The overview of synergies between the sectoral policy objectives and their legal requirements indicates that in each sectoral policy there are potential synergies to be considered. All analysed sectors have also shown, however, potential conflicts with regard to Natura 2000.

The successful integration of Natura 2000 in sectoral plans as well as in spatial plans also depends on the active involvement of relevant stakeholders. The current sectoral legislation refers to the need for stakeholder participation in the process of planning and implementation of the sectoral policies. However, the legal provisions are rather general and do not provide specific guidance to the Member States on the scope and forms of this participation. While some countries follow the minimum requirements formulated by law, others go beyond these legal requirements and are more proactive in enhancing collaboration between relevant sectoral actors, including institutional

collaboration between sectoral agencies and departments. A common challenge in this process is to ensure that competent authorities are equipped with the necessary administrative capacity, including communicative skills, a leadership role in ensuring equal representation of different actors, as well as being open to critical public opinion.

The importance of data for local planning: Ropotamo River, Bulgaria

The challenge

The Ropotamo river is located close to the city of Burgas in the Southeast part of Bulgaria. The area around the Ropotamo river estuary includes sand dunes, beach sea, wetlands, forest and steppe habitats with Mediterranean elements and unique rock formations. The area is home to over 100 plant and animal species included in the Red Book of Bulgaria, over 220 species of birds and rare representatives of the national flora. The shores of the Ropotamo river are so picturesque and exotic that it is called the 'Bulgarian Amazon'. The Ropotamo river and its surroundings are designated as protected areas under both national and EU legislation. Due to the unique natural sites in combination with its seaside location, close to the city of Burgas, the area is very attractive to tourists as well as investors. The latter became obvious when the development of the master plans of the two municipalities, through which the river flows, was started.

Planning approach

As part of the development of the master plans of Primorsko and Sozopol municipalities, environmental impact assessments and appropriate assessments were elaborated. The assessments are a mandatory element of the spatial-planning process, under both national and EU legislation. Prior to the development of the master plans for the territory of the Ropotamo river, a project aimed at mapping protected areas was commissioned by the Ministry of Environment and Water. The results were vital for the development of the environmental impact assessments initiated by the master plans.

Outcome of the planning process

Much of the necessary information for the assessment of the compatibility of the new master plans was gathered during the implementation of the project 'Mapping and Identification of the Conservation Status of Natural Habitats and Species - Phase I'. The project provided baseline data for the monitoring of biodiversity and the preparation of management plans for the protected areas. The data allowed detailed environmental impact assessments to be made of the zones in both master plans where new developments were foreseen. As a result, the master plans had to be adapted, as several of the construction zones foreseen were not compatible with the protection regime for the Natura 2000 site.

Why a best practice?

The case of the Ropotamo river shows that the availability of reliable data resulting from a recent mapping project enabled a proper EIA. The detailed data on the distribution of species and habitats were gathered in a GIS database that allowed for spatial analyses of the impact of the master plans. As a result, negative impacts of construction could be avoided in both municipalities, including the protection of 200 hectares of wetland. The case illustrates well how state-of-the-art GIS technologies facilitate proper environmental impact assessments.

Key success factors

The key success factor in this case is the availability of detailed spatial data on the habitats and species in the area (based on comprehensive scientific research) that could be accessed during the preparation of the master plans of the Sozopol and Primorsko municipalities. The spatial data formed the basis for

comprehensive assessments of the environmental impact and compatibility of the projections of the master plans with the protection measures of the natural sites. The process resulted in restrictive measures in order to mitigate negative impacts and to better preserve the natural sites. The authorities of the Primorsko municipality took the results of the mapping project into consideration prior to the completion of the final version of the master plan, preventing possible conflicts in the most attractive development zones. Initially, the municipal authority of Sozopol was reluctant to revise the plans based on the outcome of the environmental impact assessments, as development of tourism was seen as most important for the local economy. In the end, however, the plan was revised and the foreseen development zones with high environmental impacts were excluded.

Lessons learned

The Natura 2000 network covers a large part of the Black Sea municipalities in Bulgaria. The designated sites are often overlapping, which is a huge challenge during the development of environmental impact assessments for the projections of master plans. In addition, many master plans of cities and towns that are currently being prepared in Bulgaria, have to deal with already high urbanisation levels that arose during the years prior to the country's accession to the EU. In this regard, one serious problem is that both local authorities and the public underestimate what is needed for environment-friendly development of the Black Sea coast, generally due to a focus on economic interests. This case shows that joint efforts by both national and local authorities are necessary to preserve nature.

Recommendations for future projects

Environmental impact and compatibility assessments are important instruments in the process of spatial planning for protected natural areas. However, in order to produce comprehensive assessments, experts need detailed, spatially explicit data on natural habitats and species. Therefore, the use of GIS technologies and the development of GIS databases, which allow for the visualisation and analysis of spatial data on natural values, can facilitate the planning process, with proper attention for the prevention and mitigation of negative impacts on Natura 2000 sites due to urbanisation.



Ropotamo river estuary in southeastern Bulgaria

Improving forest connectivity through stakeholder involvement in Flanders

The challenge

Regional land-use plans were developed in Belgium in the late 1970s. In these plans, a land-use purpose was indicated for every single parcel of land, such as housing, industry, agriculture, forest and nature. However, the plans did not take a longer development perspective into account. In following years, new policy documents were developed that required a change of the original plans. A major milestone was the Spatial Structure Plan of Flanders, which increased the amount of land identified for nature and forests, mainly by diminishing the amount of land identified for agriculture. The *Delineation of Areas of the Natural and Agricultural Structure (AGNAS)* management programme was set up to facilitate this transition. One of the goals of this programme was to strengthen the Natura 2000 network as part of the structure of nature in Flanders. The Natura 2000 area 'Forest of the Flemish Ardennes and other South-Flemish forests' consists of several fragmented forest complexes in an intensively used agricultural landscape. Therefore, the ambition for the area is to create larger forest complexes through reforestation. This will decrease the negative effects of the meadows and arable lands that are currently intensively managed. As limited land is available in the area, spatial planning is vital in order to change the land-use designation for particular land parcels and to adapt the conservation and agriculture/forestry goals of these units.

Planning approach

A vision document proposing a new structure for nature and the agricultural use of the area was developed by a team from different administrations: i.e. spatial planning, nature conservation, agriculture and heritage. The team presented and discussed this vision with local stakeholders. Although the initial response of stakeholders was sceptical, trust increased during the process, as stakeholders recognised that their considerations were taken into account as much as possible.

Outcome of the planning process

Through the planning process, the land-use purpose was changed outside the boundaries of the designated Natura 2000 area. Since reconnecting woodland would mean afforesting certain agricultural land, which was not always approved of by farmers, in consultation with them other suitable areas were found which ensured the same outcome. The stakeholder-inclusive planning process led to an agreement in which local landowners played a major role in realising on the ground the ambition that had been formulated in both the spatial plans and the management plan for the Natura 2000 site. However, the planning process has not yet been concluded. The minister still has to agree to the plan and submit it to the Flemish government for

preliminary approval. After preliminary government approval, the spatial plan needs to be submitted to a public consultation. After the consultation, small adjustments can be made to the spatial plan, before its final approval by the Flemish government.

Why a best practice?

The case shows that, through an effective engagement process of local landowners, other stakeholders and the government, it is possible to reach an agreement on a local level. During the negotiation process common action objectives were determined. Furthermore, the locals' participation in management decisions for the area can be a guarantee that the plan will be executed.

Key success factors

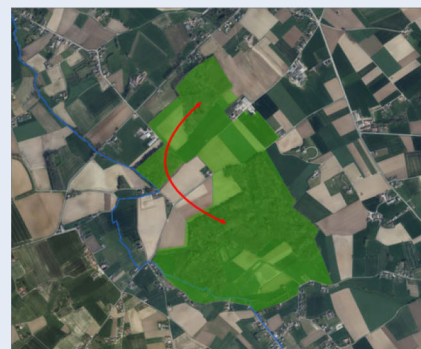
The most important factor was the effective communication with local stakeholders, which resulted in an agreement with local stakeholders. Although the consultation process was successful, it is uncertain how the process will end. The plan is still awaiting formal approval of the Ministry.

Lessons learned

Good communication can overcome scepticism and can lead to improvements in forest connectivity. A smart combination of spatial planning, Natura 2000 targets and afforestation subsidies can extend the scope of routine management practices in areas with high biodiversity values.

Recommendations for future projects

- One of the ways to involve stakeholders in the process, is to set a clear timeline for the change of agricultural land into forest;
- Financial compensation for the loss in land value; hence, afforestation occurs gradually and has only a limited impact on present landowners.



Map of planning area: Proposed direction (red) to connect forest fragments in the Natura 2000 area (green), thus ensuring that the farmland in the east of the Natura 2000 area can be retained for agricultural use. (© Flemish government)



5 Relevance of EU funds for spatial planning and Natura 2000

Key messages

- The EU funding programmes for 2014-2020 provide diverse opportunities to finance initiatives that promote synergy between sectoral developments and the implementation of Natura 2000.
 - To optimise the effectiveness of the EU structural funds with regard to Natura 2000, the objectives of Natura 2000 need to be more firmly integrated in the operational programmes of the Member States as well as in their rural development programmes.
 - National and regional strategies to enhance coherence and connectivity for Natura 2000 can facilitate the incorporation of these issues in the relevant EU funds.
-

5.1 Introduction

The EU multi-annual financial framework (MFF) 2014-2020 provides a number of opportunities to support the implementation of the nature policy, including improvement of the ecological coherence of the Natura 2000 network. The Commission has developed a comprehensive guide to the different EU funding opportunities in 2014-2020 for financing Natura 2000 (Kettunen et al., 2014). More findings and recommendations in this area have also been presented in a more recent report based on the analysis of a sample of regional or national programming documents (N2K Group. 2016).

In this chapter we will elaborate on the funding opportunities that can be used to ensure the coherence of Natura 2000, including for the implementation of green infrastructure.

5.2 Overview of funding opportunities

Funding for many sectoral developments within the EU such as infrastructure projects in transport, agriculture, energy or environmental services is provided by the European Structural and Investment Funds (ESIF). The ESIF consists of the European Regional Development Fund (ERDF), Cohesion Fund (CF), European Social Fund (ESF), European Agricultural Fund for Rural Development (EAFRD) and the European Maritime and Fisheries Fund (EMFF) (Box 5.1). The ESIF account for a large part of the EU multi-annual financial framework and offer diverse opportunities for financing project initiatives related to sustainable spatial development and nature protection.

In addition to the ESIF, the Framework Programme for Research and Innovation (Horizon 2020) and the Programme for Environment and Climate Action (LIFE), are important funding instruments for research and implementation of environmental and nature policy of the EU.

While the ESIF management is shared between the Member States and the European Commission, the Horizon 2020 and the LIFE programmes are managed directly by the European Commission.

Box 5.1 Brief overview of the main EU funds that can support spatial planning and improvement of the coherence of Natura 2000

The **European Agricultural Fund for Rural Development (EAFRD)** is implemented through regional or national rural development programmes. They include a wide range of measures that can potentially contribute to enhancing synergy between spatial planning and nature conservation. Some measures such as irrigation plans, land restructuring or afforestation, are directly related to spatial planning, while others have an indirect relation, such as the support to extensive farming and high nature-value farming. Depending on the national choices made during the preparation of a rural development programme, specific measures for Natura 2000 sites can be introduced (Regulation 1305/2013).

The **European Regional Development Fund (ERDF)** is implemented through regional or national operational programmes. They may include a wide range of investments directly related to territorial development and integrated spatial planning. The investments under the ERDF can include river-basin planning and flood prevention, coastal erosion prevention, transport infrastructures, sustainable urban development and rehabilitation of natural and urban areas as well as ecosystem-based solutions and specific investments in relation to Natura 2000 and green infrastructure (Regulation 1301/2013).

The **European Maritime and Fisheries Fund (EMFF)** is implemented through national operational programmes. The fund provides support to fisheries, aquaculture and processing, as well as to the sustainable development of fishery and aquaculture areas and the Integrated Maritime Policy. According to the regulations, the fund can provide support to the implementation of management, restoration and monitoring of Natura 2000 sites, including actions fostering the improvement of their coherence; maritime spatial planning and integrated coastal zone management processes (Regulation 508/2014).

The **European Social Fund (ESF)** promotes social investments, such as access to the labour market, employment policies, education and training, social inclusion or combating poverty. Funding can be used to improve capacity building, promote green business in Natura 2000, etc. It is implemented through regional operational programmes, sometimes together with the ERDF (Regulation 1304/2013).

The **Cohesion Fund (CF)** is aimed at Member States whose gross national income per capita is less than 90% of the EU average. It is implemented by Member States through national operational programmes and has two main strands: Trans-European Networks (TEN-T) and investments in environment and energy, which represent environmental benefits. Its current investments include supporting adaptation to climate change (including ecosystem-based approaches), protecting and restoring biodiversity and soil, promoting ecosystem services, including through Natura 2000, and green infrastructure (Regulation No 1300/2013).

European Territorial Cooperation (ETC), often known as INTERREG, is financed by the ERDF and therefore may support the measures eligible for this fund. The ETC provides a framework for the implementation of joint actions between actors from different Member States and other neighbouring countries. The ETC is developed through three strands (Regulation 1299/2013):

- Cross-border cooperation between adjacent EU regions along all internal and some external borders. It takes place through cooperation programmes, usually involving the border regions of two Member States, but in some cases can include more countries.
- Transnational cooperation. Takes place over large territories, which have been selected by the Commission, involving national, regional and local partners. It also takes place through cooperation programmes prepared by the Member States involved.

- Interregional cooperation. The third strand aims at improving the effectiveness of the cohesion policy through the exchange of experiences and networking. It has been developed through a cooperation programme known as INTERREG Europe with the participation of all Member States. This programme finances interregional cooperation projects of partnerships and of relevant policy organisations from different countries and policy learning platforms.

The ETC also finances three specific cooperation programmes:

- ESPON: observatory to reinforce the effectiveness of the EU Cohesion Policy and other sectoral policies and programmes under ESI Funds.
- INTERACT: platform for exchanging information on cooperation programmes.
- URBACT: transnational exchange and learning networks on sustainable development in EU cities.

More information on the functioning of the ESI funds can be found in Kettunen et al. (2014) and real examples of their implementation for Natura 2000 in WWG & IEEP (2009) and 2N2K Group (2016).

LIFE is the only EU funding instrument entirely dedicated to environment and climate action. It is managed by the Commission and operates on the basis of multiannual programmes. Financing is available for nature conservation, better environmental governance, habitat management, pilot projects and integrated projects implementing plans and strategies; in the case of nature, these are prioritised action frameworks (PAF).

Horizon 2020 is the financial instrument for implementing the EU research and innovation policy. It promotes transnational research in a wide range of priority areas, some of them of interest for spatial planning with regard to specific nature conservation measures. The concrete project opportunities are drawn at each call for proposals, which follow a biennial work programme on a strategic orientation. The nature conservation objectives that Horizon 2020 addresses are part of the societal challenges work programmes, namely on environment, climate change and resource efficiency. Key issues addressed in the recent calls are ecosystem services, evidence-based policy on ecosystems, nature-based solutions, etc.

The ERANET-fund is part of Horizon 2020. It finances European public networks that facilitate the coordination of national and regional research and development programmes (for example BiodivERsA, a network of 32 agencies and ministries from 19 European countries that funds research on biodiversity and ecosystem services).

Among the funds described, the ESIF provides most opportunities for funding initiatives related to Natura 2000 implementation and with view to its integration in sectoral developments and spatial planning (Kettunen et al., 2014; N2K Group, 2016).

Each fund has its specific priorities and rules of application that need to be considered by the competent authorities if they want to ensure funding for specific project initiatives related to Natura 2000 (Box 5.1). How the ESIF is spent is determined by the Member States, in consultation with the European Commission through partnership agreements. The funding priorities are further developed by each Member State in sectoral investment programmes such as the operational programmes and rural development programmes. These programmes fall under the responsibility of the national and regional authorities but are implemented at regional and local level.

One of the most relevant funds with regard to Natura 2000 is the EAFRD. Experiences of the Member States show that there have been a number of initiatives within the framework of the EAFRD funding that have contributed to Natura 2000 conservation.

Based on ERDF and the CF funding, some member states have also embedded Natura 2000 in their operational programmes. Key priorities addressed are measures to

improve freshwater habitats and non-agricultural habitats, enhance connectivity, and provide information systems and monitoring.

To varying degrees, Natura 2000 has also been integrated in the EMFF programmes. The ESF is the fund which so far has been less relevant for Natura 2000. The ESF has been seen as a potentially useful funding instrument for information and awareness raising on nature conservation, capacity-building activities related to the management of the of protected areas, and the creation of green jobs, etc. (2N2K Group, 2016).

Compared to the previous funding period, the current ESIF is to some extent more explicit about the opportunities to address Natura 2000 in sectoral developments and spatial planning. Some regions have been able to include measures to improve the connectivity of Natura 2000 based on conducting specific studies, preparation of plans for Natura 2000 management and proposing defragmentation measures, etc. However, these initiatives are not yet common.

The role of the ESIF for nature conservation depends on the willingness and capacity of the governments to take up and prioritise the Natura 2000 issues in their operational programmes and rural development programmes (Box 5.2). In particular, a key challenge is integrating issues such as the coherence of Natura 2000. This requires strengthening cooperation between the competent authorities and agencies responsible for sectoral policy implementation (e.g. agriculture, transport, water resource management, urban planning) and the nature conservation authorities.

As proven in some Member States, the effective use of the funding opportunities can be supported by national and/or regional strategies that clearly address the needs for Natura 2000 conservation in terms of specific measures for improving its functionality and connectivity (see *From planning to practice: Ecological corridors between Switzerland and France*). In this respect, an important role was played by the Natura 2000 Priority Action Frameworks in the preparation of the programmes under the main EU funds (2N2K Group 2016).

In the funding period 2014-2020, the European Commission has more explicitly addressed the need for creating synergies between different funds and funding instruments. The key objective for this is combining policy implementation with innovation in order to strengthen the competitiveness of the regions as well as the sustainability of territorial development across the regions (EC, 2014). This synergy also broadens the funding opportunities for Natura 2000, such as in the LIFE fund, the Interreg initiatives, or in combination with research in the Horizon 2020 programme.

However, these funding opportunities need to be made more visible to a wider range of actors within the Member States. So far, only few examples can be found where nature conservation projects have been funded by several funds simultaneously (2N2K Group, 2016).

The implementation of the structural funds programmes is based on a seven-year cycle. This includes phases of mid-term evaluation, revisions, monitoring and strategic environmental assessment. Within each of these phases there are opportunities to make revisions and prioritisations, which in turn provide opportunities for new issues, such as Natura 2000, to be introduced and prioritised in these funds. Moreover, the EU funds can serve as a backbone for balanced territorial development and can be more effectively used to promote integrated spatial planning and Natura 2000 implementation. In order to achieve this it is essential to strengthen the complementarity of the funding instruments and the sectoral operational programmes at the national, regional and local level in the Member states.

Box 5.2 Example of integration of Natura 2000 in a EAFRD rural development programme

The rural development programme 2014-2020 for England is an example of a regional programme with a comprehensive strategy integrating Natura 2000. It is recognised as the main means of delivering England's Biodiversity Strategy and complying with the legal obligations under the Birds and Habitats Directives.

To this end, the programme includes a specific measure, agri-environment-climate, to deliver England's PAF (Measure 10.1 pages 387-543 of the programme). It includes a set of actions specifically designed for 12 landscapes and habitats. These include the creation of beetle banks; skylark, lapwing and stone curlew plots; flower rich margins; buffering in field ponds and ditches; reed beds; the restoration of wood pasture land; and the management of hedgerows and coastal dunes; etc.

Table 5.1 Funding instruments relevant for integrating Natura 2000 in spatial planning and sectoral developments

Types of measures	Funds					Horizon 2020
	EAFRD	ERDF	EMFF	LIFE	INTERREG	
Improving knowledge and information for enhancing connectivity	✓	✓	✓	✓	✓	
Spatial planning		✓	✓	✓	✓	
Preparation of management plans	✓	✓	✓	✓	✓	
Creation and management of connectivity, green infrastructure, and nature-based solutions (related to Natura 2000)	✓	✓	✓	✓	✓	
Scientific knowledge on ecological connectivity and habitat conservation						✓
Green infrastructure and nature-based solutions (related to Natura 2000)	✓	✓	✓	✓	✓	

5.3 EU funding for an integrated spatial planning approach to Natura 2000

In this section we will showcase different activities that the EU funds can support by presenting a fictitious case study of two cross-border regions in the EU called region X and Y. The examples presented here are based on a compilation of the measures undertaken in actual operational programmes and projects and based on the different measures eligible under the different ESIF operational programmes (N2K Group, 2016).

The case study

In the recent years region X, one of the most densely populated regions of the EU, has experienced dramatic changes in land use. Artificial surfaces have increased by more than 47% in comparison to 1988, and between 1998 and 2008 the mobility in the region increased by 60%, leading to a 342% increase in the area covered by motorways. At the same time, it has lost more than 9% of agricultural surface. However, region X still has high natural value areas and, in fact, more than 31% of its surface is under Natura 2000.

In 2012 the Nature Conservation Agency, together with the Spatial Planning Agency, designed a regional green infrastructure network with a multifunctional approach: to ensure the coherence of the Natura 2000 network; to contribute to the public use of protected areas; to establish continuity with urban green infrastructures, mainly parks and open spaces; and to control urban sprawl.

The nodes of the network are Natura 2000 sites. Main corridors, connecting various Natura 2000 sites, are of crucial importance to ensure regional and interregional ecological connectivity. They also include greenways, connecting urban parks and open spaces with ecological corridors or nodes. Most of the network consists of rivers, forest and agricultural areas, and 3% is classified as land for development. The network has been officially recognised as an essential component of the Natura 2000 network.

Another important chapter of the regional conservation plan is the integration of the marine Natura 2000 sites into the National Marine Strategy, which is in line with the Marine Strategy Framework Directive (2008/56/EC). Its objectives include biodiversity conservation, promotion of coastal development through sustainable fishing and marine spatial planning.

For its effective implementation, a Prioritised Action Framework was prepared for the 2014-2020 financing period, setting up the guidelines for its integration into other policies, and more specifically into the 2014-2020 ESI programming. It was drafted with the participation of the main stakeholders: nature conservation, rural development, water planning agencies, spatial planning agency, transport and energy.

Integration of measures in the rural development plan (EAFRD)

In this programming period, rural development programmes have to demonstrate an appropriate approach towards integration with a view to achieving the EU priorities for rural development, including the specific needs of Natura 2000 areas, and for climate change mitigation and adaptation (Art 8. Regulation 1305/2013). With this in mind, the nature conservation body approached the rural development authorities at an early stage of the programming process.

The link between Natura 2000 and many potential measures in the Regulation contributed to integration in the programme of many of the measures envisaged in the PAF such as:

- **Drawing up of corridor management plans.** *A pilot management plan is going to be prepared for three of the main corridors to ensure the environmental management of the agricultural land, as part of the cooperation measures, including the promotion of High Natural Value farming (Art. 35 a & j, Regulation 1305/2013)*
- **Connectivity restoration.** *During the design phase of the green infrastructure network, three bottlenecks to the connectivity of terrestrial species were identified in relation to the existing main irrigation canals in the area. To improve the connectivity, four multifunctional overpasses have been planned under the measure 'Investments in physical assets related with the development,*

modernisation and adaptation of agriculture and forestry' (Art. 17 c, Regulation 1305/2013).

- **Habitat improvement.** Some sections of the corridors running through the south-eastern part of the region are important for the connectivity of amphibians. Several actions are foreseen here to improve landscape permeability for amphibian breeding sites, including: improvement of drinking troughs for livestock to allow the reproduction of amphibians, restoration of dried-up sources of water and fencing off of small ponds to exclude livestock. All of them are funded under the measure 'Investments on non-productive assets linked to the achievement of agri-environmental and climate objectives, including biodiversity conservation' (Art. 17 d, Regulation 1305/2013). Other investments under the same measure are the demarcation and marking of several corridor sections and the modification of fencing to improve permeability. The measure on 'Investments for improving the resilience and the environmental value of forest ecosystems' (Art 21 d) will be used to improve connectivity in 115 hectares of bush and forest, including the control of alien species located in one of the corridors.
- **Promotion of public use.** The measure 'Basic services and village renewal in rural areas' (Art 20, Regulation 1305/2013) includes a measure on restoration and upgrading of the cultural and natural heritage, including Natura 2000 and the ecological network. It will be used to prepare management plans for two of the main corridors (Art 20.1 a). Furthermore, to promote eco-tourism and equestrian tourism, several small infrastructures for use of the corridors by the public will be also financed, including information panels, signposting, paths and viewpoints (Art 20.1 e).
- **Compensation to landowners and farmers in Natura 2000 sites and adjacent areas.** Forest owners operating under the management plans will be compensated with dedicated payments (Art 30.1, Regulation 1305/2013), while farmers can join agri-environmental schemes (Art 28). One of the agri-environmental schemes is for promoting the sustainable use of pastures. It is mainly used in mountain stretches of the network to adapt the stocking density to pasture productivity and to avoid overgrazing. Measures include the replacement of bathtubs, used as drinking troughs, by stone made ones adapted to the reproduction of amphibians. The other agri-environmental scheme is being used to improve connectivity in farming habitats through traditional farming practices including: traditional fallow, reduction of tilling, land abandonment patches, restoration of field boundaries, etc.

Restoring connectivity by investing in public infrastructures (ERDF)

Using a similar approach to that of the EAFRD, the Nature Conservation Agency has been able to introduce a package of measures in the Regional Operational Programme ERDF 2014-2020. One of the main objectives of the programme is the 'Preservation and protection of the environment' (Art 9.6 Regulation 1303/2013), which includes as sub-objectives the 'Management, protection and maintenance of protected areas and their biodiversity' (Art. 5.6 d Regulation 1301/2013) including actions to restore ecosystem services. This chapter includes a set of measures to enhance ecological connectivity through several roads and railways by improving

culverts and underpasses, through measures such as afforestation, fencing and noise screens. In addition, a fish scale will be implemented to restore fish migration in a river stretch.

Although most river basins in region X are regulated, there is still an area periodically affected by flooding. Here, an ecosystem-based approach will be implemented for flood prevention (Art. 5.5 a Regulation 1301/2013). It will include the restoration of a natural wetland linked to an abandoned meander and a floodplain to retain water and alleviate flood impacts. It also includes the restoration of 1.5 km of riverbanks. These actions will contribute to improve the permeability in one of the identified corridors in the network.

Continuity with urban greenways (ERDF)

In order to provide new places for recreation, exercise and civil engagement, one of the objectives of the green infrastructure network is to establish continuity with the green spaces in the city, mainly parks and open spaces. These greenways will allow users to get out of the city and reach several protected areas without crossing roads.

Several actions of this kind have also been included in the Regional Operational Programme ERDF 2014-2020. The objective: 'Improving the urban environment, to revitalise cities and their environment' (Art. 5.6 e Regulation 1301/2013) foresees the restoration of brownfield sites, afforestation, dedicated bike paths, information panels, signposting, outdoor fitness equipment, picnic areas, walking trails, creation of small ponds and improvement of underpasses in various urban areas within the network.

Specific actions for nature conservation (Life)

- In 2016 the Regional Department of Natural Resources of region X applied for LIFE funding to support the project titles 'GoLynx'. The main objective of GoLynx is to improve the functional connectivity of the ecological network for the lynx. The project will be implemented in four corridors that are important for the lynx, and includes the following specific aims:
- Compile a database of all the information on known habitat, in and around the ecological corridors
- Compile a database of all the information on known and potential hazards for the movement of the lynx across the corridors (i.e. road accidents)
- Habitat management, including restoration of field margins, recovery of scrubland areas, construction of artificial rabbit warrens, wild rabbit restocking, creation of water points
- Implementation of measures to reduce lynx road mortality (fencing, improvement of underpasses)
- Awareness raising
- Management guidelines for landowners

Cross-border connectivity (Interreg)

Naturally, Region X's ecological network has also been considered in terms of its ecological connectivity with the Natura 2000 sites of the surrounding regions. The mountain range located on the border with the neighbouring region Y is one of the hotspots of biodiversity in this biogeographic region. A specific objective of both regions is to assure functional connectivity between them. Region Y has one of the highest biodiversity levels in the EU and is home to some of the most endangered species in the EU. Although initially the development of an ecological network was not one of the priorities for region Y, several events have changed this situation.

In the early 1980s, region X and region Y established the first cross-border cooperation, through a conservation project for the lynx. Later two trans-boundary natural parks in the cross-border mountain range were involved in a trans-boundary Interreg project (2000-2006), mainly devoted to promoting eco-tourism in both parks.

The good cooperation led to combined efforts to achieve the ambition of developing a spatial plan to ensure cross-border connectivity through the project 'Spatial planning for ensuring the coherence of the Natura 2000 network', financed by the 2014-2020 Cross Border Cooperation Programme (Art 5.6 d, Regulation 1301/2013). The main goals of the project are:

- Harmonisation of methodologies and GIS
- Development of a common information platform
- Design of the cross-border ecological network
- Identification of ecological barriers
- Plan to include ecological corridors in the spatial planning documents to allow their long-term maintenance at local and regional scale
- Management plan to ensure permeability of the network
- Plan to integrate nature in urban areas through greenways and for promoting public use
- Communicate and raise awareness about the ecological network amongst decision makers, municipalities, land planners and other stakeholders.

Research for improving connectivity (Horizon 2020)

In 2015 the Natural Environmental Research Council of Region X, in consortium with other five EU research centres, got funding from the EU Horizon 2020 to study the functional connectivity of GI network. The funding was received through a specific call for research projects by BiodiVERsa on 'Understanding and managing biodiversity dynamics in land-, river- and sea-scapes (habitat connectivity, green and blue infrastructures, and renaturing cities) to improve ecosystem functioning and delivery of ecosystem services'.

Integration of measures in the EMFF

To finance its Marine Strategy, region X has included several measures related to Natura 2000 sites within the 2014-20 EMFF programming. Although the majority of actions focus on the effective management and monitoring of the sites themselves, one of the activities focuses on a preparatory study and drafting of a management plan for fishery-related activities relating to the Natura 2000 sites and other spatial protected

areas within the Regional Marine Strategy, including mapping (Art 40 d). An agreement with the National Oceanographic Institute and the Central University will enable a study to be done on how to reduce the negative impact of fishing in the marine ecosystem of the protected areas and the surrounding buffer areas (Art 27 Regulation 508/2014).

Region X is also participating in a consortium, in which several Member States aim to establish and implement cross-border maritime spatial planning, similar to that of Baltic Scope (www.balticscope.eu). To this end, it aims to use the EMFF potential in relation to the implementation of the Integrated Maritime Policy (Arts 81-83 Regulation 508/2014).

5.4 Conclusions

EU funding programmes offer many opportunities to advance better management of Natura 2000, including improvement of spatial connectivity of the network. They can finance, for example, data gathering and analysis, including development of maps, underpinning preparation of spatial plans and management plans, development of green infrastructure, and restoration and management of areas essential for ecological connectivity.

A key challenge is the lack of national and regional strategic plans for ensuring the coherence of the Natura 2000 network. The existence of these strategies is necessary to ensure that the coherence of Natura 2000 is taken on board during the development of the rural development programmes as well as in the operational programmes. For the development of individual projects these national strategies are also essential.

Moreover, in order to embed Natura 2000 in the operational and rural development programmes of the Member States, the socio-economic benefits of Natura 2000 need to be known and made explicit so it is clear how Natura 2000 contributes to the socio-economic goals of the different sectors.

Designing a national wind farm zoning map in Bulgaria: integrating ecological knowledge and wind potential

The challenge

Wind farms have developed rapidly in Bulgaria since 2000. Several have been developed or are planned at locations which are on essential migratory routes or breeding sites of bird species protected under the Birds Directive. Wind farms in these areas lead to a higher bird mortality, frequent disturbance of birds, barrier effect and displacement of birds due to their avoidance of wind farms. Since 2004, wind farm developments have been the subject of national as well as EU court cases, due to the negative environmental impacts of wind farms. As a result several projects have been delayed or cancelled, particularly in Dobrudzha region.

Planning approach

By combining information on the sensitivity of bird species to wind farms with information on the wind capacity of different areas, a zoning map for wind farm developments in Bulgaria was prepared. This zoning map was designed in two steps. First, a national bird sensitivity map was developed. This map is based on newly collected field data and models assessing the sensitivity of 42 migratory bird species, breeding species included in Annex I of the Bird Directive, and wintering water birds (e.g. raptors, pelicans, storks, cranes, corncrake, sand martin, bee-eater). Second, a wind-farm capacity map was designed, using information on wind velocity, electrical grid and consumption patterns. By combining the two maps, the national zoning map was developed. This map indicates the areas where no conflicts occur, where conflicts can be mitigated, and where no wind farm development should be allowed given the expected effects on bird populations.

Outcome of the planning process

The national zoning map for birds and wind farms shows that Bulgaria can reach its renewable energy target for the development of wind farms whilst taking into account the protection of the most sensitive areas for birds. The map is now being used for national planning of wind farm development. However, as many of the wind farms were already approved by the planning authorities wind farms are still being constructed in sensitive areas.

Why a best practice?

The case shows that research and relevant data can contribute directly to the development of a national strategy on wind farms that combines biodiversity protection with the development of renewable energy. This map can also serve as a decision-support tool in spatial planning processes regarding the locations of wind-farm developments.

Key success factors

The success factors of the project were the availability of funding, from both national and EU sources. Furthermore, the available expertise on the ecology of species and the possibility to acquire new field data enabled the proper integration of different types of data in order to develop the map. The international collaboration between the Bird Society of Bulgaria and other expert organisations, i.e. BirdLife International, SOVON, Bureau Waardenburg and Alterra, also contributed to the successful development of the project.

Lessons learned

One of the lessons learned in the project is that sometimes economic developments proceed at such a fast pace that both research and the process of preparation of a national strategy lag behind. The lack of foresight in planning wind-farm development in Bulgaria has resulted in higher cost for the government and developers. By considering the requirements for nature conservation at an early stage of strategy and plan preparation, the costs for nature and the economy can be reduced. Therefore it is important that planning processes are timely, reflecting on ongoing rapid economic developments, and consider how these might affect nature.

Recommendations for future projects

Good ecological information and knowledge on the sensitivity of species related to wind farms or other renewable energy installations is essential for the development of national plans on renewable energy. Plans should also take into account the economic feasibility of renewable energy installations and the costs and benefits for nature and the economy.



Wind farms can lead to a higher bird mortality, frequent disturbance of birds, barrier effect and displacement of birds

Providing strategic guidance to local authorities: Thames Basin Heaths Special Protection Area Delivery Framework

The challenge

Near the Thames Basin Heaths SPA a residential housing development is being planned in the coming years. In total 15 local authorities and three counties are responsible for the residential developments that may impact on the Natura 2000 site. The heaths, and the birds that nest and breed there, are easily disturbed by people and their pets. Therefore, the impact of each residential development on the SPA should not only be judged by itself but needs to be judged in combination with other plans in the vicinity of the SPA. This required a strategic approach to mitigation by both developers and local planning authorities.

Planning approach

The Thames Basin Heaths Joint Strategic Partnership Board developed a framework to guide the development of new residential areas in the vicinity of the SPA (to a distance of up to 5 km). The underlying idea is that alternative recreational land needs to be provided to attract new residents and keep them away from the SPA in order to avoid negative impacts. The alternative recreational land needs to be delivered by local authorities or groups of local authorities and funded by developer contributions. Although the framework does not replace the required appropriate assessment or SEA, it does provide a common platform for all local planning authorities involved.

Outcome of the planning process

The framework provides local authorities with clear guidance to estimate whether they need to develop alternative recreational areas as part of their plans to develop new residential areas. Furthermore, it was concluded that within 400m of the SPA the impact of new residential development on the SPA was likely to be such that it was not possible to conclude that there would be no adverse effect on the SPA. There should therefore be a presumption against development within this zone. As the framework is developed by all authorities involved, it ensures consistency in how to assess the impact of residential areas on the SPA and cooperation to jointly develop new recreational areas.

Why a best practice?

The framework acknowledges that new residential areas in the vicinity jointly increase the recreational

pressure on the SPA. Instead of determining measures to take only on a case-by-case basis, the framework aims to avoid impact by ensuring sufficient alternative recreational areas for all residents in the area.

Key success factors

Key success factors are seen to be:

- Development of a joint partnership consisting of local planning authorities advised by the regional authorities responsible for nature as well as the largest NGO protecting birds (RSPB).
- A consistent approach to the protection of the SPA from the significant effects of residential development, which is being monitored by the Joint Strategic Partnership.

Lessons learned

Negative impact on Natura 2000 sites can originate from multiple developments in the vicinity of the area. In order to address these developments, a joint strategic approach is required that considers the need for measures from a strategic level.

Recommendations for future projects

If the responsibility for specific developments that impact a specific Natura 2000 site is to be divided over several administrative jurisdictions, the development of a jointly agreed framework between all partners is needed in order to ensure a common approach.



The woodlark is one of the species protected in the Thames Basin Heaths (© Saxifraga, Kees van Berkel)



6 The Natura 2000 network across borders

Key messages

- The coherence of the Natura 2000 network can only be ensured by cross-border collaboration between the Member States. Cooperation in spatial planning plays a key role in this process.
 - While some cross-border initiatives in spatial planning and Natura 2000 have been taking place, these initiatives are not yet a common practice.
 - Important success factors for cross-border cooperation are the existence of formal or informal cross-border institutions that enable the development of a shared agenda and trust.
 - Cross-border spatial-planning initiatives for Natura 2000 can be promoted by providing specific guidance and including them as an explicit priority under the LIFE programme and the instruments of the European Territorial Cooperation goal.
-

6.1 Introduction

The need to ensure ecological coherence of the Natura 2000 network applies not only to the network within the Member States, but also on the European scale (Kettunen et al., 2007). As a consequence, the management of the Natura 2000 network requires cross-border cooperation between neighbouring countries. This cooperation may include efforts related to mitigating negative impacts of plans and projects on the sites that stretch outside national borders and management of sites and landscapes in order to improve connectivity between Natura 2000 sites. The presence of 38 borders between EU Member States makes this a challenging process.

Successful initiatives for inter-regional coordination across countries borders occurred during the designation process of the Natura 2000 sites and, particularly, at a biogeographical level (Makomaska, 2005; Opermanis et al., 2012; Roth, 2005).

In this chapter, we analyse the key challenges of cross-border management of Natura 2000 related to spatial planning and sectoral developments across the Member States.

6.2 Ecological coherence of Natura 2000 across borders

The importance of cross-border ecological connectivity for the conservation of nature has been established in a number of studies (Bonnin et al., 2007; Bouwma et al., 2002; Harfs et al., 2010; Jongman & Simeonova, 2010; Kettunen et al., 2007).

The relations between Natura 2000 sites across borders fall within three main spatial patterns: trans-boundary Natura 2000 sites divided by a border; separate Natura 2000 sites on each side of a border and the existence of Natura 2000 sites on one side of a border affected by activities on the other side (Opermanis et al., 2012; EC, 2015b).

- **Trans-boundary Natura 2000 sites.** Member States may have designated Natura 2000 sites on both sides of a border. Although the sites are administratively two different sites, they form one ecologically continuous area. In this case, the main challenge in terms of spatial planning is to ensure that the management on both sides of the border is consistent (or at least compatible) to ensure ecological connectivity between the sites. To facilitate this process, joint management committees or other forms of regular cooperation have been established at several trans-boundary Natura 2000 sites (Vasilijević, M., Pezold, T., 2011; Van Wingerden et al., 2005). Figure 6.1 shows the extent of trans-boundary Natura 2000 sites for different Member States (e.g. structural connectivity).
- **Spatially separated Natura 2000 sites on each side of a border.** Many Natura 2000 sites are located in close proximity to a border. When this is the case, the main challenge related to spatial planning is to ensure that management of the landscape between the sites, including the border area, allows species migration between the sites. This might include the need for control of spatial developments between the sites to the effect that they do not reduce or prevent connectivity for species or, in the case of existing obstacles, the need for retrofitting of existing infrastructure or adjustments in landscape management (e.g. cases *From planning to practice: Ecological corridors between Switzerland and France* and *Joint planning to increase cross-border cooperation between Romania and Hungary*). Figure 6.1 shows that for 13 of 38 internal borders there are Natura 2000 sites present on both sides of the border, located within 1 km of the border, and that these sites host Natura 2000 species with limited dispersal capacity (e.g. functional connectivity). However, there are also Natura 2000 sites that are located at much larger distances which might be ecologically connected by species with much larger dispersal ranges (Bouwma et al., 2005). Furthermore, most attention has been focussed on biotic processes, but abiotic processes also need to be considered, such as sediment transport or water flows. The main difficulty here is that the distance to be considered depends on the abiotic and biotic processes involved and that no rule-of-thumb distance can be provided.
- **Natura 2000 site on one side of a border.** Several Natura 2000 sites are located near to a border area. The challenge here is to ensure that plans/projects or the management of areas on the 'other side' of the border do not threaten the coherence of the network. In the case of plans and projects, the appropriate assessment (Art 6.3) should take into account the effects on the Natura 2000 network, also for sites located across a border. However, due to lack of knowledge, information and awareness this does not always happen⁴. Also the Espoo Convention requires that governments notify and consult each other on all major projects under consideration that might have adverse environmental impact across borders. The agricultural and forest management of areas can also negatively affect Natura 2000 sites located on the other side of a border. Well known examples are the upstream management of catchment areas that influence water quality, water quantity and flow patterns for downstream Natura 2000 sites (Boon & Raven, 2012; EEA, 2016, N2KGroup, 2015). The implementation of the WFD as well as the Floods Directive are mechanisms to improve cross-border cooperation in these fields (see chapter 4).

⁴ The Belgian municipality of Riemst successfully challenged the permit given by the Dutch authorities to the ENCI on the grounds that it would increase nitrogen deposition on the Belgian Natura 2000 site (<https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:RVS:2014:285>).

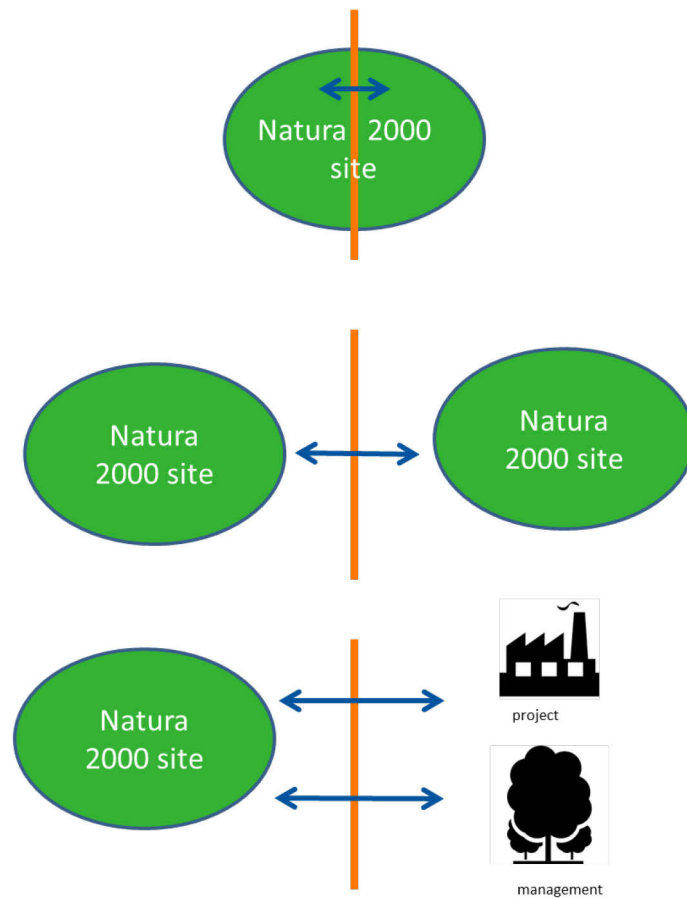


Figure 6.1 Schematic representations of the spatial cross-border relations for Natura 2000 sites. From top to bottom: Trans-boundary Natura 2000 site, Natura 2000 sites on each side of the border, Natura 2000 site on one side of the border.

To ensure coherence of the Natura 2000 sites, a number of Member States are already developing their national ecological networks. However, due to the different spatial planning practices in the Member States, there is no one single approach to the management of Natura 2000 at cross-border level. Cross-border cooperation falls under the responsibility of the individual Member States. Ideally they should proactively seek to collaborate with the neighbouring countries on this issue. Yet much progress is needed in the establishment of cross-border cooperation on Natura 2000 as a common practice. The integration of Natura 2000 in sectoral developments and in the actual spatial planning practices that concern cross-border areas is currently an ad-hoc process rather than a coordinated action between the Member states (Kettunen et al., 2007; Biemans and Snethlage 2008; Čivić et al., 2009; Opermanis et al., 2013). There is still a lack of clear understanding among the Member States regarding the importance of the benefits of ecological connectivity (Füreder et al., 2011).

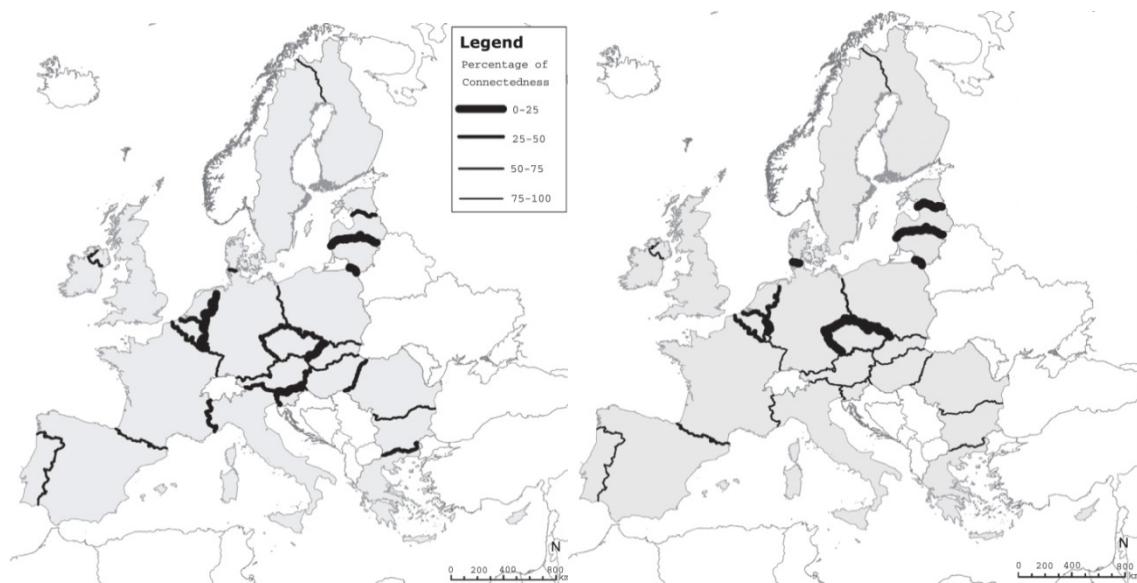


Figure 6.2 Structural connectivity (left) and functional connectivity (right) between cross-border Natura 2000 sites. Thicker lines represent worse connectivity rates (Opermanis et al., 2012 © 2012 Elsevier Ltd)

6.3 What's going on in cross-border nature conservation?

In order to advance the process of European integration, the Commission launched the first Interreg programme in 1988. Interreg has been a key funding instrument for promoting cross-border cooperation of regions. Within the Interreg projects, nature conservation issues have been addressed via activities such as tourism and protected areas management. Many of these collaborative projects in trans-boundary natural parks continued after the project ended and some have moved towards more advanced forms of nature-related governance. Examples are the common management structures of Hainaut cross-border Natural Park, the European Grouping of Territorial Cooperation of the International Marine Park Bouches de Bonifacio and of the European Park Alpi Marittime–Mercantour (See case 1 in Box 6.1).

There are also a growing number of cross-border nature conservation projects, for example on the eradication of alien species, habitat management and specific species conservation (see the case *Joint planning to increase cross-border cooperation between Romania and Hungary*). Although these cross-border projects are not always related to Natura 2000, they can play a role in enhancing cooperation between relevant stakeholders, including national parks, administrations and NGOs, and contribute to the conservation of endangered habitats and species. So far, there are not many projects which have contributed to the development of a comprehensive spatial-planning approach for the management of Natura 2000. Some initiatives that have been implemented have focused on the development of harmonised geo and spatial-information databases and the identification of functional ecological corridors (See case 2 in Box 6.1).

An important factor hindering the implementation of Natura 2000 at cross-border level is that it requires cooperation between a broad range of actors and organisations of neighbouring countries, ranging from nature conservation agencies, spatial planning authorities and various sectoral stakeholders. Often this cross-border cooperation

starts with information sharing but can evolve further even to the level of setting up joint institutions (see box 6.2).

More recent local initiatives show inspiring experiences with cross-border management of Natura 2000 (see case 3 in Box 6.1).

Box 6.1 Success stories from cross-border areas

Case 1 Case study: evolution of cross-border governance

Cross-border cooperation can be achieved through different forms of cooperation, ranging from a mere exchange of information to the establishment of common institutions. A good example of the evolution of governance in cross-border cooperation is cooperation between Mercatour National Park (FR) and the Alpi Marittime Natural Park (IT), two adjacent protected areas with different administrative organisation and protection status. Cooperation started in 1984 in relation to the conservation of the ibex and in 1988 the two parks signed an agreement for developing further projects. Since then they have developed a number of joint actions in the fields of research, management, spatial planning, education, training, tourism, information and awareness raising. In 2001, they started a first Interreg project and created a cross-border structure called Interparks. This was followed by another Interreg (2007-13) that involved the adoption of a common management plan for nature conservation and sustainable development. The strengthening of the cooperation required a new form of governance in order to provide a stable legal framework for all these common activities. Both parks were also partners of Econnect (see Case 2). An output of this project was an analysis of the legal framework of protected areas in the Alpine countries, including the potential of the European Grouping of Territorial Cooperation (EGTC) for the governance of trans-boundary protected areas, and the situation of both parks was specifically studied (Econnect, 2009). This opened the door for both parks forming the first EGTC (2013) in the field of nature conservation. It aims at implementing projects on biodiversity and landscape protection, education, sustainable agriculture, sustainable tourism and sustainable mobility. This case is an example of natural evolution of cross-border governance.

Case 2 Econnect: Integrating ecological connectivity into spatial planning

The Alpine Convention established in 1991 is an international treaty between Alpine countries for the sustainable development of the Alps. In 2006 an ecological platform was founded within the Convention to develop common strategies for biodiversity conservation, which included safeguarding the connectivity between natural habitats. In 2007, a group of international organisations linked to the Alpine Convention (CIPRA, ISCAR, ALPARC and WWF Alpine Space Programme) joined to prepare a project to promote ecological connectivity in the region. It resulted in Econnect (2008-11), a project supported by Interreg through the ETC Alpine Space Programme, with the participation of 15 partners and four observers from six countries (IT, FR, DE, AT, CH, SI). The existence of a clear common objective, cross-border institutions and previous experiences in cross-border cooperation reduced the transactional costs and facilitated the implementation of the project. A major challenge of the project was to override the differences on legislation and administrative organisation. A detailed study was carried out regarding the different legal systems in order to identify the opportunities and barriers for further advances in cross-border cooperation, including the opportunity of implementing the EGTC of Case 1.

The project, ended in 2011, has contributed to the harmonisation of information, terminology and methodology and has left a common GIS tool (Jecami) that allows users to integrate the ecological connectivity needs into the regional and local spatial planning. It has also contributed to developing a regional culture on the need for cross-border ecological networks that has resulted in further advances in this area.

Case 3 From planning to implementation: the biological corridor contract

As the example in Case 2 shows, a few EU-funded cross-border projects have laid the foundations for the regional implementation of ecological networks and green infrastructure. They have developed harmonised methodologies, geo-information systems and even planned

ecological corridors. However, the question remains how these plans can be implemented. An answer can be found in the Interreg project Corridors Biologiques. In 2007 different stakeholders of the France-Vaud-Geneva conurbation signed an agreement to develop a new spatial-planning approach, which not only included the preservation of natural areas but also their interconnections. The implementation of these ecological corridors takes place through the so called 'biological corridor contract', which is an agreement between private partners, communities and associations, to develop the corridors in a 5-6 year plan. For more information see the Case description at the end of this chapter.

Box 6.2 Steps in cross-border cooperation

In general, cross-border cooperation can be achieved through different levels of cooperation, usually increasing the level of cooperation with time, but different authors agree that no level is better than another; it just depends on the objectives. Kidd and McGowan (2013) have categorised these levels using the following scale:

- *Information sharing.* This first step is a precondition for the others, because without communication and knowledge of each other it is impossible to go further in cooperation. Information sharing is a basic requirement to build trust and understanding among the various state, market and civil stakeholders. At this level all parties continue working independently but share information on issues of common concern.
- *Administration sharing.* This takes place when both parties understand that closer collaboration is better for being efficient. It can take many forms. For example, the establishment of a joint working commission to solve a problem.
- *Agreed joint rules.* At this level, stakeholders establish common procedures related to specific areas of activity for improving efficiency. These may include monitoring protocols, harmonised information or management plans. Although it is a step towards a more formalised arrangement, central resources are still only maintained at a low level.
- *Combined organisation.* This can include the establishment of joint planning teams, research centres, etc.
- *Combined institution.* A higher level of cooperation is to develop a legal agreement on partnership. This means delegating responsibilities and power to a shared organisation representing the common interests. In respect to spatial planning, the Espoo Convention is a clear example of information sharing, as it requires the governments involved to share information on projects and plans. Many INTERREG projects and LIFE projects that deal with cross-border cooperation enable the processes of information sharing, administration sharing, agreeing on joint rules and combined organisation by setting up joint databases, action plans and joint research activities. Although combined institutions are rare, some have been developed in the last years mostly as EGTC.

6.4 Overcoming bottlenecks to cooperation

Currently there are a number of challenges to cross-border cooperation. These include overcoming language barriers, a lack of administrative structures and clear policy and legislation on cross-border issues, cultural disparities, different planning traditions, a lack of economic incentives, and a need for sharing knowledge and collaboration practices between the Member States (see box 6.2).

Cross-border cooperation can take considerable efforts but the benefits of such collaboration prove to be high and have a long-term effect. In terms of nature conservation policy, these benefits include more efficient nature-management practices, including more effective species protection in larger territory areas across the borders, the creation of mutual benefits for economic development through tourism and recreation, awareness raising, the creation of opportunities to resolve land-use conflicts, dealing with alien species, forest fire prevention, flood prevention

or reduction of nitrogen pollution (Linz & Leibenath, 2005; Brunner, 2011; Ivanovski, 2011; Job et al., 2011; Mazza et al., 2011; Petrikova, 2011; Trusova, 2011).

Cross-border collaboration is more likely to take place when the perceived benefits outweigh the efforts required for cooperation (see Box 6.2) (Econnect, 2009; Lintz & Leibenath, 2005; Favilli et al., 2014; Leibenath et al., 2010). Moreover, the costs must be shared, as these directly affect institutions and individuals involved in the process, while others might also benefit from the cooperation. One of the most effective tools to stimulate cooperation is the creation of specific cross-border institutions and collaboration bodies. By working together on a regular basis, the preconditions for successful cross-border cooperation (e.g. exchange of knowledge, trust, shared objectives and understanding) can be guaranteed.

Cross-border cooperation can be enhanced by several EU programmes such as LIFE and the instruments of the European Territorial Cooperation goal (see Chapter 4). However, a review of the funded projects shows that the majority of the projects funded do not aim to improve cross-border coherence for Natura 2000.

Box 6.3 Success factors and bottlenecks in cross-border cooperation

Several success factors and bottlenecks have been identified in studies reviewing cross-border cooperation. These include the level of policy convergence, symmetry, shared agenda, existence of cross-border institutions and stakeholder involvement.

- *Policy convergence* The more similar the policies and legislation the easier it is to cooperate. Although the process of convergence in Europe is a factor that encourages joint cross-border planning, it can be still hindered by important differences in relation to the legal frameworks, land-use planning processes and administrative fragmentation (Econnect 2009; Favilli et al., 2014; UNEP 2014).
- *Symmetry* Cross-border governance can be often hindered by differences in languages, administrative structure, human resources, operational culture, planning tradition, economic and technological frameworks, basic knowledge, different participatory culture, etc. (Leibenath and Knippschild 2007, Harfst et al., 2010).
- *Sharing agenda* Shared objectives and problems can stimulate cooperation.
- *Previous experience* Another key factor is trust and better knowledge of each other. In fact, many of the most successful projects have been built through a long process of continuous cooperation projects.
- *Existence of cross-border institutions* Transaction costs can be reduced by the existence of cross-border institutions, formal or informal. Some of the most successful projects have been developed under the umbrella of transnational institutions (Linz & Leibenath 2005; Harfst, et al., 2010; Leibenath et al., 2010; Econnect, 2011).
- *Stakeholder involvement* The existence of good cross-border relations between different stakeholders also facilitates cooperation, although it might also complicate matters as more interests need to be considered.

6.5 Conclusions

Currently there is insufficient understanding and coordination among a wide range of governmental institutions and actors across the Member States regarding the benefits of cross-border connectivity of Natura 2000. To address this issue, the exchange of information and knowledge between the Member State institutions needs to be enhanced in a more coordinated manner. The promotion of cross-border green infrastructure developments, examples of best practices and new funding opportunities can play an important role in enhancing this cooperation. The creation of an institutional framework for cross-border cooperation for Natura 2000 could be one possible solution (e.g. www.espaces-transfrontaliers.org).

Prioritising cross-border cooperation on Natura 2000 within the current EU-funding programmes, such as the European Territorial Cooperation programme (e.g. Interreg) and the LIFE fund, could also be an important step in the future, as it is important to fill knowledge gaps with regard to the needed spatial-planning interventions, shared databases, knowledge on ecological impacts of cross-border sectoral developments, conservation measures and species migration across the Member States.

From planning to practice: Ecological corridors between Switzerland and France

The challenge

Geneva, one of the main financial centres in the world, is located on the shore of Lake Geneva. Due to its dynamic economy, Geneva expanded significantly and the urbanisation has even extended beyond the borders of Switzerland, into the neighbouring areas of France. The whole area has over one million inhabitants and every day the French-Swiss border is crossed more than 550,000 times, giving rise to a cross-border conurbation between the Swiss cantons of Geneva and Vaud, and the French departments of Ain and Haute-Savoie. The need for cross-border cooperation is obvious in the area and, although hampered by many difficulties, it has been built up gradually since 1962. One of the main challenges of this area is to combine the fast urban expansion with the preservation of the environment. In this sense it has to be noted that Greater Geneva is surrounded by outstanding natural areas, including the Haut-Jura Mountains, the Massif du Mont Vuache, the Massif des Voirons, the Vallée de l'Arve and the Lac Lemman, all of them Natura 2000 sites.

Planning approach

The conurbation charter (2007) recognised that the quality of life and the character of a 'green metropolis' were threatened by intensive land use, habitat fragmentation, landscape degradation and urban sprawl. To minimise these threats the charter included the preservation and strengthening of ecological and landscape connectivity. Greater Geneva was divided into eight sectors and for each of them a study was produced, identifying the ecological corridors needed for the movement of species as well as friction areas with transport infrastructures. The studies, completed in 2010, will be implemented through plans known as 'corridor contracts'. A corridor contract is an agreement between private parties, communities and associations to implement a 5-6 year action programme consisting of four components: (1) the inclusion of biological corridors in the spatial planning documents to allow their long-term preservation at local and regional scale; (2) restoration work, to ensure connectivity across transport infrastructure; (3) scientific monitoring, to check the viability of the ecological corridors; (4) local governance, to implement a sustainable policy based on new governance principles and better integration and coordination of decision-making (partnerships, citizen participation, awareness raising, etc.). Each component may include several actions and should present details on budget, time schedule, responsibilities, location map, monitoring indicators, and photographs. The implementation of each measure is assigned to a stakeholder (regional and national administration, communities, municipalities, NGOs, hunting associations, etc.), who also has to finance at least 20% of the costs. The rest of the costs are financed by municipalities, regions, the central state, private companies, state agencies or foundations. The first

two corridor contracts were co-financed by the EU through the Interreg IV France-Switzerland Operational Programme.

Outcome of the planning process

In 2012 the first two corridor contracts were signed, which were followed by another two soon after. The contracts are implemented in both Swiss and French municipalities and cover over 57,000 ha. Examples of specific measures that can be included in a corridor contract are modification of existing spatial plans (regional and municipal), habitat restoration, awareness raising, defragmentation measures.

Why a best practice?

This case shows the benefits of cross-border cooperation, and more specifically how cross-border spatial planning cooperation can contribute to the achievement of nature conservation objectives. Furthermore, it is an innovative and pragmatic way of implementing ecological corridors outside protected areas in densely populated areas.

Key success factors

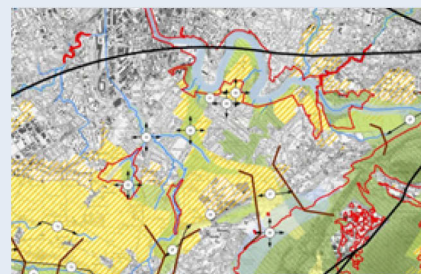
Key success factors were the strong cooperation between the border regions and the commitment of both parties to solve shared problems. As a result, the cross-border relationship evolved into a more complex governance system. Furthermore, the involvement of a wide range of stakeholders in the whole process, from decision-making to implementation and funding, created a sense of ownership and responsibility to achieve the pre-set goals.

Lessons learned

After the political decision, it took three years to realise on-site implementation of the plan. This proves that when there is strong commitment to a spatial-planning project it can be implemented fast. Public funding is ideal, but in absence thereof other funding sources can be tapped into.

Recommendations for future projects

- In cross-border cooperation political commitment is essential. Cooperation agreements may be required.
- Stakeholders' involvement increases commitment.



The Champagne-Genevois corridor (© Pro Natura Geneve)

Joint planning to increase cross-border cooperation between Romania and Hungary

The challenge

The southern cross-border area between Romania and Hungary, around the cities of Timisoara and Szeged, is part of the Great Pannonian Plain. Traditionally this is a rural area and the need for economic growth to improve the livelihood of local communities is high. As a result, agriculture in the area is intensifying, leading to a decrease in pastures, hay meadows, humid areas, and an increase in arable land and overgrazing in the case of pastures. There are several Natura 2000 sites for the protection of specific species and habitats. In order to tackle the agricultural intensification in the area, three partners from Romania and Hungary initiated a project called X-PARC. The target area of the project spreads across the Crisul Alb/Korosok and the Mures/Maros river basins.

Planning approach

To preserve the area and to ensure more efficient natural resources management, as part of the X-PARC project, a Cross-Border Protected Areas Resource Centre has been established. Although the centre has no official competences in planning and management of the natural areas, the expert team stationed at the centre offers support to stakeholders involved in nature preservation and natural resources management, such as protected areas administrators, NGOs, public authorities, companies, and the general public. The first step towards the establishment of a common planning approach was the development of a Joint Biodiversity Action plan for the Romania-Hungary cross-border area, which is currently used as a planning tool, for example by the managers of the protected sites. The plan identified specific cross-border nature conservation objectives, to address cross-border problems and to prioritise intervention actions.

Outcome of the process

In order to facilitate future planning and management processes, a GIS database was established regarding the natural resources within four cross-border counties, i.e. Arad and Timis in Romania and Csongrad and Bekes in Hungary. The main objective is to provide a common database allowing easy access to relevant information for the cross-border area, such as surface of nature protected areas, both Natura 2000 and national, area of administrative territories, land use, environmental pressures and boundaries of jurisdiction for environmental authorities. The GIS database will be further used in the planning process to facilitate the decision-making on management measures or future developments in the area. In addition, a number of initiatives were carried out among stakeholders and the general public to raise the awareness of existing or potential activities with a negative impact on the natural sites.

Why a best practice?

The case of the cross-border collaboration between Romanian and Hungarian partners in the area around Crisul Alb/Korosok and the Mures/Maros river basins can be seen as a best practice as it addresses a widespread problem faced by cross-border areas: the lack of common management structures, databases

and visions for future developments. The cross-border planning process carried out during the X-PARC project, resulting in a joint action plan and common database, is an innovative approach for the Romania-Hungary border region. The GIS database that was developed is the first step towards the development of the necessary technological infrastructure for an effective management process of a cross-border rural area. A broad range of stakeholders, e.g. managers of protected areas, public environmental protection and natural resources management authorities, were involved in order to gather all relevant information for the setting up of the GIS instrument, which is also accessible online. The outputs of the project can be further developed and will be used in other consequent actions to enhance the knowledge basis regarding Natura 2000 and to facilitate the management of protected sites.

Key success factors

One key success factor in this case was the availability of funding for cross-border cooperation under the Romania-Hungary Cross-Border Cooperation Programme 2007-2013. More important for the successful implementation of the project and the development of the GIS database, however, was the smooth collaboration with the managers of the protected sites within the targeted area. This allowed the project partners to access all relevant information. Moreover, good communication with relevant authorities and institutions involved and responsible for the management of natural resources within the two partnering countries was of key importance for achieving the objectives of the project.

Lessons learned

Activities and initiatives in cross-border regions aimed at the establishment of common structures for management are time consuming and require considerable human resources. Moreover, the development of a common GIS database needs good planning and knowledge of available spatial tools and technologies. In the case of the X-PARC project, a large amount of data from different sources was processed. Nevertheless, the final product still lacks some in-depth details of the characteristics of the area. This is due to the functionalities available on the online database used, which did not allow the presentation of some information in a user-friendly manner, envisaged in the development phase of the project.

Recommendations for future projects

- Cross-border collaboration among various stakeholders should include the formation of a joint vision;
- The success of an initiative depends on setting achievable objectives and planning with sufficient human and financial resources;
- Providing easy access to information through the development of shared GIS databases and platforms is a highly effective way to ensure well informed management of nature sites.



7 Spatial planning technologies for Natura 2000

Key messages

- Harmonisation of data is needed to make best use of the available spatial planning tools.
 - In order to assess the impact of plans on Natura 2000 and in view of ensuring long-term strategic development of regions, data from different spatial scales need to be used.
 - Remote sensing provides new opportunities to assess and monitor land-use change in and around Natura 2000.
 - Newly developed geo-data based decision-support tools can enhance public participation in spatial planning.
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7.1 Introduction

Contemporary spatial planning is highly dependent on the application of geo-spatial information technologies (GIS) which provide a reliable knowledge base for decision-making processes. Harmonisation of data from different sources and development of common standards for information have been major challenges in this respect. The type of data required for spatial-planning processes related to Natura 2000 varies considerably depending on whether the information is needed to assess the impact of plans and projects (regulatory function of spatial planning) or for development of long-term strategies (the development function).

More recently, a variety of approaches have been used to make GIS technology available and accessible to a wider range of stakeholders, including the public, in order to enhance broader participation in spatial planning, also in relation to the management of Natura 2000 sites. All approaches used in this regard are commonly referred to as 'Public participation GIS' (PPGIS).

This chapter presents the state-of-the-art of geo-spatial information technologies and methods used in spatial-planning processes that are relevant for Natura 2000 and how they can be applied. It addresses three key issues:

- Practical aspects: requirements for geospatial data for the Natura 2000 network;
- Methods for spatial analysis and modelling of data and their applications for the purposes of spatial planning for Natura 2000 sites;
- New approaches: Public Participation GIS (PPGIS).

7.2 Practical aspects - requirement for geospatial data for the Natura 2000 network

Over the past two decades, geo-information technologies have developed rapidly and become widely used in the field of spatial planning. The main driver of this process is the geospatial character of spatial planning and the necessity of spatially referred quantitative and qualitative information in order to provide knowledge-based decisions. GIS technologies allow the processing of large amounts of data and the

development and exchange of information between specialised spatial data infrastructures and platforms for different territorial levels – European, national, regional and local. Therefore, GISs facilitate and play a key role in defining and implementing all European policies related to spatial planning and sustainable governance of the environment, in particular the Natura 2000 sites.

The development of the Natura 2000 network database is one of the largest organised, and to a great extent standardised, geospatial database initiatives at European level (see box 7.1). The main challenge in the process of development and update of the Natura 2000 GIS database is related, on the one hand, to the large territorial extent of the network (including over 27,000 sites in EU28) which means there are large amounts of geospatial data that need to be harmonised and maintained, and on the other hand, the unique character of each site that needs to be properly represented.

Box 7.1 Spatial data for Natura 2000

Each Member State regularly submits data to the European Commission for the European database on Natura 2000. The data is submitted in a standard data form and is validated by the EEA and its supporting bodies. It is the responsibility of the Member State to regularly update the data. The specific spatial data, namely the boundaries of the sites, are validated by the EEA and if any discrepancies are found they are reported to the Member States, which should take them into consideration. Afterwards, the spatial data is generalised to a scale of 1/100 000 and integrated in the common database.

Over the last years, various GIS tools and technologies have been employed to gather, maintain and give access to the spatial data on the Natura 2000 network. Based on the GIS technology, the European Commission with the support of the EEA has developed a public viewer for all Natura 2000 sites. The tool provides a number of functions for the users to view spatial information on the network and also allows the turning off and on of several layers such as nationally designated areas (CDDA), CORINE land cover, location of LIFE projects, bio-geographical regions, etc. The EC has also launched the Web Map Services which is a standard protocol allowing users to acquire geo-referenced maps online. Another service concerning the Natura 2000 network is the Web Feature Service (to be published) which allows users to request geographical features that can be used for spatial analysis or mapping. Also available for all stakeholders and the general public are various maps for Natura 2000 exported by Member States. Furthermore, almost every country already has a national website available that allows spatial information related to Natura 2000 sites to be viewed and often downloaded.

The quality, quantity and accessibility of geographic data have become the subject of a number of major initiatives for the application of GIS by European governmental and non-governmental organisations (such as GSDI, GINIE, EUROGI). An important achievement in this respect is the INSPIRE Directive that was developed to harmonise GIS data and which aims to support the implementation of environmental legislation (Box 7.2).

Box 7.2 INSPIRE: Harmonising spatial information standards across Europe

The INSPIRE Directive, in force since 2007, addresses the spatial information of various fields, including the environment. The main aim of the Directive is the establishment of an Infrastructure for Spatial Information in the European Community (INSPIRE) for environmental policies, or policies and activities that have an impact on the environment.

The directive represents a big step towards overcoming the challenges regarding the lack of availability, accessibility and sharing of spatial information across the various levels of public authority in Europe. It defines common standards for 34 spatial data themes including Natura 2000, which is explicitly mentioned in the protected sites data classification.

Despite these efforts, the biggest challenge in relation to spatial planning involving Natura 2000 remains the high diversity of data necessary for effective decisions in the planning process. In order to facilitate environmental protection and to ensure ecological connectivity for Natura 2000 sites, planners need to be provided with the necessary spatial data. The type of data needed depends on the spatial level of the plan, the spatial-planning approach applied, and the socio-economic characteristics of the area as well as the species and habitats for which the sites have been designated (Goodchild & Janelle, 2004). Another challenge is to ensure adequate 'harmonisation' and integration of data within the spatial-planning processes by extraction and generation of spatially-referred information. Several projects have been initiated to explore these challenges with regard to nature conservation (see box 7.3).

Box 7.3 Three examples of projects on spatial data for nature and regional planning

NatureSDI Plus Project: NatureSDI Plus project is one of the first projects developed to directly contribute to Annexes I and III of the INSPIRE Directive focusing on the nature conservation issues by establishing a Best Practice Network on geographical information for nature conservation in the Member States. The project addressed the need for interoperable, accessible and harmonised datasets for geo-information provided in the field of environmental protection. The aims of the project were achieved through state-of-the-art methodologies and best practice examples, to improve harmonisation of national datasets and make them more accessible and exploitable. As the first step towards the harmonisation process, the project analysed the data usability and accessibility within a wide European context. The conclusions are that the heterogeneity of the data among the different countries is very high. Best practices on interoperable datasets for nature conservation were collected and made available to users on the website of the project. The final objective of the project is to establish a NATURA-SDIplus Geoportal that has aggregated datasets and metadata from different partners.

Humboldt Project: Humboldt is another project that is designed to facilitate the integration and harmonisation of different datasets into a common European structure. Thus it contributes to the implementation of a European Spatial Data Infrastructure (ESDI) that integrates the diversity of spatial data available for a multitude of European organisations. The ESDI is directly related to the implementation of the INSPIRE Directive. The main objective of the project is to facilitate organisations to document, publish and harmonise their spatial information in the field of nature protection. A key feature of the Humboldt project is the development of scenario applications that provide specific examples of the use of the Humboldt framework to address the challenges of the interoperability of geospatial data in a variety of application settings. The main aim of the Protected Areas Scenario is to embed geo-information managed by park authorities in a seamless flow, gathering data from diverse sources at different level, European, national, regional, enabling its exploitation for planning, management and tourism promotion. The website of the project gives access to the open-source software which is an output of the activities aimed at achieving the objectives.

Plan4All Project: Plan4all is yet another project that focuses on the harmonisation of spatial-planning data according to the INSPIRE Directive, based on the existing best practices in EU regions and municipalities and the results of current research projects. It is an eContentplus 'Best Practices Network' project started in May 2009. The eContentplus programme is a European Commission multi-annual programme and its main aim is to make digital content in Europe more accessible, usable and exploitable. The main objective of Plan4all was to build a network of local, regional and national public bodies, stakeholders, ICT industry organisations; organisations dealing with planning issues and regional development; universities; and international organisations. Thus it is not restricted only to spatial-planning issues in the field of nature conservation. The partnership has consisted of data holders, software and planning organisations, SMEs, consultancy, research organisations and academic institutions in European countries and international organisations. The results of the project are European forums for SDI in spatial planning, a database of best practices and analysis of best practices in terms of organisation, sharing, harmonisation and SDI building recommendations for spatial planning.

7.3 Methods for spatial analysis and modelling of data

In order to address multiple and often conflicting land uses within and outside Natura 2000 sites, spatial planners and environmental experts involved in the preparation of spatial plans can use GIS in five key steps (see Figure 7.1).

Step 1 Identification, gathering and processing of data from different sources: This process includes searching for and identifying analogue and digital spatial and attributive data, digitisation, transformation and harmonisation of the data, filtering of existing databases through queries, aiming to select a subcategory of spatial and attributive criteria. Often, information from different sources is inconsistent or even contradictory. Therefore it is important to check the data and the reliability of the sources. Finally, all data, gathered and processed, must be integrated into the GIS database (see *EPIC WebGIS: setting the baseline for green infrastructure development in Portugal*).

Step 2 Combining data available in the GIS database in the form of digital maps: processing and integration of all data gathered in order to make it suitable for further use and analysis. In order to assess the relations between the data on biodiversity, land use and other information sources, the data need to be combined in one GIS-database. It is important to ensure spatial consistency between the data.

Step 3 Spatial analysis: This process is a type of geographical analysis including various techniques. It seeks to explain patterns of human behaviour and its spatial expression. Spatial analysis allows various tasks to be carried out, such as computational analysis of geographic patterns to find best routes, site selection and advanced predictive modelling. Thus, spatial analysis facilitates planning of Natura 2000 sites by answering specific questions related to connectivity between areas, proximity of areas and sphere of influence or the status of the investigated objects or phenomena (see Box 7.1). An example of such a spatial analysis is provided in Box 7.4 and the case Modelling tools for spatial planning prioritisation: the Zonation toolkit).

Step 4 Spatial modelling: This is an essential process in spatial analysis, which allows the GIS representation of basic processes and properties for a given set of spatial features. It facilitates planning by allowing the researcher to study and simulate spatial objects or phenomena that occur in the real world using GIS

visualisation. It involves complex analytical, assessment and evaluation methods, such as spatial overlay, geo-statistical analysis, and multiple-criteria evaluation (MCE). Spatial modelling is often used to predict the condition of a territory after it has been given a specific land use or the effects that management might have on specific biophysical or socio-economic factors. Also, information on future trends in land use can be generated through spatial modelling (see chapter 3).

Step 5 Cartographical visualisation of the results: Every spatial plan has cartographical output in the form of thematic maps and schemes, which are part of the planning document. GIS gives the necessary platform and tools for development and publishing of sophisticated maps in analogue, digital or online form (see the case *Designing a national wind farm zoning map in Bulgaria: integrating ecological knowledge and wind potential*).

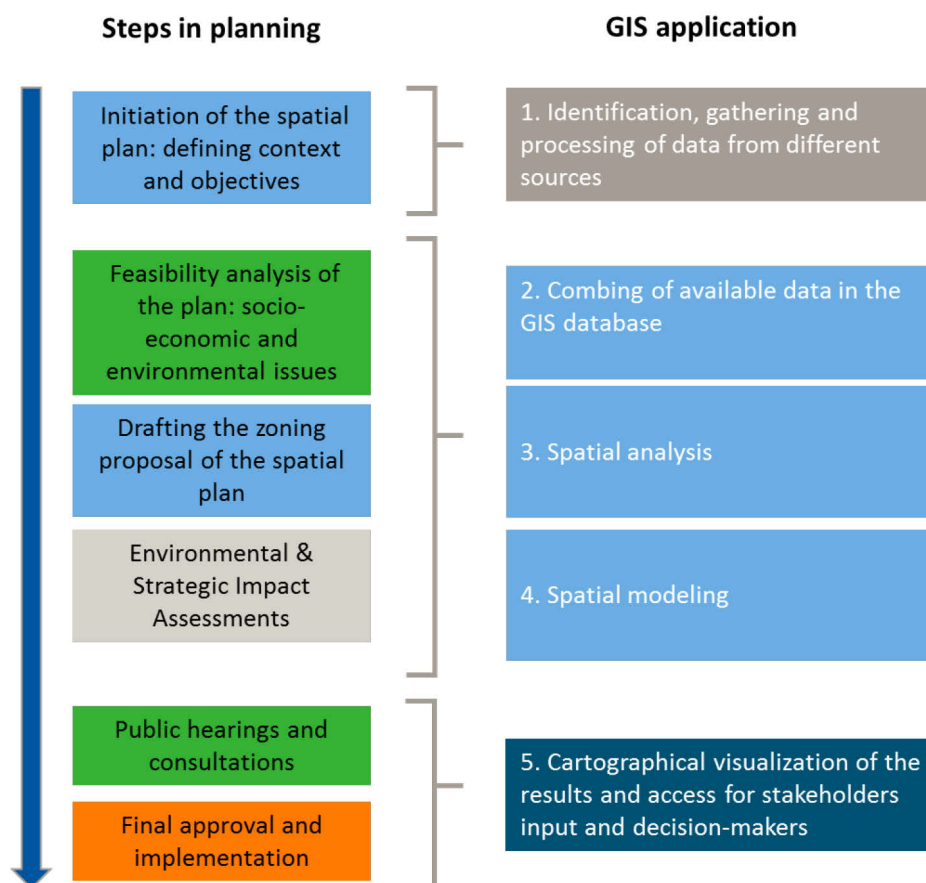


Figure 7.1 Planning steps and GIS – technologies and methods in spatial planning

The complex nature of spatial planning requires the use of multiple-criteria evaluation methods (MCE). Most of these methods and techniques are based on the so-called 'spatial overlay'. GIS plays a key role in this process (Sullivan and Unwin, 2003) for example in land suitability evaluation (see Box 7.4).

Box 7.4 Spatial overlay example of land suitability evaluation

Land suitability evaluation can consist of a spatial overlay of different data to assess the suitability of a given area for a specific use. Such suitability can be assessed in view of the spatial sensitivity of a given area (from a social, economic or environmental perspective) and factors driving and limiting certain developments in a particular area. The level of suitability is tested based on individual factors, which are later overlaid to indicate overall development suitability. This kind of analytical assessment usually includes five major steps:

- Defining the major assessment criteria for analysis and allocating relative weights to each of them (based on the importance of each criteria)
- Defining data needs
- Acquisition and processing of necessary data
- Development of GIS hierarchical overlay model
- Evaluating the results and calibration

Figure 7.2 presents an example of a hierarchical spatial overlay model for selection of appropriate sites for a specific crop (or group of crops), where the result is a specialised map, showing the level of suitability, resulting from the combination (overlay) of different factors.

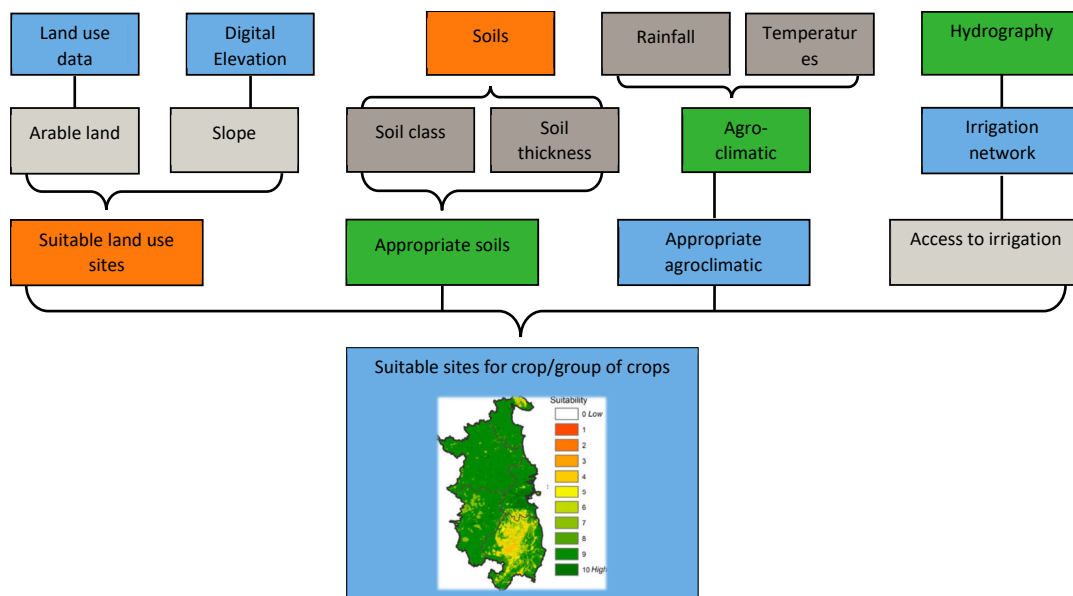


Figure 7.2 Hierarchical spatial overlay model

7.4 Remote sensing

Remote sensing is becoming an increasingly important tool for the collection of spatial data. In recent years, a number of kinds of remote sensing (RS) data and techniques have become available to spatial planners and natural resource managers, supporting not only planning procedures, but the whole process of managing and monitoring the status of the ecosystems, landscapes and human-nature interactions. Remote sensing supplies accurate and objective information for spatial planning in areas where maps are not available, or for the generation of information that cannot be collected through traditional methods. For instance, via remote sensing researchers can measure the normalised difference vegetation index (NDVI) which provides very useful information when assessing whether the area observed contains vegetation or not and what its condition is. Another very important role of remote sensing in spatial planning is related to bridging information gaps and updating information from traditional

analogue spatial maps. In some cases the available maps are out of date and the analysis of the current situation is possible only through processing and analysing remotely sensed earth observation data. Also, remote sensing allows comparison with historic remote-sensing imagery to analyse environmental change related to different land uses, which is often used for modelling of habitat and population viability scenarios for ecological networks such as Natura 2000. Box 7.6 presents some EU research projects that are researching the applicability of remote sensing for Natura 2000.

A major advantage of remote sensing compared to traditional field-data gathering is its complete spatial coverage, also for remote and inaccessible areas. Remote sensing can provide indicators for different spatial and temporal scales ranging from the individual habitat level to entire landscapes and involving varying temporal revisit frequencies up to daily observations. Habitat mapping is developing at a fast rate by combining field mapping and remote sensing. The latest technologies are quickly incorporated into habitat monitoring, which can support planning decisions in and around Natura 2000 areas or concerning the mitigation measures needed to reduce land-use pressures on the natural landscape (Lengyel et al., 2008; Turner et al., 2003).

Advances in remote sensing methods have resulted in the widespread production and use of spatial information on biodiversity (Duro et al., 2007; Papastergiadou et al., 2007; Förster et al., 2008). In fact, earth observation data is becoming more and more accepted as an appropriate data source to supplement, and in some cases even replace, field-based surveys in biodiversity science and conservation, as well as in ecology (see figure 7.3). It can be used to assess the condition of Natura 2000 sites and how their condition is influenced by plans and projects (Lang and Langanke, 2005). For instance, the data gathered by remote sensing could be used for various calculations regarding distances, areas of distribution, or volumes of timber on a certain area. However, it should be borne in mind that there are various sources of uncertainty in remote sensing-based monitoring of vegetation (Rocchini et al., 2013). These are mainly related to the processing of the data and the tools used in GIS afterwards, so it is important that experienced GIS experts carry these out.

One of the newest and very fast growing sectors of remote sensing, with vast potential for spatial planning in relation to Natura 2000 sites, is the unmanned aircraft systems (UASs) for earth observation (e.g. drones). This new geo-information technology emerged from the convergence between robotic, computer vision and geomatic technologies. UASs are valuable as they can provide images frequently and in a short period, thus enabling the analysis of short-term dynamics, for example concerning changes in water level and meandering of rivers, in periods of droughts, after fires, during and after flooding, landslides and more. Drones can also be used to investigate the NDVI index. Using multispectral and sunshine sensors drones can analyse vegetation vitality by capturing the amount of light they absorb and reflect. Thus, through spectral analyses of the canopy, experts can easily locate ecosystems affected by anthropogenic activities or diseases. UASs equipped with an infrared (thermoMap) camera can produce thermal videos or images that allow the creation of full thermal maps of a site that can show, for instance, the current location of larger mammals or water temperature disturbances caused by human activities. Many of these promising technologies, however, are still in the early stages of development and their effective use by planners still needs to be explored and implemented (See Box 7.5).

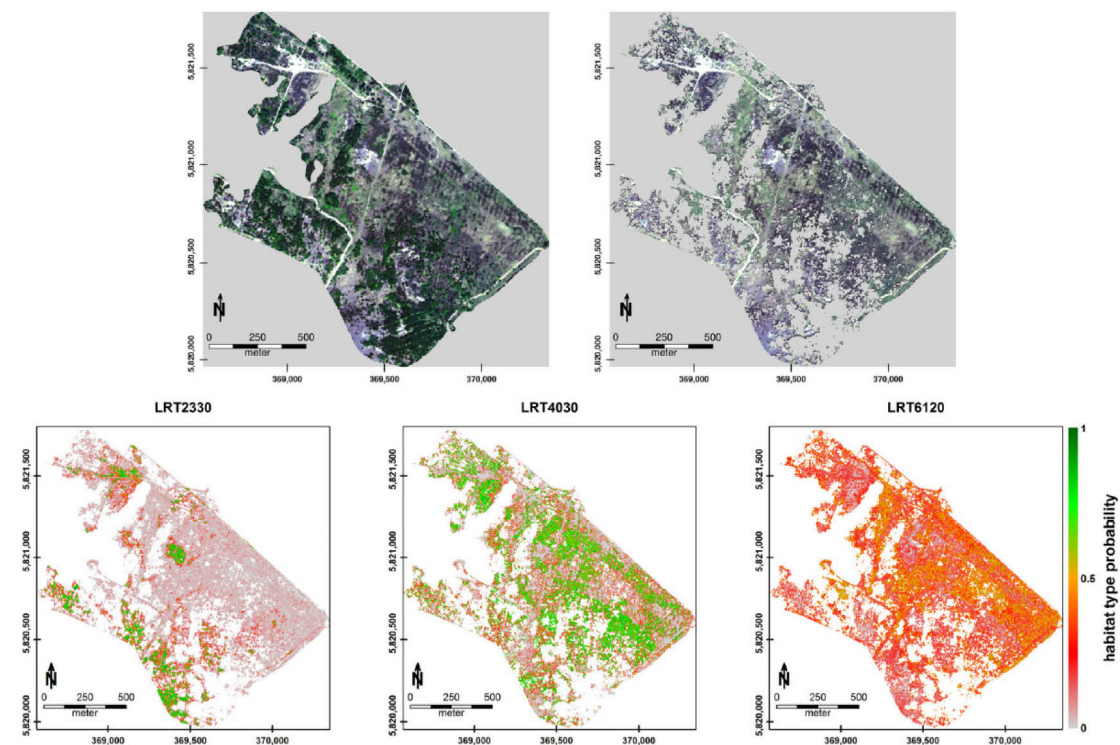


Figure 7.3 Example of the use of remote sensing images (top) for the assessment of habitat suitability (bottom) on the Natura 2000 site Döbritzer Heide (Neumann et al, 2015)

Box 7.5 EU projects dedicated to remote sensing applications for Natura 2000

Copernicus is an EU-wide programme that aims to provide improved environmental information. It consists of a complex set of systems which collect data from multiple sources: earth observation satellites and in-situ sensors such as ground stations, airborne and sea-borne sensors. It processes these data and provides users with up-to-date information through a set of services related to environmental and security issues including relevant information for the management of Natura 2000 sites. MS. MONINA is a Copernicus project exploring biodiversity as a 'new emerging area' of global attention. The project offers remote-sensing based monitoring services for observing and managing the Natura 2000 sites and other areas to reduce the loss of biodiversity.

New concepts and methods combining earth observation (EO) data and in-situ data are defined and implemented with the aim of supporting public authorities in implementing policies and measures. Pilot applications in a range of study areas all over Europe demonstrate the value and importance of monitoring for the conservation of biodiversity.

While European nature conservation will substantially benefit from this initiative, the tools and services developed also have a global impact. The project supports the GEO (Group on Earth Observations) societal benefit area of biodiversity and demonstrates the power of EO-based methods for monitoring sensitive ecological sites in general. More information at: <http://www.ms-monina.eu/>.

The Habistat project aims to develop an operation-oriented methodology to map, to monitor and to evaluate habitat characteristics, vegetation types and gradients in order to determine habitat quality. The focus of the project is to create a transferable platform for operational habitat reporting, integrating novel and advanced remote-sensing methodologies. Novel techniques that are investigated within the project include the use of hyper-spectral imagery, super-resolution image reconstruction, spatial contextual description and structural analysis. Major applications for the integration and validation of the developed methodologies are the detailed mapping of ecotopes and the assessment of the conservation status of Natura 2000 habitats. For more information see: <http://habistat.vgt.vito.be>

7.5 New approaches - Public Participation GIS (PPGIS)

Spatial planning is a complex process that requires the involvement not only of experts but also a wide range of stakeholders including the local communities (landowners, NGOs, businesses and citizens). The integration of Natura 2000 in the routine spatial planning process and its procedures ideally would involve consultations between expert teams from the field of nature conservation and planning as well as with academics. Additionally, soliciting public opinion is required in most of the countries' planning law. These consultations should involve all aspects of developing new investments or plans and their impacts on Natura 2000.

In order to ensure meaningful participation of stakeholders and to provide reliable information for the spatial planning process, GIS technologies are particularly useful (Peng, 2001; Batty and Xie, 1994; Harris and Batty, 1993). In every phase of planning, platforms developed for consultation with multiple actors can benefit from various GIS analytical and visualisation tools. So far, however, these tools have been used mainly on expert level, and less so by local stakeholders. The expert-oriented nature of GIS is one of the main reasons for the criticism from different stakeholders who feel that as a high-tech tool GIS fails to provide an opportunity for active public participation (Aitken and Michel, 1995; Harris and Weiner, 1998). The lack of access to geo-information resources in the decision-making process, or lack of understanding thereof, often forms an impediment to reaching a consensus on future developments, land use and nature conservation requirements between different stakeholders. This may limit effective participation in public consultation processes (Peng, 2001; Aitken and Michel, 1995; Curry, 1995; Obermeyer, 1995; Obermeyer and Pinto, 1994; Pickles, 1995; Rundstrom, 1995). More recently, rapid developments and innovation in geospatial technology, and especially its integration with internet technology, have made facilitated putting the public participation geographic information system (PPGIS) into practice in the field of spatial planning.

The main objective of PPGIS is to integrate technical and analytical capabilities of GIS to support collaborative planning and spatially determined decision-making processes in the planning and management of the territory (Onsrud & Craglia, 2003). The PPGIS can significantly improve communication and distribution of information resources both within the expert team and among the stakeholders and the general public during spatial planning and can be beneficial for supporting decisions in favour of the effective management of Natura 2000 sites. Through this type of public-based GIS platforms, the latter two groups not only have an effective means of access to information, justifying decisions, but they also have tools for effective participation in the planning process.

Expected benefits of PPGIS for spatial planning in relation to Natura 2000:

- Increasing the public interest in conservation and management of Natura 2000
- Low operational costs facilitate its use
- Simplicity of access to data which enhances transparency of the planning process
- Stimulation of collaboration

The 'Citizen Science in Monitoring Insects' project⁵ is an example of public participation using GIS in relation to Natura 2000. Its aim is to raise awareness about the importance of preserving old-growth forests and the invertebrates they host, and it takes place on five Natura 2000 sites in Italy. The idea of the project is to involve citizens in mapping the distribution of invertebrates via a web and smartphone

⁵ The LIFE project 'MIPP' - Monitoring of Insects with Public Participation (11 NAT/IT/000252)

application and thus to fill the gaps in information gathered through traditional approaches and sources.

7.6 Conclusions

New methods and technologies used for spatial planning offer great opportunities for conservation and management of Natura 2000 sites, resolution of conflicts between different land uses, ensuring synergies between Natura 2000 and some other sectors and for involvement of different stakeholders. Thanks to the growing availability of data, decision-makers can take better-informed decisions and citizens can effectively verify if these are based on the best available knowledge. Due to the fast development of this area, keeping abreast with technological progress will most likely continue to be a major challenge for planners and other stakeholders. Ensuring sufficient financial resources and administrative capacity to take advantage of available knowledge will also be of key importance. Promotion of free-access data sources, involvement of stakeholders (including promotion of citizen science) and taking advantage of available EU and other public and private funding may facilitate collection and use of spatial data for the benefit of Natura 2000.

Modelling tools for spatial planning prioritisation: the Zonation toolkit

The challenge

One of the common problems encountered in planning – particularly for Natura 2000 sites and other natural areas – is that during the planning process limited attention is paid to conservation concepts such as complementarity, connectivity, and cost-effectiveness. Often, information on these issues is missing and therefore they cannot be considered.

Planning approach

The Zonation toolkit – a software tool for spatial priority ranking for conservation and land-use planning – was developed by the University of Helsinki. It has been applied to find a near-optimal set of protected sites in state and privately owned lands to support and enhance representation of biodiversity and connectedness of the existing national protected areas and the Natura 2000 network. The toolkit:

- Aims to maximise ecological value of the solution (set of areas) considering simultaneously data for multiple habitats and species;
- Is able to balance the value of the solution with the costs of the solution;
- Uses spatial data on habitat and species occurrence;
- Can apply multiple data on state of areas and habitats, risks, gains, costs;
- Ranks areas throughout the investigated planning area or 'landscape';
- Identifies complementarity, i.e. what is missing or poorly represented;
- Analyses connectivity, condition and cost-effectiveness.

Outcome of the process

Since its development the tool has been successfully applied for the implementation of the national METSO programme for forest biodiversity protection, where a total of 10,000 ha in 2009 and 13,000 ha in 2014 of state-owned forestry land was identified for protection. The tool has also been used to carry out national, international and EU level analyses for spatial prioritisation for green infrastructure, ecosystem services and restoration potential.

Why a best practice?

The use of systematic analysis software allows proper consideration of many basic conservation concepts like complementarity, connectedness, and cost-effectiveness. GIS modelling is useful for showing which different solutions are possible and what kind of trade-offs or synergies different solutions may have, e.g. trade-offs between biodiversity and ecosystem services. The use of the Zonation tool has proven very useful in supporting

conservation decision-making at local and national scale in Finland as well as in other countries.

Key success factors

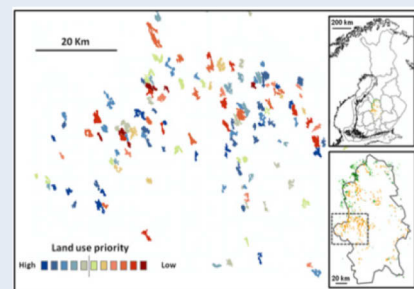
A key success factor for the development of the spatial prioritisation model was the availability of sufficient financial resources from the METSO programme. Furthermore, the interest of the forestry unit of Metsähallitus was important for the application of the software during the decision process on land allocation for protection. The existence of resources, data, and well defined goals and targets were of high importance for successful application of the tool in a planning process.

Lessons learned

Ecologically and operationally the Zonation toolkit is a very sophisticated software tool, applying e.g. meta-population models when operating with connectivity kernels, or island-biogeographic theory when modelling the change in the value of the remaining solution when areas are removed. In practice the toolkit works by removing areas and choosing them so that ecological losses are minimised. However, this and the many other options that can be used make the Zonation toolkit more complicated than some other spatial prioritisation software, i.e. defining the analysis parameters and question to be solved carefully together with the potential end-users is crucial to successful implementation of the results, as is the help from the analysts when the results are used.

Recommendations for future projects

- Spatial models can ensure that complementarity, connectedness and cost-effectiveness are taken into account during the process of selecting areas for protection or for land-use change;
- The end-users need to be involved in the development in order to ensure applicability of the model in their decision process.



Land-use priority map of the Zonation toolkit (Mikkonen & Moilanen, 2013 © 2013 Wiley)

EPIC WebGIS: setting the baseline for green infrastructure development in Portugal

The challenge

In 1983, the National Ecological Reserve (REN) was established in Portugal. The REN is an ecological network that integrates all landscape elements that are needed to safeguard the functioning of ecosystems and the hydrologic systems. The REN aims at contributing to the sustainable use of the territory with the following objectives:

To protect the water and sensitive areas and to safeguard the biophysics processes and systems associated with the coast and the water cycle, to ensure environmental goods and services essential for the development of human activities.

Prevent and reduce the effects of the degradation of groundwater, flooding, erosion and slope movements, contributing to the adaptation to climate change and ensure the safety of goods and people.

Currently, the REN has to be accounted for in all spatial planning initiatives. Its delimitation takes place at both the strategic level and municipal level, and this is compulsory. Other legislation that relates to environmental protection co-exists with REN, such as the protection of water and soils, and the establishment of the National Agriculture Reserve (RAN) and nature conservation areas (ACN), including Natura 2000. The REN overlaps with some of these other legal regimes, which requires coordination of actions. Vital to this are transparent methods for implementation and up-to-date and easily accessible spatial information for all stakeholders. However, in practice data are often scattered among many different departments and hard to access.

Planning approach

The main objective of the *National Ecological Network* (2010-2013) project, has been to map all the ecological components of the landscape, including REN. The project, led by the Research Centre for Landscape Architecture of the School of Agronomy/University of Lisbon, has been developed by a large multidisciplinary team, including landscape architects, environmental engineers, vegetation ecologists, agronomy engineers, architects and engineers. It has also included the participation of some municipalities and regional development commissions. The project used a methodology already applied in the past, which has been refined and reinforced.

Outcome of the process

The outcome of the project is the EPIC WebGIS, a website that contains the entire geo-referenced cartography related to green infrastructure. It provides immediate access to a wide range of information, such as geology, geomorphology, land

morphology, soil, water, vegetation, climate and protected areas, considered essential to ecosystem and natural resources management. The EPIC WebGIS has been extended to include spatial information from the Potential Land-Use Ecological Plan - Application to Portugal project, which produces information on land potential for human activities, i.e. agriculture, forests, pastures, nature conservation and urban areas. The information is freely available to the public, with maps ready for download.

Why a best practice?

Considering the general deficiencies in spatial data in Portugal, this project contributed to spatial planning at all scales as well as providing a decision support tool regarding sustainable development. Although it is not yet an official tool, it is already being used all over the country for spatial planning and environmental impact assessments of plans and projects. In addition, it is important to note that in Portugal, the most important part of spatial planning takes place at municipal level, which is generally developed by urban architects, who do not always take into account the ecological principles. In this regard, the EPIC WebGIS contributes to the joint action of both disciplines for spatial planning. Finally, the REN intends to be a reference for a future Portuguese green infrastructure network.

Key success factors

A multidisciplinary and highly qualified team with vast experience of spatial planning.

The centralisation of all the information in a website that is easily accessible, ready to be used for spatial planning, and freely available to the public.

Lessons learned

The availability of ready-to-use good quality information is essential for the integration of nature conservation needs in spatial planning. This will always provide the basis for sustainable development. Such information is essential in both the public and political debate about development policies concerning agriculture, forestry, nature conservation and urbanisation.

An ecological network usually cannot be developed by a single municipality, as the areas of the network cross municipal boundaries.

Recommendations for future projects

Planning ecological networks or green infrastructure, within and across borders, can be eased through developing a joint action plan and shared databases, preferably web-based.



8 Conclusions and recommendations

8.1 Conclusions

The territory of the EU Member States is experiencing important land-use changes characterised by a number of trends including increased urbanisation, intensification of agriculture and land abandonment. These trends are taking place at a time when the effects of climate change are becoming increasingly evident and in the context of dwindling natural resources and important societal and economic changes. In view of these phenomena, governmental, and non-governmental and international organisations, as well as individual citizens, are taking initiatives with the aim of preserving and sustainably managing natural resources. The main purpose of this report was to review and explore how spatial planning can contribute to this goal, particularly in relation to the protection and management of Natura 2000.

While at the European level strong support is provided to sustainable territorial development, spatial planning is not an EU competence; it falls within the remit of the Member States. It is a competence of the national, regional or local authorities.

Irrespective of the level at which it is carried out, spatial planning provides important opportunities for ensuring better implementation of EU nature legislation and resolution of conflicts between different sectors, and may enhance stakeholder involvement in decision-making about territorial developments. This in turn provides the preconditions for establishing better synergy between different sectoral policies and environmental policy.

Spatial planning is also a key instrument for ensuring that land-use developments comply with EU sectoral and environmental legislation, particularly in relation to deciding about the design, location and management of infrastructure, built-up areas and other land uses. In this regard, spatial planning reviews the impacts of different developments on Natura 2000 (Article 6 of the Habitats Directive). The implementation of Article 10, which refers to the quality and connectivity of landscape at a large scale, is also an essential part of the spatial planning process. This might include the planning and development of national ecological networks and of green infrastructure.

As this study shows, spatial planning has a strong coordinating role across sectors and can strategically support various initiatives for the protection, restoration and management of biodiversity in the Member States. Ideally, spatial planning can regulate and strategically manage the overall quality of a territory and identify the mutual benefits that can be achieved for sectors and the environment and the trade-offs needed. The ultimate goal is to provide optimal quality of life and conservation of natural resources of the territories while ensuring that developments have as little impact on nature as possible and that any destruction or degradation of nature areas is offset. EU initiatives that have this goal include the No Net Loss Initiative on biodiversity, Ecosystems services and the Strategy on Green infrastructure.

Integrated spatial planning, which reconciles the needs of different sectors and stakeholders at each stage of the planning process, has a particularly important role. Experience gathered through this report has shown that land-use planning which only acknowledges the environmental needs at the final stages of a planning process often

results in delays and additional costs to projects or plans and occasionally can even result in the total failure of planned investments or the loss of valuable nature. Best practices implemented until now prove that planning which considers the needs of nature from the early stages of the spatial planning process (i.e. from initiation of a spatial plan) is highly beneficial for different sectors and nature conservation, and at the same time it offers more cost-effective solutions to land-use developments. This way of working can also ensure win-win opportunities for potentially competing sectors, as well as nature, and has great potential for the practical delivery of water, air, flood control, health care and tourism policy (among others). However, it does require a more proactive approach that reaches out to different stakeholders.

The study has also shown that whilst spatial planning is not (as such) an EU competence, several different EU policies, funds and programmes can contribute to the promotion and advancement of an integrated spatial planning process that effectively and timely considers nature conservation issues. The EIA and SEA are key legal tools in this respect. The implementation of several EU policies such as the WFD, MSFD and FD provide opportunities for synergy with Natura 2000. EU co-funded operational programmes can, for example, contribute to improving scientific knowledge, raising awareness and improving dialogue between stakeholders. However, to take advantage of these opportunities, stakeholders and their organisations need to actively engage with the authorities managing these programmes in order to ensure that financial support for nature is also sufficiently recognised as a legitimate requirement and need within the often highly competitive funding environment.

Although experiences with cross-border cooperation in spatial planning are limited, they play a pivotal role in ensuring coherence of the Natura 2000 network between Member States. Moreover, cross-border co-operation offers opportunities for sustainable developments such as eco-tourism and recreation, next to conservation.

Finally, the study has highlighted the wealth of methods and technologies that can be used in spatial planning to better integrate the needs of Natura 2000. Advancement of technologies such as remote sensing and modelling offers great potential in this area. Mobile applications which can be used by any interested and motivated person in the context of 'citizen science' offer additional opportunities to improve our knowledge about nature.

8.2 Recommendations

A number of best practices have been generated already while integrating Natura 2000 in spatial-planning processes of the Member States. Similar practices however need to be further promoted in all the Member States in order to achieve a better implementation of the Natura 2000 policy. Based on the key messages of this study, the following overall recommendations have been formulated to achieve an integrated spatial-planning approach and meet the objectives of Natura 2000.

- Spatial planning should be recognised as one of the key elements for effective implementation of Natura 2000 policy.
- Authorities at different levels of planning (national, regional and local) should tap into opportunities for joint implementation of spatial-planning policies to reduce costs and increase the effects of different sectoral policies.
- Policymakers and practitioners should consider the potential opportunities offered by EU funds to improve and promote integrated spatial planning practices for Natura 2000.

- The potential of spatial planning for EU initiatives such as No Net Loss should be studied and communicated among relevant actors in the Member states.
- Governments should continue their efforts to involve more citizens in spatial planning, particularly in the early stages of plan development.
- Cross-border cooperation on spatial planning should be promoted to enhance the coherence of the Natura 2000 network across borders.
- New relevant GIS-technologies should be systematically scrutinised to assess their potential for spatial planning and Natura 2000.
- More efforts should be made by the Member States and related EU initiatives to further raise awareness on the role of spatial planning for nature policy in particular through sharing and promote examples of best practices.

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