European Commission

Guidance document on

Inland waterway transport and Natura 2000

Sustainable inland waterway development and management in the context of the EU Birds and Habitats Directives

Environment

Guidance document on sustainable inland waterway development and management in the context of the EU Birds and Habitats Directives

This document reflects the view of the European Commission services and is not of a binding nature.

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1. INTRODUCTION

1.1. Background to the guidance document

Inland waterways play an important role in the transportation of goods across many parts of Europe. Each year, over 500 million tons of commercial goods are transported in this way. Through a navigable network of over 40,000 km of waterways, inland waterways connect industrial hubs and commercial centres to one another, and provide vital access to the sea and so also to the rest of the world.

Inland waterway transport (IWT) is considered to be a safe, energy efficient and more environmentally friendly mode of transport. The EU has recognised the great potential of IWT already for some time and acknowledges its important role in the whole transport system.

The Commission's White Paper[1] "Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system" considered transport by inland waterways, rail and short-sea-shipping as key for the sustainability of the European transport systems in view of their environmental advantages. The overall modal shift objective is 30% of all road movements over 300km to rail and water by 2030, and 50% by 2050. In view of the need to decarbonise the entire transport sector as 57% of Europe's oil goes to transport, the Commission wants to facilitate the exploitation of the potential of inland waterway transport and boost better integration into the intermodal transport chain.

In order to reach these objectives, inland waterway infrastructure needs to be improved in an ecologically sustainable way. River systems are an integral part of functional ecosystems with their own dynamics, which are also heavily influenced by different activities both on the river itself and in the surrounding ecosystems. This makes the planning of new inland waterway infrastructure developments a complex issue. An integrated multidisciplinary approach and multi-stakeholder involvement are essential and must therefore be done at an early stage. Good practice examples which achieve a win-win for inland waterway and ecology should be taken as the reference.

Like all other river users, inland waterway development and management operates within the framework of EU environmental laws, which include the Birds and Habitats Directives (so called "nature directives") as well as the Water Framework Directive (WFD). The overall objective of the two EU nature directives is to conserve Europe's most valuable and endangered habitats and wildlife, including those that are dependant on rivers. Central to the two nature directives is the creation of a Natura 2000 network which protects core sites for the species and habitat types listed in the Annexes.

Natura 2000 sites are not designed to be 'no development zones' and new developments are not excluded. Instead their designation requires that any new developments are undertaken in a way that safeguards the species and habitat types for which the site has been designated.

[1] White Paper 2011: Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system. 28 March 2011, COM (2011) 144 final.

1.2. Purpose of the guidance document

In light of the above, this document has been elaborated to provide guidance on how best to ensure that activities related to the development and management of inland waterways are compatible with EU environmental policy in general and nature legislation in particular.

Particular attention is given to explaining how to develop integrated projects which aim to take account of the river's ecological processes early on in the design process and which search for win-win solutions for both inland waterway transport and biodiversity wherever possible.

This guidance document also outlines the procedures to follow when carrying out an appropriate assessment under Article 6 of the Habitats Directive. Clarification is provided on certain key aspects of this approval process in the context of inland waterway developments in particular. Experience has shown that delays in the approval process are very often caused by poor quality appropriate assessments that do not allow the competent authorities to make a clear judgement on whether or not to authorise the proposed plan or project.

The present guidance document is designed principally for use by competent authorities and developers responsible for inland waterway infrastructure developments, as well as impact assessment consultants, Natura 2000 site managers and other practitioners who are involved in the planning, design, implementation or approval of inland waterway plans and projects. However, it is hoped that it will also be of interest to other organisations such as conservation NGOs and international bodies to get a better understanding of the necessity to properly manage and develop inland waterways.

The document has been written in consultation with members of the European Commission Working Group on Rivers which has provided valuable feedback on the various drafts of the guidance document. The working group was co-chaired by the European Commission's Directorates General for Environment and Transport and comprised representatives of different IWT industry sectors, public authorities from various Member States, scientific experts and associations and conservation NGOs. It also provided a forum for discussing key issues and sharing experiences on inland waterway development in the context of the EU nature directives.[2]

1.3. Scope of the document

The guidance document concentrates on the construction, maintenance and upgrading of infrastructure projects related to commerical inland waterway transport.

The guidance document limits itself to developments in inland waterways and does not cover developments that are located in estuaries or coastal areas. The Commission produced a separate guide on these activities in 2010 entitled *"The implementation of the Birds and Habitats Directives in estuaries and coastal zones, with particular attention to port development and dredging".*[3]

Finally, the document focusses specifically on the development of inland waterway transport infrastructure as well as on the conservation of rivers from the perspective of protecting Europe's rare species and habitats under the EU Birds and Habitats Directives and in the wider context of the Water Framework Directive.

[2] http://circa.europa.eu/Members/irc/env/river_working_group/library

[3] Available at http://ec.europa.eu/environment/nature/natura2000/management/docs/guidance_doc.pdf

Other relevant EU environmental laws relating for instance to water or air pollution, or to climate change, whilst also relevant to inland waterways are not covered in this document but are mentioned where appropriate for the sake of completeness.

1.4. Structure and contents

The document is made up of five sections:

- *Chapter 1:* explains the background and purpose of this guidance document.
- *Chapter 2:* sets out the EU policy context for inland waterway transport with specific priority on the policy for Trans-European Transport Networks and promotion of inland navigation (NAIADES) and for the conservation of Europe's rivers, with particular reference to the Birds and Habitats Directives and the Water Framework Directive.
- *Chapter 3*: describes the multifunctional nature and use of Europe's rivers and outlines their role for inland waterway transport. It also explores the environmental status of inland waterways across the EU and their designation under the Natura 2000 network. It outlines the effects – both positive and negative – that inland waterway developments can have on river stretches, including those designated as Natura 2000 sites.
- *Chapter 4*: outlines the benefits of using a more integrated approach to inland waterway development and management planning and design as well as the advantages of multisectoral dialogue as a means to promoting the sustainable use of Europe's rivers. It examines how to promote win-win or minimal loss situations between inland waterway development and management and biodiversity conservation where possible, as illustrated by good practice examples.
- *Chapter 5*: provides a step by step guide to carrying out an appropriate assessment of plans or projects that are likely to have a significant effect on Natura 2000 sites in accordance with Article 6 of the Habitats Directive. It outlines the steps to follow in order to ensure that the appropriate assessment is done correctly and to a suitable standard. It also explains how projects which are considered to be necessary for imperative reasons of overriding public interest, and for which no alternatives exists, can be approved even when they have an adverse effect on a Natura 2000.
- *Chapter 6*: explores the relationship between the Birds and Habitats Directives, the Water Framework Directive and the EIA/SEA Directives and how this relates to the implementation of IWT activities.

1.5. Limitations of the guidance document

Finally a word should be said about the limitations of this guidance document. It is intended to be bound by, and faithful to, the text of the Birds and Habitats Directives and to the wider principles underpinning EU policy on the environment and inland waterway transport. It is not legislative in character, it does not make new rules but rather provides further guidance on the application of those that already exist.

As such, it reflects only the views of the Commission services and is not of a legally binding nature. It rests with the European Court of Justice to provide definitive interpretation of EU directives. Wherever relevant, existing case law has been included when clear positions have already been taken by the Court.

The document also does not replace the Commission's existing general interpretative and methodological guidance documents on the provisions of Article 6 of the Habitats Directive. Instead, it seeks to clarify specific aspects of these provisions and place them in the context of inland waterway development and management in particular. The present guide is therefore best read in conjunction with the existing general guidance and the two directives[4].

The guidance recognises that the two nature directives are enshrined in the principle of subsidiarity and it is for Member States to determine the procedural requirements arising from the directives. The good practice procedures and proposed methodologies described in this document are therefore not prescriptive in their intent; rather they aim to offer useful advice, ideas and suggestions based on extensive discussions with IWT industry representatives, NGOs and other stakeholders in the frame of the Commission's Working Group on Rivers.

Finally, the Commission would like to thank all those who participated in the Working Group for their valuable contributions and discussions. This has been central to the elaboration of the present guidance document.

[4] Managing Natura 2000 sites. The provisions of Article 6 of the Habitats Directive 92/43/EEC; Assessments of plans and projects significantly affecting Natura 2000 sites - methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC; Guidance document on Article 6(4) of the Habitats Directive 92/43/EEC; http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm

2. THE EU POLICY FRAMEWORK

2.1. Introduction

This chapter outlines the overall EU policy framework in support of both inland waterway transport and biodiversity conservation. It provides an overview of the main policy documents and legislative acts relevant to each sector and outlines their key objectives and provisions. The aim of this section is to encourage a better mutual understanding of the main drivers and conditions which are in operation at EU level for each sector.

The policy context is underpinned by the Europe 2020 strategy adopted in March 2010. This EU strategy set out a vision for Europe's social market economy over the next decade, and rests on three interlocking and mutually reinforcing priority areas: **smart** growth - developing an economy based on knowledge and innovation; **sustainable** growth - promoting a low-carbon, resource-efficient and competitive economy; and **inclusive** growth - fostering a high-employment economy delivering social and territorial cohesion.

2.2. EU transport policy in support of inland waterway transport

The EU's transport policy is a cornerstone of the European internal market and integration process. It is indispensable to the free movement of goods and people, supports trade and it aims to create fair conditions for competition for individual modes of transport and between the different modes and to encourage the freedom of services as well as the opening of transport markets.

A constant growth in transport volumes during the last decade led to the consideration and integration of social and ecological ramifications in transport matters. This is when the model of sustainable mobility gained significance. This model involves an integrated approach to optimise the efficiency of the transport system, transport organisation and safety as well as to reduce energy consumption and environmental impacts. It includes improving the competitiveness of environmentally friendly modes of transport and the creation of integrated transport networks used by two or more modes of transport. Inland waterway transport is seen as an obvious choice in this context as it provides a safe, congestion-free, low-carbon and cost-efficient transport mode.

It is therefore an important component of the Commission's new White Paper, adopted in March 2011, "Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system"[5]

In this White Paper the Commission has adopted a roadmap of 40 concrete initiatives for the next decade to build a competitive transport system that will increase mobility, remove major barriers in key areas and fuel growth and employment. At the same time, the Commission's proposals should help significantly reduce Europe's dependence on imported oil and cut carbon emissions in transport by 60% by 2050.

[5] COM(2011) 144 final.

Key goals of the road map related to IWT include:

- a 30% shift of long-distance road freight to rail and waterborne transport by 2030 and more than 50% by 2050;
- a fully functional and EU-wide multi-modal trans-European core network for transport by 2030 with a good connection between core seaports and rail and inland navigation;
- removal of the main bottlenecks in order to complete the TEN-T network;
- internalisation of all externalities in all modes of transport;
- full application of the "user-pays" and "polluter-pays" principles.

In this context, the Commission will establish an appropriate framework to optimise the internal market for inland waterway transport and to remove barriers that prevent its increased use by ensuring the continuity of the implementation measures launched under the EU NAIADES Action Programme and addressing new challenges.

2.2.1. EU NAIADES Action Programme

In 2006, the Commission adopted an integrated European Action Programme for Inland Waterway Transport called **NAIADES[6].** Its aim is to bolster the advantages of inland waterway transport whilst also tackling a number of obstacles that prevent it from tapping into its full potential.

The EU Action Programme focuses on five strategic interdependent areas and includes recommendations for action to be taken between 2006-2013 by the European Community, Member States and other parties concerned:

1. Markets**:** actions include attracting new markets, creating a business-friendly climate and improving the administrative and regulatory framework.
2. Fleets: actions focus in particular on improving the logistics efficiency as well as the environmental and safety performance of IWT.
3. Jobs and skills: actions include attracting a new workforce by improving working and social conditions in the sector and investing in human capital e.g. through harmonisation of education and training systems.
4. Image: actions include promoting inland navigation as a successful partner in business, setting up and expanding European IWT promotion and development network, and monitoring trends and developments within the IWT market.
5. Infrastructure: actions include improving waterway conditions, improving multi-modal networks and implementing River Information Services (RIS).

In addition, the action programme foresees measures to modernise the organisational structure of IWT to overcome the current fragmentation of resources and of efforts at different levels.

In order to support the implementation of the NAIADES programme, the Commission established in 2008 a platform of inland waterway stakeholders, Member States, River

[6] Communication from the Commission on the promotion of inland waterway transport - "NAIADES" - An Integrated European Action Programme for Inland Waterway Transport, COM(2006)6. http://www.naiades.info/

Commissions and industry representatives called PLATINA[7] (Platform for the implementation of Naiades). PLATINA is a coordination action for inland waterway transport which brings together 23 partners from 9 European countries. Funded through the 7th Research Framework Programme (2007-2013), it provides effective support in the five policy areas of the NAIADES Programme to the European Commission. PLATINA has inter alia developed a manual on Good Practices in Sustainable Waterway Planning which provides guidelines for planning waterway development projects that are compatible with environmental protection requirements (see chapter 4).

In April 2011, the Commission presented its mid-term progress report on the implementation of NAIADES[8]. It showed the important strategic role of NAIADES in order to promote the role of IWT within the European transport system. It also summarised the achievements of the programme, as well as those issues which still need further effort and/or re-assessment including the question of the allocation of financial resources.

Finally, it is widely acknowledged that the lack of dedicated resources turned out as disadvantage for the implementation of the programme, which could only to a limited extent be compensated for by PLATINA. In 2012, the Commission intends to present a communication on a successor to the current NAIADES action programme. This communication will set out an appropriate framework to optimise the Internal Market for the inland waterway transport sector, show up ways to remove barriers that prevent its increased use and to better integrate inland navigation into the multimodal transport system.

The focus of this communication will be on measures required to help the sector to resume the path of solid growth and to ensure that inland waterway transport remains attractive also from an environmental point of view. The issues to be addressed include integrated infrastructure development and operation, the deployment of smart mobility systems, such as RIS, or the further greening of the fleet.

2.2.2. The Trans-European Transport Network (TEN-T) policy

Another central pillar of the EU's transport policy is the Trans-European Transport Network[9] established to provide a single, multimodal network that integrates land– including inland waterways -, maritime, and air transport networks throughout the Community, and allows goods and people to circulate more efficiently between Member States and assures international connections. Following Article 170 of the Treaty on the functioning of the European Union (TFEU), the TEN-T together with the TEN-E in the areas of telecommunications or energy contribute to the goals of completing the common market in general, as well as the single European transport area.

The investment required to complete and modernise a true trans-European network in the enlarged EU amounts to some 550 billion EUR until 2020, out of which 215 billion EUR is for the removal of the main bottlenecks. Given the scale of the investment required, projects are prioritised in close collaboration with national governments.

By 2007 under the guidelines in force at that time[10], 30 priority infrastructure projects had been identified so far within the TEN-T network. All modes of transportation are targeted: railways, roads, airports, inland waterways, short sea shipping, and multi-modal links, as well

[7] http://www.naiades.info/platina/page.php?id=1

[8] Commission Staff Working Document Mid-term progress report on the implementation of the NAIADES Action Programme for the Promotion of inland waterway transport SEC(2011) 453 final.

[9] http://ec.europa.eu/transport/infrastructure/index_en.htm

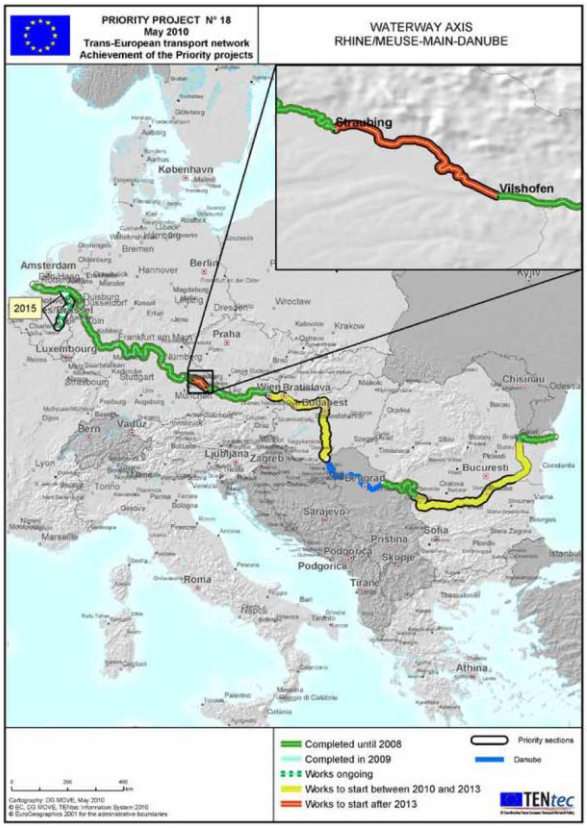
[10] Decision No. 1692/96:EC of the European Parliament and of the Council of 23 July 1996 on Community guidelines for the development of the trans-European transport network (OJ L 228, 9.9.1996, p. 1) as amended

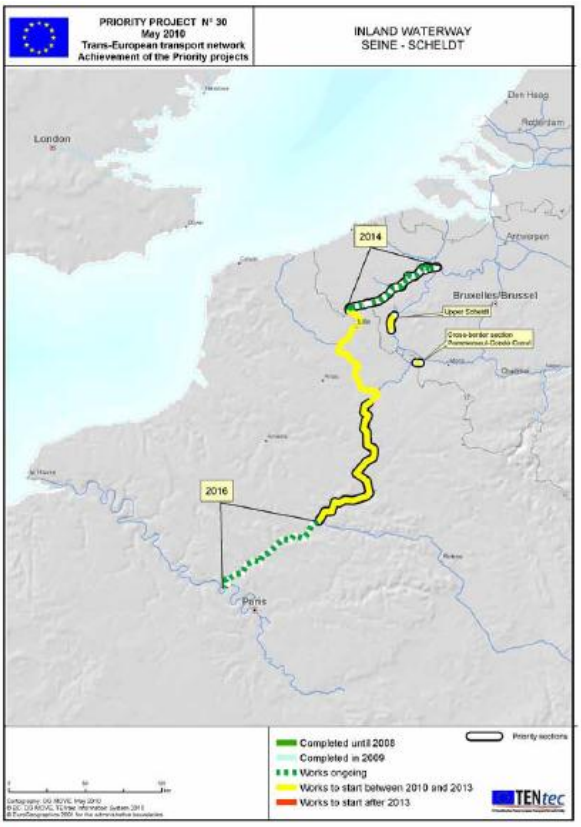
as the Galileo satellite navigation system. In some cases the projects involve the creation of new infrastructures, in others it concentrates on upgrading existing infrastructures and carrying out feasibility studies.

Financial support for the implementation of the TEN-T projects comes from several EU financial instruments (e.g. structural funds, TEN-T budget) and through loans from the European Investment Bank.

Two of the current priority projects specifically target inland waterways:

- *Project 18 - Waterway axis Rhine/Meuse-Main-Danube:* crosses Europe transversally from the North Sea at Rotterdam to the Black Sea in Romania. It involves a series of river engineering projects, construction of navigation locks and new bridges as well as various feasibility studies along different stretches of the waterway.





- *Project 30 - Inland waterway axis Seine-Scheldt*: aims to connect the French inland waterway network to the Belgian, Dutch and German network and ports, as well as to the main ports of the Northern Range (Le Havre, Rouen, Dunkirk, Zeebrugge, Ghent, Antwerp and Rotterdam). It will consist of a waterway connection between Compiegne in France and Ghent in Belgium, accessible for large gauge barges. Actions include, amongst others, the building of the Seine-Nord canal on French territory, a series of upgrade works between Compiegne in France and Ghent in Belgium, the building of multimodal logistics sites, works to ensure water protection and supply, as well as anticipation to cliamte change.

Article 8 of the TEN-T guidelines stipulates that when projects are developed and carried out, environmental protection must be taken into account by the Member States through the execution of environmental impact assessments of projects, or appropriate assessments under the Birds and Habitats Directives.

A proposal for new TEN-T guidelines has recently been adopted by the Commission[11], together with a proposal for a Regulation establishing the Connecting Europe Facility (CEF)[12], which is the funding counterpart of infrastructure development, providing a budget of 50 billion EUR to transport, telecommunictation and energy. Within this budget 32 billion EUR are earmarked for transport.

The multi-modal European transport corridors of the TEN-T network, as proposed by the Commission, cover the main inland waterway corridors in the EU, so that all inland waterways from class IV AGN specification upwards should be part of the core network. The CEF financing instrument should be implemented in such a way as to ensure that bottlenecks and cross-border connections – also for inland waterway transport – will be addressed as a priority. It is, however, foreseen to make it possible to not only fund the physical "hard" infrastructure, but also measures which will allow its more efficient and even "greener" operation, such as intelligent management systems and alternative fuels infrastructure.

2.3. EU Danube Strategy – a new EU macro-region strategy

As part of its new approach to regional development within the EU, the Commission has started to develop a series of European macro-region initiatives which are intended to produce more effective coordination. This approach does not imply new laws or institutions but rather strengthens links between different policies and between the wide range of stakeholders present in the region. It aims to serve the interest of the region as a whole while taking into account its diversity.

In December 2010, the Commission launched a new proposal for a second EU macro-region, following on from the success of the Baltic Sea Strategy. This EU strategy focuses on the Danube Region[13]. The initiative seeks to develop the huge economic potential and improve environmental conditions of the region.

By establishing a framework for long-term cooperation on a wide range of issues, the strategy aims to play a key role in improving sustainable transport, linking energy systems, protecting the environment, preserving water resources and stimulating the business climate. While there are no new funds for implementation of the strategy, closer alignment of programmes adopted by the Danube states should mean that the money which is made available to the region in the current financial period achieves greater impact.

The strategy contains a detailed action plan based on four pillars, two of them are directly relevant for IWT and for biodiversity conservation:

[11] COM(2011) 650/2 http://ec.europa.eu/transport/infrastructure/connecting/revision-t_en.htm
[12] COM(2011) 650/3 http://ec.europa.eu/transport/infrastructure/connecting/connecting_en.htm
[13] COM(2010) 715 final.

(1) Connecting the Danube region:

- to improve mobility and multimodality of
  - (a) inland waterways;
  - (b) road, rail and air links;
- to encourage more sustainable energy;
- to promote culture and tourism, people to people contacts.

(2) Protecting the environment in the Danube region:

- to restore and maintain the quality of waters;
- to manage environmental risks;
- to preserve biodiversity, landscapes and the quality of air and soils.

Specific targets for each of the priority areas have been set in the action plan accompanying the communication[14] and further elaborated by the steering groups. For inland waterway and biodiversity they are as follows:

Priority area - *To improve the mobility and multimodality of inland waterways* aims to:

- increase the cargo transport on the river by 20% by 2020 compared to 2010;
- solve obstacles to navigability, taking into account the specific characteristics of each section of the Danube and its navigable tributaries and establish effective waterway infrastructure management by 2015;
- develop efficient multimodal terminals at river ports along the Danube and its navigable tributaries to connect inland waterways with rail and road transport by 2020;
- implement harmonised River Information Services (RIS) on the Danube and its navigable tributaries and ensure the international exchange of RIS data preferably by 2015;
- solve the shortage of qualified personnel and harmonise education standards in inland navigation in the Danube region by 2020, taking duly into account the social dimension of the respective measures.

Priority area - *To preserve biodiversity, landscapes and the quality of air and soils* aims to:

- halt the deterioration in the status of all species and habitats covered by EU nature legislation and achieve a significant and measurable improvement, adapted to the special needs of the Danube Region by 2020;
- secure viable populations of Danube sturgeon species and other indigenous fish species by 2020;
- secure that by 2020 ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15% of degraded ecosystems;
- secure that by 2020 invasive alien species and their pathways are identified and prioritised, priority species are controlled or eradicated, and pathways are managed to prevent the introduction and establishment of new invasive alien species.

[14] SEC(2010) 1489 final.

2.4. EU biodiversity policy

Like the promotion of inland waterway transport, the conservation of the EU's biodiversity is high on the political agenda. It is identified as one of the key operational objectives of the EU Sustainable Development Strategy (SDS)[15] and is one of four priority areas for targeted action within the 6th Environment Action Programme[16], which sets out the framework for the EU's environmental policy over the period 2002-2012.

In 2010 the EU Heads of State and Governments set themselves the following mid term target for biodiversity conservation in the EU[17]: "*To halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, restore them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss.*"

The Commission's EU 2020 biodiversity strategy, adopted in May 2011, sets out six main targets and 20 actions to ensure this overall objective is achieved by 2020[18]. The six targets focus on:

- full implementation of EU nature legislation to protect biodiversity;
- better protection for ecosystems, and more use of green infrastructure;
- more sustainable agriculture and forestry;
- better management of EU fish stocks and more sustainable fisheries;
- tighter controls on invasive alien species;
- a greater EU contribution to averting global biodiversity loss.

2.5. Birds and Habitats Directives

The Birds and Habitats Directives are the cornerstones of the EU's biodiversity policy. They enable all 27 EU Member States to work together, within a common legislative framework, to conserve Europe's most endangered and valuable species and habitats across their entire natural range within the EU, irrespective of political or administrative boundaries.

The overall objective of the **Birds Directive**[19] is to maintain and restore the populations of all naturally occurring wild bird species present in the EU at a level that will ensure their long term survival. The **Habitats Directive**[20] has similar objectives to the Birds Directive but targets species other than birds as well as certain habitat types in their own right.

The two directives do not cover every species of plant and animal in Europe (i.e. not all of the EU's biodiversity). Instead, they focus on a sub-set of around 2000 (out of ca 100,000 or more species present in Europe) - which are in need of protection to prevent their extinction. These are often referred to as species of Community interest or EU protected species.

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[15] COM (2001)264 final, Renewed EU Sustainable Development Strategy adopted June 2006.
[16] Decision no 1600/2002/EC, OJ L 242, 10.9.2002.
[17] Council conclusions: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/113591.pdf
[18] Our life insurance, our natural capital: an EU biodiversity strategy to 2020 (COM(2011) 244), 3.5.2011.
[19] Directive 2009/147/EC Council (codified version of Council Directive 79/409/EEC on the conservation of wild birds, as amended) – see http://ec.europa.eu/environment/nature/legislation/index_en.htm
[20] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, consolidated version 01.01.2007 - http://ec.europa.eu/environment/nature/legislation/index_en.htm

The two directives require that Member States do more than simply prevent the further deterioration of the listed species and habitat types. They must also undertake positive management measures to ensure their populations are maintained and restored to a **favourable conservation status**[21] throughout their natural range within the EU.

Favourable conservation status can be described as a situation where a habitat type or species is prospering (in both quality and extent/population) and has good prospects to do so in future as well. The fact that a habitat or species is not threatened (i.e. not faced by any direct extinction risk) does not necessarily mean that it is in favourable conservation status. The target of the directive is defined in positive terms, oriented towards a favourable situation, which needs to be defined, reached and maintained. It is therefore more than avoiding extinctions.

To achieve this objective, the directives require two types of provisions:

- **Site designation and management measures:** aimed at conserving core areas for those species listed in Annex I of the Birds Directive and Annex II of the Habitats Directive as well as habitat types listed in Annex I of the Habitats Directive

- **Species protection** provisions: require Member States to establish a general system of protection for all wild bird species in the EU and for other endangered species listed in Annex IV and V of the Habitats Directive. These measures apply across their entire natural range and therefore also outside protected sites.

2.5.1. Natura 2000 network

A central element of the nature directives is that they require Member States to designate Natura 2000 sites for selected species and habitat types listed in the directives. Once designated these sites must be managed in a way that maintains or restores those species and habitat types for which they have been designated in a good conservation condition.

Over 26,000 sites have been designated so far [22] as Natura 2000 sites. Together they cover around 18% of the land area in the EU-27 as well as significant marine areas[23]. Lake and river ecosystems make up around 4% of the surface area included in the Natura 2000 network.

These sites have to be managed and protected in accordance with the provisions of Article 6 of the Habitats Directive. These provisions are briefly decribed here as they have a direct relevance both for the development of integrated projects that aim to achieve win-wins or minimal loss scenarios (chapter 4) or for carrying out an assessment of the ecological impacts of a new plan or project on a Natura 2000 site (chapter 5).

The first two paragraphs of Article 6 requires Member States to:

- establish the necessary conservation measures which correspond to the ecological requirements of the protected habitat types and species present on the sites (Article 6(1));

[21] The concept of "favourable conservation status" is not mentioned in the Birds Directive but there are analogous requirements, i.e. all SPAs must still be subject to special habitat conservation measures in order to ensure the survival and reproduction of the Annex I birds in their area of distribution.

[22] http://ec.europa.eu/environment/nature/natura2000/barometer/index_en.htm

[23] There is sometimes considerable overlap between SPAs and SCIs so the figures are not cumulative.

- prevent any damaging activities that could significantly disturb these species or deteriorate the habitats of the protected species or habitat types (Article 6(2)).

To facilitate this task, Member States are encouraged to develop **conservation objectives for each Natura 2000 site**. At a minimum, the conservation objective will be to maintain the conservation condition of species and habitats for which it was designated and not to allow this to deteriorate further. However, as the overal objective of the directive is for the species and habitat types to reach a favourable conservation status, more ambitious conservation objectives may be set to improve the conservation condition of these species and habitat types on a site.

How are Natura 2000 sites selected:

Each site has been selected to be a Natura 2000 site in light of its value for the conservation of one or more habitat types or species of Community interest present on that site. The selection is done on the basis of the criteria laid down in Annex III of the Habitats Directive, which looks at the degree of representativity of the habitat type present as well as its area, structure and functions and - in the case of species - the size and density of the population, the features of the habitat which are important for the species and the degree of isolation of the population, as well as the overall value of the site for the conservation of that habitat type or species.

This information is recorded in a Standard Data Form[24] (SDF) which accompanies every site. The SDF provides key data about the site and the species or habitat type for which it was designated and their conservation condition (scored A to D). They are therefore an important reference base not only for determining whether there has been any deterioration in the conservation condition of the designated habitat types and species within the site but also for setting conservation objectives for the site, in line with the overall objectives of the Habitats Directive.

NATURA 2000 VIEWER :

Immediate online access to Natura 2000 maps and standard data forms

http://natura2000.eea.europa.eu/

The Natura 2000 viewer provides a means for consulting the detailed site descriptions and maps of Natura 2000 sites anywhere in the EU, including along different river stretches.

Various search options are available:

- browse in a particular area to see which, if any, Natura 2000 are present – for instance along a particular stretch of river. By typing in the location, e.g. nearest village, the map will automatically zoom into that area and highlight all the Natura 2000 sites present there;
- locate a specific Natura 2000 site for which the name or site code is already known;
- search for a particular species or habitat type protected under the Habitats Directive and see which sites have been designated for it;

For each Natura 2000 identified on the map a standard data form (SDF) can be downloaded which identifies the species and habitat types for which it was designated, estimated population sizes and conservation status, and the importance of that site for the species.

[24] SDFs can be accessed through the Natura 2000 viewer http://natura2000.eea.europa.eu/ and are available from authorities responsible for Natura 2000 in each country/ region.

Example of map from Natura 2000 viewer for Meuse river north of Verdun in Lorraine, France. The SPA site designated under the Birds Directive was marked in red, in blue the SCI site designated under the Habitats Directive (sometimes they overlap).

Article 10 – improving the ecological coherence of the Natura 2000 network.

In addition to designating core sites under the Natura 2000 network, Article 10 of the Habitats Directive also requires Member States to endeavour to improve the ecological coherence of the network across the broader countryside by maintaining and, where appropriate, developing features of the landscape which are of major importance for wild fauna and flora, such as wildlife corridors or stepping stones, which can be used during migration and dispersal.

Natura 2000 management plans, where they exist, often outline the conservation objectives for the site and the measures needed to achieve these objectives. They can therefore be a useful source of information for inland waterway developers as they:

- describe the ecological requirements of the habitats and species for which the site has been designated so that it is clear what is being conserved and why;
- analyse the socio-economic and cultural context of the area and the interactions between different land-uses and the species and habitats present;
- identify threats to the species and habitat types;
- spell out the conservation objectives for the site;
- identify a series of practical management measures that need to be implemented to bring the site up to a favourable conservation status, and how these measures can be integrated into other land use practices at the site;
- at the preparation and implementation stage involve stakeholders interested in the conservation of the site.

2.5.2. New developments affecting Natura 2000 sites

Whereas Article 6(1) and 6(2) of the Habitats Directive concern the day-to-day management and conservation of Natura 2000 sites, Articles 6(3) and 6(4) lay down the procedure to be followed when planning new developments that might affect a Natura 2000 site[25].

This stepwise procedure is examined in detail in chapter 5 but, in essence, it requires that any plan or project that is likely to have significant negative effect on a Natura 2000 site undergoes **appropriate assessment** to study these effects in detail, in view of the site's conservation objectives.

Depending on the findings of the appropriate assessment, the competent authority can either agree to the plan or project as it stands if it has ascertained that it will not have an adverse affect the integrity of the site concerned. Or, depending on the degree of impact identified, the competent authority may require:

- the plan or project to be redesigned to prevent adverse effects on the Natura 2000 site;
- mitigation measures to be introduced to remove the negative effects or certain conditions to be respected during the modification, upgrading and maintenance of the river ecosystems or the construction of associated infrastructures, again to remove the likelihood of negative effects;
- alternative less damaging solutions to be explored instead.

In exceptional circumstances, a plan or project may still be approved in spite of it having an adverse effect on the integrity of one or more Natura 2000 sites provided the procedural safeguards laid down in the Habitats Directive are followed (Article 6(4)). Thus, if it can be demonstrated that there is an absence of alternatives and the plan or project is considered to be necessary for **imperative reasons of overriding public interest** then the project may still be approved provided adequate compensation measures are put in place to ensure that the overall coherence of the Natura 2000 network is protected.

2.5.3. New developments and their relation with the strict species protection

In addition to protecting core sites through the Natura 2000 network the two directives also require that Member States establish a general system of protection for all naturally occuring wild bird species in the EU and for species listed in Annex IV and V of the Habitats Directive. These provisions apply both inside and outside protected sites.

The exact terms are laid down in Article 5 of the Birds Directive and Article 12 (for animals) and Article 13 (for plants) of the Habitats Directive[26].

They require Member States, amongst others, to prohibit:

- deliberate disturbance during breeding, rearing, hibernation and migration;
- deterioration or destruction of breeding sites or resting places;

[25] This applies to the SCIs, SACs and SPAs and concerns not just plans or projects inside a Natura 2000 sites but also those that are outside but could have a significant effect on the conservation of species and habitats within the site. For instance a dam constructed upstream on a river that could alter or stop the regular flooding of an important wetland for birds within an SPA further downstream.

[26] See Guidance document on the strict protection of animal species of Community interest under the Habitats Directive http://ec.europa.eu/environment/nature/conservation/species/guidance/index_en.htm

- deliberate destruction of nests or eggs, or the uprooting or destruction of protected plants.

As some of the protected species are potentially vulnerable to long distance interferences with their habitats, these provisions must also be taken into account when considering inland waterway developments also outside Natura 2000 sites. For instance, this might be relevant if a development is proposed to be situated along a major migration or dispersal route for a rare or engandered species such as the sturgeon (*Acipensor sturio*) or the zingel (*Zingel asper*) and to the extent that it might create a significant barrier to migration or cause the deterioration or destruction of their breedng sites also outside Natura 2000.

2.6. Water Framework Directive

Finally a word must be said about the Water Framework Directive (WFD) as its provisions are directly relevant to both the implementation of the Birds and Habitats Directives and to the sector of inland waterway transportation.

Adopted in December 2000, the overall purpose of Water Framework Directive[27] is to prevent further deterioration of aquatic ecosystems and dependent habitats and to protect and enhance their present status so that they reach **a good status by 2015**[28]. In the case of surface waters (e.g. rivers, canals, lakes, etc.) the quality of the water is judged on the sum of both its **ecological** and **chemical status**.

For the purposes of the WFD, Europe's water bodies are grouped into distinct river basin districts so that the management of the entire river basin can be coordinated at the most appropriate level – that of the geographical and hydrological unit – and not, as was often the case in the past, along fragmented administrative or political boundaries.

For each of these river basins, environmental objectives are set and a programme of measures is drawn up to ensure the river basin reaches a good status by 2015. The importance of these environmental objectives and programme of measures is underlined by the results of a first assessment of Europe's water bodies which found that around 40% of all EU water bodies were in such poor conditions that they were at risk of failing to meet the WFD's environmental objectives[29].

A **River Basin Management Plan (RBMP)** is drawn up for each river basin. According to Annex VII of the WFD it contains**,** among others:

- description of the characteristics of each of the water bodies in the river basin;
- summary of the significant pressures and impacts of human activity;
- map showing the status of the different water bodies: for surface water (ecological and chemical status), for groundwater (chemical and quantitative status), and for protected areas;
- list of environmental objectives that have been established for all the surface waters, groundwater and protected areas within the basin (in accordance with Article 4), and the identification of exemptions under Articles 4(4) to 4(7);

[27] Directive 2000/60/EC establishing a framework for Community action in the field of water policy. OJ 327, 22.12.2000.

[28] Or good ecological potential in the case of heavily modified water bodies.

[29] Commission Communication : Towards Sustainable Water Management in the European Union' First stage in the implementation of the Water Framework Directive 2000/60/EC [COM(2007) 128 final].

- summary of the economic analysis of water use;
- summary of the programme of measures designed to bring the water body up to good status by 2015.

At the time of finalising this document (May 2012), 23 Member States[30] have adopted their RBMPs and reported them to the Commission. Once verified, the Commission will publish the assessment of the RBMPs in the 3rd Implementation Report[31] scheduled for November 2012, as an integral part of the Blueprint to Safeguard Europe's Water Resources[32]. Recommendations for better policy integration and good practices were included in the policy paper on the WFD and the hydromorphological pressures adopted in November 2006[33] in the framework of the Common Implementation Strategy, with the participation of Member States and relevant stakeholders.

It is clear that there are strong synergies between the WFD and the Birds and Habitats Directives as they both have broadly similar ambitions in terms of aiming to ensure the non-deterioration of the rivers and the enhancement of their (ecological) condition. The relationship between the WFD and the Birds and Habitats Directives is explored further in chapter 6 in so far as it is relevant for inland waterways.

[30] http://ec.europa.eu/environment/water/participation/map_mc/map.htm

[31] The previous reports on the implementation of the WFD may be found at http://ec.europa.eu/environment/water/water-framework/implrep2007/index_en.htm

[32] http://ec.europa.eu/environment/water/blueprint/index_en.htm

[33] http://circa.europa.eu/Public/irc/env/wfd/library?l=/framework_directive/thematic_documents/hydromorphology/hydromorphology/_EN_1.0_&a=d
http://circa.europa.eu/Public/irc/env/wfd/library?l=/framework_directive/thematic_documents/hydromorphology/technical_reportpdf/_EN_1.0_&a=d

3. EUROPE'S RIVERS: AN IMPORTANT RESOURCE

3.1. The multifunctional role of rivers

Europe has a diversity of rivers ranging from short upland streams with small catchment areas to large lowland rivers which run for hundreds of kilometres. The characteristics of each river depend very much on its location and on a range of other factors such as the bedrock geology, soil types, gradient and climatic conditions. As a result, rivers are very diverse and also very dynamic, continuously changing as they progress from headwater to mouth. In the EU there are around 50 main rivers, of which 20 have catchment areas larger than 50,000 km². Each one also supports an important network of tributaries.

Rivers are an important multi-functional resource for Europe's economy and social well-being, servicing a large number of different sectors. Depending on the river system's individual characteristics and location, they provide drinking water or water for agriculture, industrial processes and cooling. Some are also used for power generation, navigation, gravel and sand extraction, fisheries, recreation and tourism amongst others.

Healthy river ecosystems also deliver many important goods and services to society for free. They provide important source of freshwater and act as purification centres, removing excess nutrients and pollutants from the water course and the surrounding catchment area. They prevent erosion and retain soils, nutrients and sediments and are a vital natural buffer against floods, absorbing excess rainwater during periods of high discharge. However, this economic value is often overlooked because they are viewed as predominantly public goods with no 'market' value. As a result, the benefits healthy river systems bring to society are rarely taken into account when trade-offs are involved[34].

Ecological importance of rivers		
Although rivers only represent a tiny proportion of Europe's surface area, they make significant contributions to the welfare of Europeans		
SUPPLYING SERVICES	REGULATING SERVICES	CULTURAL SERVICES
Products obtained from river ecosystems	*Benefits obtained from regulation of ecosystems processes*	*Non-material benefits obtained from river ecosystems*
Food and raw materials including a vast range of food products derived from plants, animals and other organisms, as well as materials such as wood. Fresh water: rivers are important for the supply and regulation of fresh water.	Climate regulation: river ecosystems can influence climate. Disease regulation: changes in the riverine ecosystem can directly influence the abundance of disease vectors, such as mosquitoes. Water regulation: flood control, alleviation of draught, etc.	Recreation and ecotourism Aesthetic Educational Sense of place Cultural heritage Spiritual é religious

[34] http://www.teebweb.org/

Energy: wood and hydroelectric power. Genetic resources including the genes and genetic information used for animal and plant breeding and biotechnology. Transport: Essential role in trans- portation of goods and people – both business and leisure.	Erosion control: riverside and floodplain vegetation cover plays an important role in soil retention and the prevention of river erosion. Water purification: river eco-systems can help to filter out and decompose organic wastes.	SUPPORTING SERVICES *I.e. those necessary for the production of all other ecosystems services* Soil formation Nutrient cycling Primary production Biodiversity (habitats and species)

Tapping into the economic value of ecosystem services

Under the Lower Danube Green Corridor (LDGC) Agreement, it has been agreed to restore 2,236 km² of floodplain, side channels and associated habitats along the Danube to help control floods in the region. The total cost of this restoration work is estimated at 50 million EUR and would result in 2,100 million m³ of flood retention capacity. This compares very favourably to the cost already occurred in Romania alone as a result of floods in 2010 which amounted to 59 million EUR. In addition, it is estimated the restoration would provide 112 million EUR a year in additional ecosystem services for fisheries, forestry, nutrient retention and recreation.[35]

3.2. The environmental status of Europe's rivers

The multiple usages of many of Europe's rivers have put immense pressure on this valuable resource over the last 150 years, with the result that few of its major lowland rivers are now in an entirely natural state. In addition to being subjected to varying degrees of pollution and high nutrient loads, which lead to a degradation in water quality, many rivers have also undergone major hydro-morphological changes for a wide variety of reasons.

Based on the first characterisation of river basins in relation to the WFD (Article 5)[36], the majority of EU Member States indicated that pressures related to urban development, flood defence, power generation including hydropower, inland water navigation, straightening and land drainage for agriculture are the most important and affect the hydro-morphological status of water bodies to the highest degree. The most recent assessment of the state of Europe's rivers concluded that around 40% of all EU water bodies were in an impoverished state and at risk of failing to meet the WFD's environmental objectives.

3.2.1. Main pressures on Europe's rivers

According to the European Environmental Agency[37], the main factors that increase the risk of not achieving good ecological status, or potential, in European rivers are:

- **Nutrient enrichment** (eutrophication) – one of the principal sources of organic pollution discharged into Europe's watercourses is from organic waste around areas of Europe

[35] Costs and Socio-Economic Benefits associated with the Natura 2000 Network, Output of the EC project "Preparatory Actions for Natura 2000", Revised final version, October 2010.

[36] Commission Communication : Towards Sustainable Water Management in the European Union' First stage in the implementation of the Water Framework Directive 2000/60/EC [COM(2007) 128 final].

[37] The European environment state and outlook 2010, freshwater qualityand LIFE and Europe's rivers, 2007.

with high population density and high industrial development. High levels of organic pollution tend to reduce the concentration of oxygen in water and thus affect all riverine species and habitats. Nevertheless, over the past 15 years the levels of organic matter concentration and nutrients in the European rivers have been gradually decreasing.

- **Hydromorphological pressures** (including river regulation) – that is the physical changes that man imposes on watercourses, such as the construction of reservoirs and energy production (hydro-electric dams), canalisation and navigation structures, land drainage and irrigation, maintenance work (removal of obstacles to water flow, sediment removal, etc.). Such measures may result in a disconnection of the rivers from floodplains with a negative impact on dependent habitats and species. They may also cause disruption of the river sediment system (erosion, transport and deposition) and/or disruptions to the river continuity, which may have a major impact on aquatic organisms, for example by hindering the up- and down-stream migration of migratory fish, or by changing water flows and temperatures.

Other pressures include:

- **Acidification** – decreasing of the pH levels caused by sulphur and nitrogen oxides deposition (as a result of the combustion of fossil fuels) into the rivers' catchments.

- **Organic micro pollutants** – an increased use of pesticides and the production of other organic substances has led to pollution of watercourses. Pesticides entering the aquatic environment may have serious impacts on flora and fauna and limit the use of the water for drinking water abstraction.

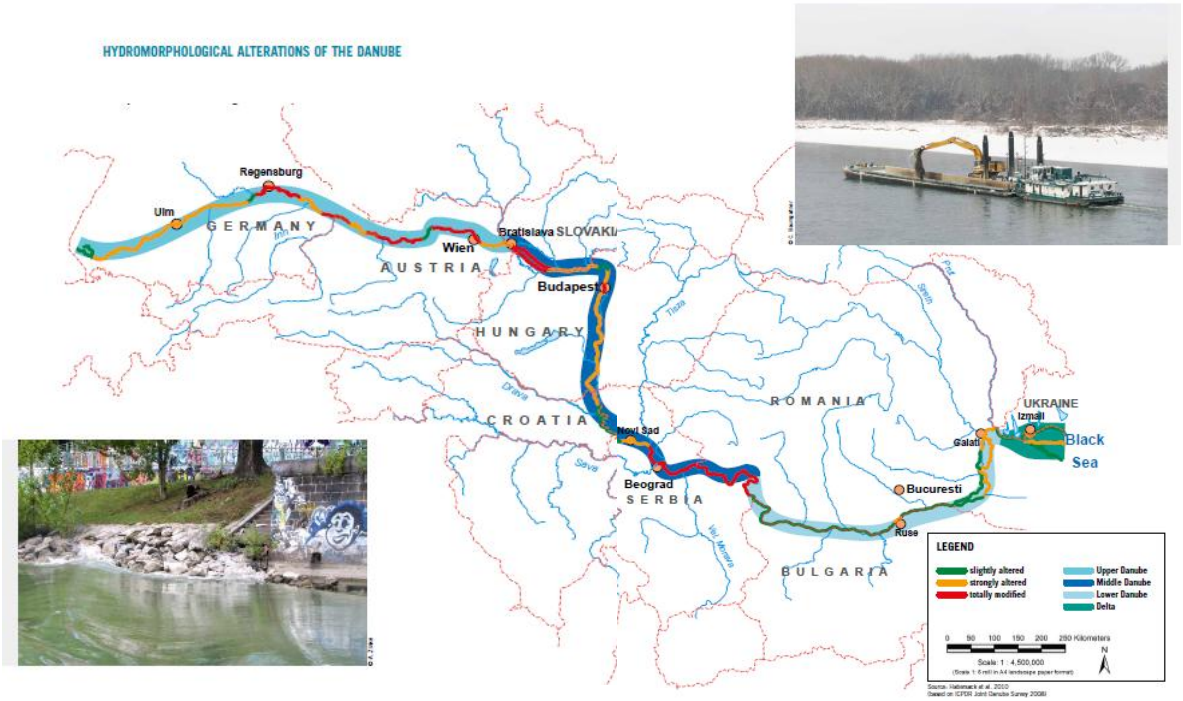
- **Heavy metals** – the main sources in Europe's rivers are industrial and mining facilities. However, concentrations of heavy metals are decreasing in European rivers.

As the above overview illustrates many of Europe's rivers are already heavily regulated and polluted by a wide range of different socio-economic activities, to the extent that they no longer exhibit the full extent of their natural hydro-morphological functions or their ecological values. Others meanwhile still have relatively natural stretches that remain dynamic and free-flowing and retain their high ecological value.

Effects of hydro-morphological changes on the Danube and Rhine

Like many other European rivers, the Danube and Rhine are heavily influenced by human activities including intensive navigation and habitat modification by hydraulic engineering. The natural structure on many stretches of the rivers has been changed, including their depth and width, flow regimes, natural sediment transport and fish migration routes. Dams and reservoirs have been built in nearly all mountainous areas and in some lowland regions and navigation channels, whilst dykes and irrigation networks are widespread in the lowlands along the middle and lower reaches of the river.
As a result:
- more than 80 % of the Danube is regulated for flood protection and about 30 % of its length is impounded for hydropower generation;
- about half of the Danube tributaries are used to generate hydropower; the generation capacity of all the hydropower plants in the Danube basin is almost 30 000 MW;
- more than 700 dams and weirs have been built along the main tributaries of the Danube;
- along the Rhine, water meadows between Basle and Karlsruhe have shrunk by 87 % following construction of dykes and channels to cut off meanders.

Source: ICPDR, 2010 and Umweltbundesamt, 2006.



3.2.2. New challenges facing Europe's rivers

Rivers are also facing new challenges **such as climate change and invasive alien species**. In the context of climate change, there is increasing evidence to show that climate-induced changes in ice cover periods, river discharge regimes, thermal stratification, nutrient availability and the duration of growing seasons will affect species composition and food web structures. It also could lead to major changes in water flow regimes in rivers.

Water temperature is one of the parameters that determines the overall health of aquatic ecosystems. Most aquatic organisms (e.g. salmonid fish) have a specific range of temperatures that they can tolerate, which determines their spatial distribution along a river or across a region. Climate change could lead to the extinction of some aquatic species or at least could modify their distribution in a river system or move their distribution northwards, if they are not prevented from doing so due to a lack and degradation of suitable habitats or obstacles along the water's course.

Invasive alien species also pose an increasingly important threat to Europe's rivers. According to a recent inventory, 296 species of invertebrate and 136 fish species found in Europe's freshwater environment are alien[38]. A major EU funded research project called DAISIE[39] also found that the primary pathways for introducing animal alien species to European inland waters are: stocking of water bodies to support extensive fish culture and sport fishing (30%), intensive aquaculture (27%) and passive transportation by ships (25%).

Invasive alien species impacts also have severe socio-economic impacts. They can cause significant production losses (e.g. decreases in fisheries and aquaculture production, decreases in the availability and prevent suitable access to water for industries. They can also decrease the navigability of inland waters) and cause a decline in valuable ecosystem services (e.g. water purification, nutrient cycling).

[38] EEA report, March 2010: 10 messages for 2010 — freshwater ecosystems.
[39] http://www.europe-aliens.org/

Experiences from the Main-Danube Canal as regards invasive alien species

Artificially linking different water systems, for instance through man-made canals is known to cause the spread of invasive alien species since it brings two different river systems into physical contact with each other, something that would very rarely happen without human intervention. This causes the introduction of alien species and their intermixing /competition with native species. The opening of the Main-Danube Canal in 1992, which connects the Rhine River and the Danube River, in particular facilitated the invasion of many Ponto-Caspian species to northern and western Europe,. It is expected that in the near future more Ponto-Caspian species will migrate into the North Sea basin via the Main-Danube-Canal (Gollasch & Nehring 2006).

3.3. The importance of rivers for biodiversity

The structural complexity and highly dynamic nature of rivers makes them exceptionally rich ecosystems, bringing lifeblood, or in this case water, to large parts of the surrounding countryside. Rivers are not only valuable habitats in their own right but they also act as vital ecological corridors, encouraging species dispersal and migration over sometimes long distances and through different biogeographical zones.

In addition, rivers exert a major influence on the surrounding catchment area - be it through flood pulses and/or the replenishment of groundwater, amongst others. This lateral connectivity is associated with the development of a rich mosaic of interconnected, water dependent, wetlands such as floodplain forests, marshes, fens, wet meadows, etc., all of which further enhance the overall biodiversity of these natural systems.

As a result, healthy natural rivers and their associated floodplains host a remarkably rich biodiversity, providing important habitats for a significant number of Europe's wild fauna and flora species, including highly endangered species listed in the Birds and Habitats Directives.

The ecology of large rivers

Large river systems are multidimensional ecosystems where natural disturbance regimes, such as floods or droughts, are the basis for their highly dynamic and heterogeneous nature. These complex forces and exchange processes – acting across three spatial dimensions and through temporal (seasonal and inter-annual) changes – result in frequently changing connectivity conditions and an especially diverse habitat complex.

Rivers can usually be divided into three main sections – the upper, middle and lower stretches. Each part is characterised by different abiotic (i.e. nonliving) features (such as hydromorphology) and biological communities.

- **Abiotic parameters** include slope, grain size, sedimentation, water turbulence, oxygen content, nutrients, pollutants, water temperature, etc.

- While abiotic parameters characterise habitat and living conditions, **biological communities** are the focal point of ecosystem function. They comprise the living organisms from both aquatic and semi-aquatic habitats in the river and adjacent riparian zones and floodplains. All these organisms are linked in the trophic food webs by their behaviour and life history.

- **Hydromorphology** is the physical characteristics of riverine structures such as river bottom, river banks, the river's connection with adjacent landscape elements (riparian zone and floodplains) and its longitudinal continuity as well as habitat configuration.

Numerous other factors add to the complexity and highly dynamic nature of large river systems, such as natural disturbances (e.g. floods and droughts) and associated sediment transport variations.

River ecosystems have frequently changing connectivity conditions and exchange processes with adjoining ecosystems (via tributaries, groundwater and floods). The most important consequence of this ever-shifting mosaic of river habitats and ecotones is that natural riverine environments generally feature outstandingly high biodiversity and offer – during different time periods and varying connectivity gradients – important habitats for a variety of species.

Adapted from PLATINA Manual.[40]

3.3.1. Natura 2000 along major EU lowland rivers

Altogether, lake and river ecosystems cover around 4% of the surface of Natura 2000 (EEA, 2010). They have been designated for a range of freshwater habitat types and species listed in the two nature directives. These include high profile species such as the Atlantic salmon (*Salmo salar*), otter (*Lutra lutra*) or kingfisher (*Alcedo atthis*) as well as lesser known species such as the white-clawed crayfish (*Austropotamobius pallipes*), the thick-shelled river mussel (*Unio crassus*) or the European pond turtle (*Emys orbicularis*). They have also been designated for a number of threatened types of water courses and associated habitats such such as riparian and alluvial forests, wet meadows, humid grasslands and fens.

For the purposes of this guidance document an analysis was done of the Natura 2000 sites that have been designated along 13 of the most important lowland rivers in Europe. This provides an illustration of the kind of freshwater habitat types and species protected under the two nature directives which are most frequently quoted as the reason for designation as well as the number of Natura 2000 sites designated along each river – further details in Annex I.[41]

[40] http://www.naiades.info/platina/downloads

[41] For detailed information on each Natura 2000 consult the Natura 2000 Viewer – see chapter 2 for details www.natura2000.eea.europa.eu/

Map illustrating the Natura 2000 sites which have been designated along 13 of Europe's major lowland rivers; source: European Commission, DG ENV.B.3, September 2010 – detailed maps in Annex I.

River	Number of Natura 2000 sites	Total Natura 2000 area (km²)	Total length (km)	Length covered by Natura 2000 (km)	% length covered by Natura 2000 (km)
Danube	230	5.033,99	2.770,36	1.234,08	44,55%
Elbe	174	1.708,89	1.087,29	681,07	62,64%
Ems	33	361,72	345,06	212,30	61,52%
Main	100	202,04	473,15	65,70	13,89%
Meuse	83	704,31	731,18	192,62	26,34%
Moselle	37	230,38	429,08	54,97	12,81%
Odra	71	1.627,69	823,75	605,13	73,46%
Rhine	199	1.423,09	1.159,96	448,62	38,68%
Rhone	52	591,89	910,62	233,40	25,63%
Scheldt	17	150,31	268,05	57,24	21,35%
Seine	31	490,89	673,65	121,03	17,97%
Vistula	53	990,10	895,68	276,41	30,86%
Weser	66	351,19	444,09	96,59	21,75%

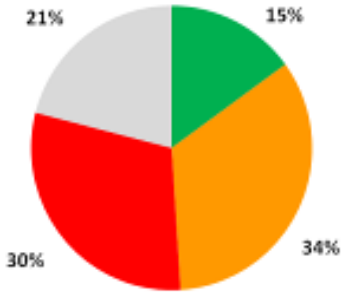
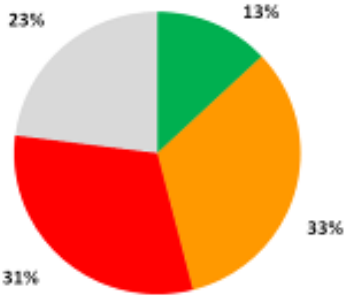
Table: Number of Natura 2000 sites found along 13 of Europe's major lowland rivers, and the proportion of each river covered by Natura 2000 (covers the entire length of the river from its source, i.e. including parts that are not navigable). Source: European Commission, DG ENV.B.3, September 2010.

3.3.2. Conservation status of EU protected freshwater species and habitat types

In 2009, the European Commission published the first ever systematic assessment of the conservation status of Europe's most vulnerable habitat types and species protected under the Habitats Directive[42]. The results, covering 2001-2006, show that only a small proportion of the habitats and species of Community interest are in a favourable conservation status: 63% of the listed freshwater habitats and 64% of the freshwater species have an 'unfavourable-bad' or 'unfavourable-inadequate' status, compared to only 15% of habitat types and 13% of species with a favourable conservation status.[43]

This shows that many of the freshwater habitats and species of EU importance are in a poor conservation state and heavily degraded, and therefore highly vulnerable to any further changes. Major efforts will therefore be needed under the Birds and Habitats Directives in order to restore them to a more favourable conservation status.

[42] COM/2009/0358 final : http://ec.europa.eu/environment/nature/knowedge/rep_habitats/index_en.htm
[43] All data is for EU-25 excluding Romania and Bulgaria.

Conservation status of habitats in lake and river ecosystems	Conservation status of EU protected species in lake and river ecosystems
	

Legend: 'favourable' (green), 'unfavourable inadequate' (amber), 'unfavourable bad' (red) or 'unknown' (grey). Source: ETC/BD, 2008.

3.4. The use of rivers for commercial inland waterway transport

One of many different important river uses relates to the transportation of commercial goods. Today, the network of navigable inland waterways[44] within the EU extends over 40,986 km (Eurostat). The main network, hosting rivers and canals of Class IV and higher, which are accessible to vessels over 1000 ton, is made up of over 12,000 km of interconnected waterways, some 450 locks and several hundred inland ports and transhipment sites.

The contracting parties to the European Agreement on Main Inland Waterways of International Importance (AGN)[45] agreed to establish a network of inland waterways and ports of international importance (E waterway network) within the framework of their relevant programmes according to the provisions of the Agreement (see map).

The network of inland waterways of international importance consists mainly, but not exclusively, of four main waterway corridors in the EU are:

- **The Rhine Corridor:** comprising the entire Rhine confluence and the canals in the western part of Germany, Belgium, the Netherlands, Luxemburg, as well as in the eastern part of France and Switzerland;
- **The South East (Danube) Corridor**: comprising the entire Danube confluence between German Bavaria and the Black Sea as well as all tributaries and navigable canals such as the Main-Danube Canal;
- **The East-West Corridor:** comprising the Mittelland Canal in northern Germany and the confluences of Elbe, Oder and Vistula;
- **The North-South Corridor:** covering the major French rivers (Seine, Loire, Garonne, Rhone-Soane), navigable tributaries and linking canals extending between the lower Rhine area and the Mediterranean.

[44] Navigable inland waterways are defined here as "rivers, lakes and canals, over which vessels of a carrying capacity of not less than 50 tonnes can navigate when normally loaded".
[45] http://untreaty.un.org/unts/144078_158780/9/5/2638.pdf

The vast majority of the commercial goods transportation by inland ships concerns just five countries: the Netherlands, Germany, France, Belgium and Romania. Out of these, Germany and the Netherlands account for over three-quarters of the market, mostly as a result of the Rhine corridor which is in itself responsible over half of all the inland waterway freight transport in the EU (CCNR). The North-South corridor amounts to 16%, the East-West Corridor to 2% of the total transport performance in EU 27. In the Danube river basin, approximately 50 million tonnes are transported (14%) at an annual basis[46].

3.5. Inland waterway development and management and their potential positive and negative impacts on rivers

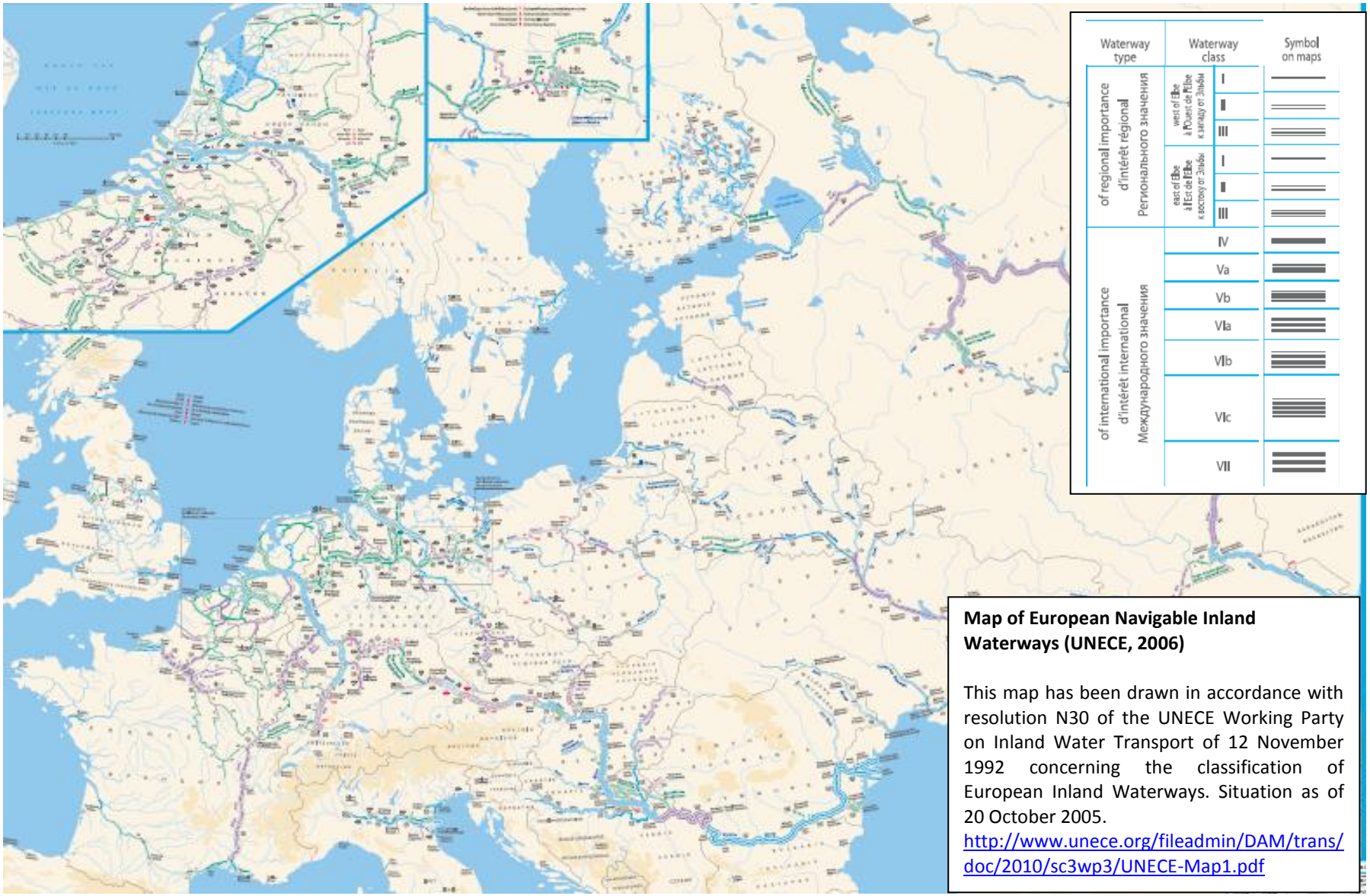
The remainder of this chapter is dedicated to exploring the kind of effects – both positive and negative - that inland waterway developments may have on Europe's river biodiversity, and on the rare and threatened species and habitat types protected the two EU nature directives in particular.

Inland waterway infrastructure planners who are aware of these potential effects and who have an understanding of the complexities of riverine ecosystems will be in a much better position to develop more integrated plans or projects for their sector which take account of the ecological and other river user's requirements already at the start of the design process and which search for win-win solutions wherever possible (see chapter 4).

It should also facilitate the environmental assessment of the plan or project under Article 6 of the Habitats Directive. Gathering information on the kind of risks and possible effects of inland waterway developments already at the design stage will not only help to improve the quality of the appropriate assessment, which should in turn speed up the decision making process, but will also allow the planner to take these potential effects into account when first developing the project so they are avoided or minimised wherever possible (see chapter 6).

Clearly the impact of any new activity aimed at improving inland water transport will depend not just on the type of development foreseen but also on the state of that river reach. New developments on an already degraded river are likely to cause fewer negative effects and can provide important opportunities for improving the river's ecology. Such **win-win solutions** can be of major benefit not just **to inland navigation** and **nature conservation** but also to a wide range of other river dependent activities and uses – such as recreation, tourism and flood management. However, where river reaches still retain their natural dynamics and high ecological interest, there could be more risk of river development projects causing a significant negative impact on that river.

[46] Summary document on Study on Medium and long term perspectives of Inland Waterway Transport in the European Union (European Commission, 2011).



Map of European Navigable Inland Waterways (UNECE, 2006)

This map has been drawn in accordance with resolution N30 of the UNECE Working Party on Inland Water Transport of 12 November 1992 concerning the classification of European Inland Waterways. Situation as of 20 October 2005.
http://www.unece.org/fileadmin/DAM/trans/doc/2010/sc3wp3/UNECE-Map1.pdf

3.5.1. Possible negative effects of inland waterway development and management activities on habitats and species protected under EU nature legislation

The following outlines the type of possible negative effects an inland waterway development project may have on habitats and species protected under the EU nature directives. Clearly the impacts will vary considerably from one site to another depending on the individual characteristics of the river, its physical and ecological state, the type and scale of inland waterway development measures proposed and the species and habitats for which the site has been designated.

For instance, the assessment of an inland waterway management project which is foreseen on a river stretch that has been designated for the kingfisher will have a very different impact than one which is foreseen on a Natura 2000 river that has been designated for a much wider range of rare and endangered species (fish, amphibians, mammals, birds) and habitat types (humid grasslands, riparian forests, fens, etc.). In the case of the former, it will be much easier to find win-win solutions or suitable mitigation measures that will satisfy the requirements of both inland waterway transport and the species for which the site has been designated. Hence the importance of looking at each inland waterway management project on a **case-by-case basis**.

- ***Habitat loss, degradation and fragmentation***

The physical modification of water bodies can, if not planned properly, affect the normal hydrological processes of freshwater systems, disconnect rivers from floodplains and wetlands, and change the water and sediment flow, amongst others. This in turn results in the loss, degradation and fragmentation of natural habitats and species which depend on the the river's natural processes for their existence. The significance of loss depends on scale of the impact as well as on the rarity and vulnerability of the habitats affected and their importance as a feeding, reproduction, resting or staging places for species, especially for species of European interest.

The most obvious form of habitat loss is the direct **physical destruction** of the habitats themselves (e.g. land take, removing riparian vegetation or river islands, shingle banks, draining floodplain areas or stabilising the riverbed, etc.). But the disruption of natural hydromorphological processes, sediment balances and nutrient cycles can also lead to significant habitat loss, degradation and fragmentation[47]. For instance, cutting off a side arm can cause valuable habitats, such as floodplain forests or wet meadows, to dry out or silt up. This not only results in the loss or degradation of the habitat itself but can also potentially lead to the disappearence of species that depend on the habitat for their existence.

Preventing fluctuations in waterlevel and seasonal flooding can also cause the diverse range of wetland habitats to degrade and disappear. Water level fluctuation within the channel is crucial to the health of the ephemeral wetland habitats in the marginal zone and elsewhere in the channel (e.g. in mid-channel bars). Water level stabilisation within the confines of the channel can have an important impact on wetland communities, eliminating seasonally exposed habitats that are critical to Natura 2000 habitats and species features.

Without seasonal flooding, the complex mix of more or less water tolerant plant species in the riparian zone, for instance, may be rapidly replaced by a few dominent species that no longer offer the diverse habitat conditions required by many species. Stopping seasonal flooding also prevents regular replenishment of both surface and groundwater in the

[47] See also Integrative study on hydromorphological alterations on the Danube (Habersack et al, 2010).

catchment which in turn disrupts the nutrient cycle of the ecosystem and its ability to self purify, leading to further habitat degradation and loss. It has to be noted, however, that measures to prevent seasonal flooding are done for a variety of reasons, e.g. flood protection, and not just for navigation.

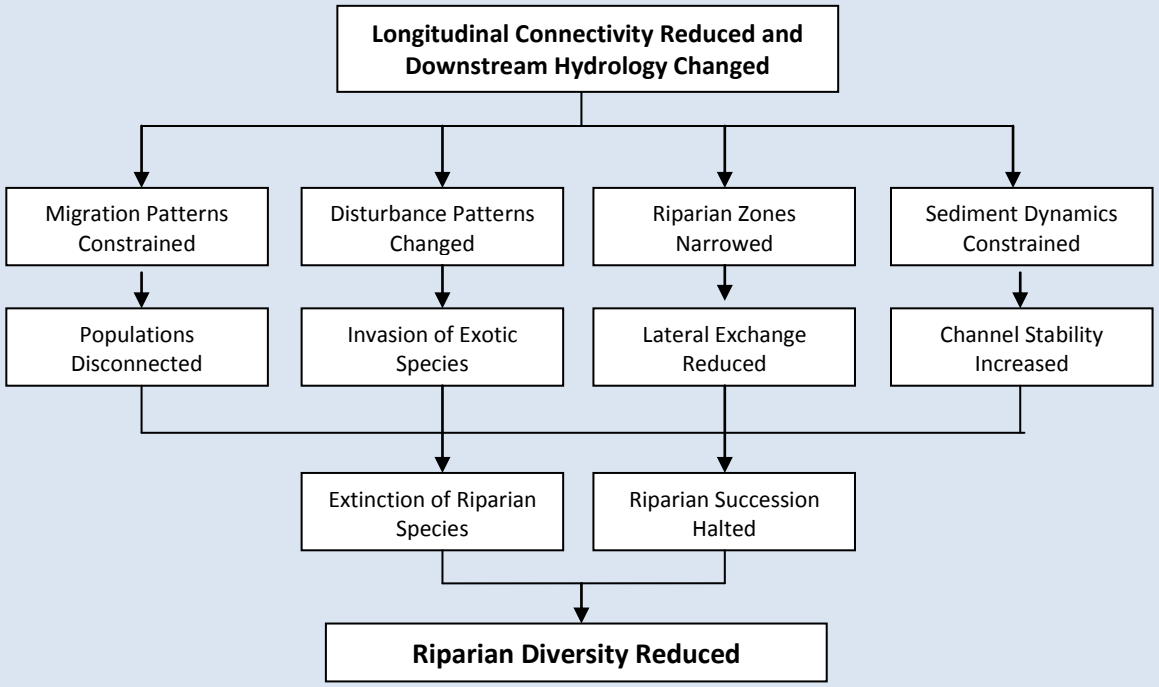


Figure: Overview of riparian succession following a reduced flooding regime downstream from dams. The figure summarises four scenarios of change that may occur individually or in combination. Obstructions to dispersal disconnect riparian populations, whereas changed disturbance regimes may favour the spread of exotics. This eventually results in the extinction of native riparian species. When riparian zones are narrowed and sediment dynamics constrained, the aquatic riparian system becomes stabilized and the riparian succession is halted. The final result of any scenario is a reduction of riparian diversity.

Source: C. Nilsson and K Berggren.

Straightening river courses can accelerate water velocity causing severe erosion of both the riverbed and the shoreline as well as any other shallow habitat features such as gravel bars which are so important for a range of species. This erosion is sometimes countered by artificial bed re-enforcement such as ripraps or concrete structures which further diminishes the natural processes of the river, and so provokes the further loss or degradation of valuable natural habitats. Increasing river velocity can also cause the lowering of the water table in the surrounding area which leads to increased drainage and drying out of valuable wetland habitats.

Impounding sections of the river to control depth and water velocity can also result in fundamental changes in the morphological and hydrological conditions of the river and surrounding areas and can interrupt the lateral and longitudinal continuity of the ecosystem.

Upstream of an impounded section, the normal flow of bedload may come to a standstill and lead to a gradual accumulation of sediments and sludge which not only negatively affects the

surrounding habitats but also requires regular dredging and flushing, both of which may in themselves cause further negative effects. Downstream of an impounded section, erosion may be more pronounced and can lead to a gradual deepening of the riverbed, causing a drop in both surface and groundwater in the surrounding catchment area and, as a consequence, the further loss and degradation of both riverine and river related habitats.

Inland waterway development activities, as well as increased shipping traffic, may also lead to a temporary or permanent increase in turbidity and resuspension of sediments. The re-suspension of sediments impairs different aquatic organisms in different ways. Fine sediments can damage the respiratory organs of the larvae of water insects. The increased turbidity reduces the light intensity, which, in turn, decreases the photosynthesis of plankton and benthic algae and of vascular plant species. The deposition of fine sediments on gravel banks can also bring about changes in the living conditions of specific aquatic organisms. In particular, spawning and living grounds of litophilous species (e.g. fish, insects) are lost, due to clogging of the interstitial spaces. Moreover these interstitial spaces provide refugia for most bottom dwelling species during flood periods.

Habitats and species can also be damaged by ship waves and propellers. This may have a potential scouring effect on the river bed and banks depending on the size, frequency and speed of the vessels. Regular wave action can uproot plants and disrupt the benthic fauna and flora as well as fish spawning areas.

- ***Species disturbance and displacement***

River engineering works and increased shipping traffic may cause disturbance to certain species and disrupt their life cycles, especially in the case of benthic fauna and flora which rely on a high water quality. The impact may be temporary or permanent, direct or indirect, on-site or off-site and may come into play at different times during the project cycle.

Rare and threatened species may be disturbed by a range of factors such as noise, water turbidity, pollution, human presence, sedimentation, regular movements (e.g. wave action and propeller suction) etc. This may affect the species ability to breed, feed, rest or disperse and migrate. The effects of wave may for instance disrupt the early life history stages of riverine fish that have their nursery zones in shallow areas[48].

If the disturbance reaches significant levels it can lead to the exclusion of the species from that area and hence the loss of habitat use or it can result in poorer survival and/or breeding success. In the case of rare and endangered species even small or temporary disturbances can have serious repercussions for their long-term survival in the region.

The level of disturbance depends on many factors which will need to be assessed both in function of the type of disturbance caused as well as the species likely to be affected (some species are more sensitive to certain disturbance factors than others). The scale and degree of disturbance determines the significance of the impact, as does the availability and quality of other suitable habitats nearby that can accommodate the displaced animals.

- ***Barriers to migration and dispersal***

Rivers and riparian zones play an important role in the dispersal and migration of freshwater species and in more localised movements between different feeding and nesting areas. They act as vital ecological corridors or stepping stones across the landscape. Some inland waterway development activities can either directly or indirectly disrupt or prevent species dispersal and migration.

[48] Kucera-Hirziger et al 2008.

The most obvious obstructions include dams and impounded areas which present physical barriers to fish migration, thereby preventing them from travelling up and down the river. This has had major impacts on the populations of long distance migrators in particular (e.g. allis shad, Atlantic salmon) and resulted in the fragmentation and isolation of remaining freshwater populations (e.g. the Danube salmon). Artificial canals can also act as barriers to species movement by causing habitat fragmentation across the terrestrial landscape.

- ***Pollution***

Inland waterway shipping can be a potential source of pollution coming from ship waste or bilge water. There is also a risk of accidential spills resulting from ship collision or damage. However, IWT has a **very high safety record**. During the last decades there have been no accidents or other incidents of serious consequences for the environment.

3.5.2. Possible positive effects of inland waterway development and management activities on river ecosystems

As section 3.2 illustrates few of Europe's large lowland rivers are still in an entirely natural state, many of them have been physically altered over the years for a wide variety of reasons.

Experience has shown that modern inland waterway developments can play an important role not only in mitigating the potential negative effects of new developments but also in helping to actively improve the ecology and natural functioning of such regulated rivers in a way that benefits both the river and the river users, including inland waterway transport. Ecologically-orientated river engineering started on a local scale in the 1980s but is now common practice on many rivers, notably in Austria, Belgium, Netherlands, France, Denmark and Germany.

Clearly the type of measures that can be implemented will depend very much on local circumstances, such as the condition of the river and the extent of the alterations already in place, the type of navigation conditions required as well as the other uses that are made of the river. In practice, the relation between uses, alterations, state and measures can be complex which is why more and more inland waterway developers are adopting an integrated approach to new waterway developments which fosters a mutual understanding of the multipurpose use of waterways in order to reconcile environmental protection and sustainable mobility (see chapter 4).

Within the context of these new methods, new projects can be designed to take account of the main natural functions of river systems and wherever possible aim to maintain or restore these key functions, including:

- morphological processes (erosion, sediment transport and sedimentation);
- maintenance of the hydrological balance (e.g. flood pulse);
- provision of habitat (ecological continuum);
- maintenance of biological and chemical processes (nutrient cycles).

In many cases measures to achieve needed depth, clearance, width or velocity can be designed in a way to minimise impacts on important waterway functions or to restore lost ecological functions.

Depending on local circumstances this can involve inter alia:

- removal of obsolete infrastructures or the modernisation of these infrastructures in a way that helps to improve the river's ecology;
- restoration or removal of hard reinforcement structures along riverbank and the use of more natural embankment techniques;
- use of alternative groyne types leading to higher dynamics along the river bank;
- re-connection of side arms, floodplains and ox-bows to restore riverine habitats;
- creation of a bypasses or floodways to improve structural diversity of the river ecosystems and encourage the passage of fish;
- use of ecologically orientated maintenance dredging and sediment management techniques;
- recreation of typical riverine habitats such as floodplain islands or the creation of soft side channels to increase the range of natural habitats available for local wildlife.

In light of the structural and functional connectivity of river ecosystems, it is essential that such measures are developed on the basis of a detailed understanding of the river's condition and ecological processes as well as of the navigation needs. This will ensure that the measures have the desired effect and do not inadvertently create new problems for either the river's ecology or for its navigability.

Table: Review of various river engineering measures in terms of their technical and ecological goals[49]

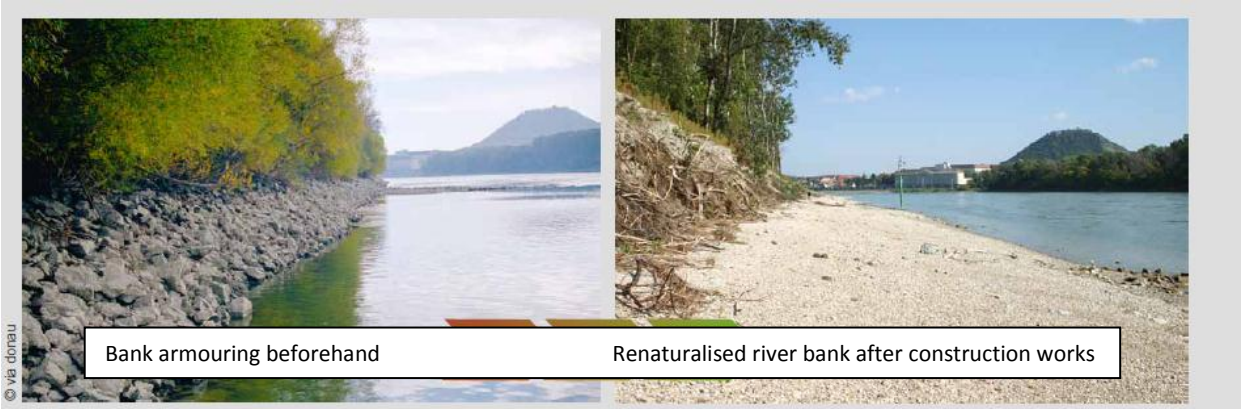
A. River banks/ near bank zones	
Type of measure	*Alternative groyne types*
Inland navigation goal	Improvement of navigability (increase water depth at low discharges, reduce maintenance dredging). Fixation of the navigation channel / fairway. Protection of banks at outer curves.
Ecological goal	Reduction of groyne field effects (less sedimentation, etc.). Improvement of ecological conditions (improvement of aquatic habitat diversity by near bank flow). Restoration of banks (side erosion due to higher shear stresses because of new groyne forms).
Type of measure	*Restored/unprotected banks*
Inland navigation goal	Flood protection (increase of discharge cross sections). Increase of sediment input. Reduction of river bed incision ("soft banks") by reducing shear stress.
Ecological goal	Natural morphological development of bank zones (morphodynamics). Sustainable improvement of the ecological conditions (particularly at the banks). Improvement of the landscape appearance.
B. Riverbed/fairway	
Type of measure	*Granulometric bed improvement*
Inland navigation goal	Sustainable river bed stabilisation – stop river bed erosion. Reduce maintenance (less ford dredging). Increase of low water level.
Ecological goal	Sustainable river bed stabilisation – stop river bed erosion. Increase of water level. Dynamic equilibrium.
Type of measure	*Alternative groyne types*
Inland navigation goal	Improvement of navigability (increase water depth at low discharges, reduce maintenance dredging). Modification of discharge splitting (side-arms). River regulation, fixation of the navigation channel/ fairway.
Ecological goal	Minimise engineering impact.
C. Floodplains	
Type of measure	*Reconnection of side arms*
Inland navigation goal	Emphasising flood retention (hydrological), lowered water level at higher discharges. Sediment input. Reduced shear stress in main channel.
Ecological goal	Permanent connection of the side-arm system (at low flow). Improvement of the ecological

[49] Adapted from the PLATINA manual.

	conditions (especially at the river banks and the side-arms). Sustainable sediment budget in the side-arm system. Permanent refugial areas, protection against wave influences.
Type of measure	*Restoration or preservation of floodplains*
Inland navigation goal	Flood protection. Flood retention (hydrological and hydraulic effects).
Ecological goal	Preservation of floodplains. Restoration of floodplains.

Examples of the type of measures that can be used to improve ecological functions:

More natural river embankment:



LIFE project Thurnhaufen along the Danube, Austria. Measures were undertaken as part of a LIFE-Nature project to renaturalise the river bank armouring which had been installed originally to prevent bank erosion from ship waves.

Alternative groyne types:

Pilot project Witzelsdorf along the Danube, Austria. Because of bed degradation old groynes were much higher than necessary. In this project the old groynes were removed and replaced with fewer groynes which were lower and facing downstream. This led to higher dynamics along the river bank which in turn helped to improve the habitats for local wildlife.

Examples of ecological improvement projects along navigable rivers

Flood-spillway Rees, Germany

The Lower Rhine in Germany is heavily affected by river bed erosion; up to 2 cm/year is a maximum value in recent time. Decline of navigable water levels and subsequent effects on ecological and land-use functions are to be expected. Counteracting this impact is currently done by expensive river bed load supply and additional measures fixing the river bed technically.

The stretch of Rhine-km 833,5 to 839,0 – where the city of Rees is located – is at almost a 90° angle, which causes a bottleneck in river discharges. This in turn increases the risk of flooding. The wide left bank floodplain at present allows a multifunctional use i.e., farming, recreation, tourism and nature protection (Fig. 1). The whole area is protected under Natura 2000 network.

Figure 1: Aerial view of the Rhine floodplain at the city of Rees

Considerations to counteract bed erosion have already been initiated in 1995 resulting in the adoption of the program to "minimise river bed erosion on the Lower Rhine" by the German Ministry of Transport in 1998. The main navigational targets: a) maintain navigable water levels, b) to reduce bed erosion and c) to minimize expensive bed load supply have been included in an integrated planning approach. But the project also aimed to be multifunctional and in particular a) relieve the city of Rees from danger of flood damage, b) enhance natural value within the area and c) integrate farming, recreation and tourism. These targets have been included in the early planning process by involving a stakeholder expert panel advancing their views and interests.

For achieving these multiple goals there was mutual consent to use the floodplain by increasing its portion in river discharge. The subsequent effect of lowered flow velocities in the river channel should then decrease the bottom shear stress finally leading to reduced bed erosion. Before any engineering work began, several alternatives of flood-spillway directions and of reshaping floodplain morphology were evaluated mainly from the ecological perspective (Fig. 2).

After having selected an ecologically viable alternative that fulfilled at the same time the hydraulic targets and the nature targets, the actual construction design could begin. Because of the project's multiple targets it received additional funding from the Federal State of North-Rhine-Westphalia responsible for flood-control in that area.

The legal administration procedure was initiated including the Environmental Impact Assessment (EIA) and the appropriate assessment procedure under Article 6 of the Habitats Directive in relation to the Natura 2000 sites conservation objectives. The project was legally approved in 2008.

The construction works started in 2009 and should end in 2015. An extensive monitoring programme was launched at the same time this will not only monitor the effects of the measures being undertaken during the construction phase but also after the project has been completed.

Figure 2: Five alternatives for the spillway and lowering the floodplain

All measures for ecological enhancement (e.g. designing a wet grassland, ecological revetment of spillway banks) and for compensation, if needed, are realised simultaneously to the technical construction itself.

Thanks to this integrated planning approach, a win-win-situation was created for both navigational and other stakeholder targets. Although primarily a navigation project the "Flood-spillway Rees" project produces added values for flood prevention, nature value, farming and recreation.

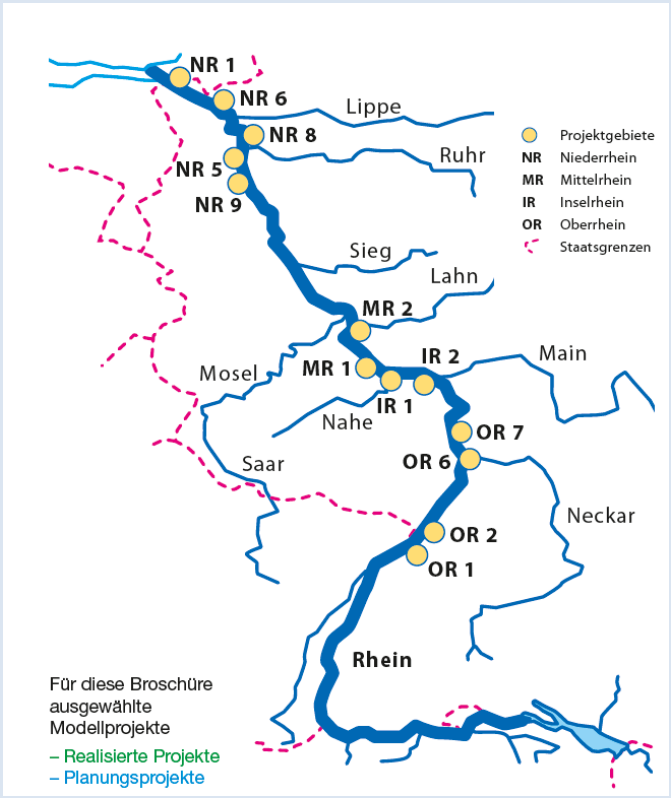
More information: http://www.wsa-duisburg-rhein.wsv.de/Projekte/Flutmulde_Rees/index.html

Living Rhine

The Rhine is both the largest inland waterway in Europe and an outstanding river habitat connecting rivers and wetlands between the Alps and the North Sea. There are approximately 200 Natura 2000 sites along the river. The large scale loss of natural hydromorphological structures and dynamics triggered two consecutive NGO led projects (2003-2010) to revitalise degraded river sites along the Rhine waterway. These were initiated under the name 'Living Rhine – River of Thousand Islands' led by the German NGO NABU (BirdLife) and developed step-by-step through trust-building and intense cooperation between environment and transport interest groups (including the establishment of joint advisory boards made up of NGOs, waterway and government experts).

Over the entire project period, 15 local projects were planned and 7 have been implemented so far. Funding came from various public and private foundations, businesses as well as the EU LIFE and Interreg IIIb funds. They were financed and executed by federal and local administrations as well as NGOs. The projects include for instance the removal of various bank protections, the reconstruction of groynes and restoration of side-channels. A monitoring programme to verify the impact of the restoration measures and a communication strategy helped also secure wide public awareness and political support for this initiative.

More information on: www.lebendiger-rhein.de



Modification of groynes at Elbe riverbanks (DE) [50]

More than 6900 groynes have been installed to stabilise the riverbed at mean water level and assure the navigability of the river Elbe. The fixing of the riverbed in this way however resulted in the severe loss of structural diversity along the river banks and the regular incline of the groynes induced a longterm siltation process in the groyne fields leading to a loss in typical riverine habitats such as scours and gravel banks.

In parts of the middle Elbe river, where regulation measures were not properly maintained before German unification around 1500 groynes were fully or partially damaged and had therefore lost their hydrological function. It was decided to use this opportunity, as part of a waterway maintenance measure to test whether the groyne could be made more ecological. Two types of groynes were built: type I involved the construction of a v-shaped groyne inclined on the bank side and declined on the riverside. Type II involved an inclined groyne lowered by 1.20 m below mean water level on the riverbank side.

The monitoring results indicate that the new groyne designs have increased hydromorphological dynamics at the riverbanks which will in turn decrease the aggredation processes in the groyne fields. The improved structural diversity in the groyne field is also improving the condition for aquatic fauna, especially juvenile fish whilst having no negative consequences for navigation. Long term monitoring will determine the final ecological efficiency of these new designs. More information on: http://www.bafg.de

Creation of side channels along the Main (DE)

Along the river Main at km 151.96-152.53 the river channel was fixed by groynes and the former floodplain became elevated (winter and summer dikes) and transformed into agricultural land and sand and clay extraction pits. The specific riverine habitats and lateral hydromorphological connectivity was lost as a result.

Pursuant to the domestic nature conservation act, several compensatory measures were put in place which included:

a) Creation of three side channels in 1996-1999. A permanent channel of 2 km, a 1 km channel flowing approx. 265 day/year and a channel flowing approx. 100 days/year.

b) 200 m rehabilitation of riparian zones by planting willows and transforming sandy beaches to softwood forest.

This was accompanied by measures to decrease grazing intensity and by monitoring.

The measure created dynamic riverine habitats typical for the river Rhine and the species associated with these habitats. There was a much improved diversity in flow conditions and inundation frequencies, erosion and sedimentation. This restored typical habitats provided valuable areas for rheophilic fish and macro-invertebrate species in particular (higher diversity than in groyne fields).

There were no negative effects on navigation other than minor sedimentation in the main channel at entrance of largest channel. The width of the floodplain is only several hundreds of meters compared to several kilometres in a natural state.

[50] Some of the following examples are extracted from the WFD and hydromorpholgical pressures technical report – case studies - potentially relevant to the improvement of ecological status/ potential by restoration/ mitigation measures - November2006.

3.5.3. Integrating ecological river restoration initiatives into IWT sector plans

In some countries and regions the aim for inland waterway development to contribute to river restoration has become more systematic. In Austria, for instance, the new waterway management and development company 'via donau – Österreichische Wasserstraßengesellschaft' has been carrying out ecological improvement measures along Austrian rivers since 2005.

The legal base for this is laid down in the Austrian Waterways Act (2005) and imposes certain obligations on the company:

- Article 2 - to improve the living conditions of plants and animals along the banks and riparian areas of navigable sections (such as the Danube, March/Morava and Thaya/Dyje Rivers), in particular the planning, development, establishment, restoration and maintenance of habitats;

- Article 3 - to execute all construction and maintenance measures in a near-natural way whenever possible and use best possible environmental care. Such measures must be planned and executed in a way that makes no non-essential interventions into the landscape and ecosystem, and executes all unavoidable interventions as lightly as possible (compensation measures shall be applied as much as possible).

The number of ecological restoration projects carried out by the Austrian waterway administration increased significantly since the 1990s, and includes such projects as the reconnection of old side branches and river bank restoration projects along the Danube River between Vienna and Bratislava where ecological measures have also been undertaken in the free-flowing section of the Austrian Danube, the Wachau.

The German Federal Water Act (WHG, 2009) and the Act on Federal Waterways (WaStrG, 2007) also aim to ensure that inland waterway developments contribute to fulfil targets of the European Water Framework Directive (WFD, 2000).

The Act on Federal Waterways (WaStrG) stipulates that, in waterway maintenance, development and new-construction projects, the requirements of the natural balance have to be taken into account, and the appearance of the water landscape and its recreational value must be considered. The natural foundations of life must be preserved, and the management objectives of the Water Framework Directive have to be considered (Article 8(1) and Article 12(7)).

As a result of these obligations, Wasser- und Schifffahrtsverwaltung des Bundes (WSV) has developed a long experience of ecologically oriented measures on federal waterways. These experiences result primarily from the implementation of the regulations of interventions pursuant to the Federal Nature Conservation Act (BNatSchG) in the framework of new construction and development projects, but also from the practice in maintenance[51]).

[51]. A collection of case studies has been compiled by the Bundesanstalt fur Gewässerkunde (bfg) and is available under www.icpdr.org/icpdr-files/15083

4. THE IMPORTANCE OF INTEGRATED PLANNING

4.1. The benefits of an integrated approach to project planning and design

As the previous chapter illustrated, rivers are complex dynamic ecosystems that are used by a wide range of stakeholders. In order to develop a sustainable waterway infrastructure which aims to minimise negative impacts, it is clear that IWT planners need to be fully aware of this wider environmental context.

The old-fashioned way of developing a project, be it for transport or for any other interests, is to first design the project for that purpose and then, afterwards, to consider wider environmental and other river use issues. However, this often results in such issues being taken into consideration at a relatively late stage in the project planning process. In practice, project developers often have very little interaction with experts from the environmental sector before the project is submitted for an environmental impact assessment.

When the design concept is already so far progressed, the environmental impact assessment necessarily becomes an exercise in damage limitation and, even though all the rules governing environmental impact assessments are followed thoroughly, there is no guarantee of success. This traditional type of approach to project design and planning can also lead to long discussions with planning authorities, other interest groups and NGOs during the public consultation phase because this is often the first time that these bodies learn about the project. This can, in turn, cause significant delays to the planning process and incur additional costs.

Recognising the need for a more **holistic and integrated approach** to project planning that reconciles sometimes conflicting interests, more and more infrastructure planners are now adopting a new approach to project planning and design. It is one that considers both the infrastructure and the ecological needs together with other land uses of the river at the outset and factors these into the initial project design. It also promotes a more interactive and transparent planning process and encourages the active assistance and input from ecologists and other stakeholders right from the outset.

Whilst it is true that preparing and executing such an integrated planning process may require a more substantial initial investment there is increasing evidence to show that this type of approach almost invariably delivers substantial benefits that far exceed the initial extra investment required.

In particular integrated planning can:

- Provide inland waterway planners and authorities with greater certainty over the success of their planning application because environmental concerns are taken into account already during the initial project concept when there is more flexibility in the design.
- Be more cost effective in the long run. Traditional infrastructure projects often face considerable practical problems (and costs) in trying to incorporate environmental improvements or mitigation measures into an already completed design and long delays in getting planning permission due to opposition during the public consultation process.

- Lead to more holistic solutions that can serve various sectoral interests and needs at the same time as well as improve cross-sector communication. If other sectors are involved in the initial scoping stage of the project, their ideas or suggestions can be taken into account already at the initial project design stage. This would enable the project to not only improve transport but also to contribute to other policy objectives such as flood protection or river restoration. Such win-win solutions have proven to be particularly useful on already degraded rivers where new inland waterway developments can be coupled with measures to restore the ecology of the river itself thereby, leading to improvements for both navigation and the river ecosystem.
- Lead to the development of new, creative and innovative solutions which are unlikely to have been explored under the more classic sectoral approach to project planning.
- Contribute to an improved public image of the project and the institutions responsible. By informing the public and involving key stakeholders during the entire planning process and not simply at the impact assessment stage, many of the delays caused during public consultation can be effectively overcome, especially if the stakeholders can see that a transparent planning process has been applied and they have been given an opportunity to comment and influence the project design from an early stage in the planning process.

It is for these reasons that the European Commission strongly recommends the use of the integrated approach for planning inland waterway projects, especially when applying for (co)financing under EU Programmes such as the TEN-T, Structural or Cohesion funds, and, as of 2014, the Connecting Europe Facility.

The integrated approach is especially important when dealing with developments which may affect one or more Natura 2000 sites as it will enable the planners to consider the ecological requirements of those sites at an early stage in the design process and take specific account of the site's conservation objectives. Whilst this may not guarantee the success of the project application it should considerably facilitate the authorisation process.

There may however be occasions where a project might simply not be compatible with conservation objectives of the Natura 2000 sites, particularly on relatively unaltered river systems. Nevertheless, thanks to the integrated planning approach this conclusion should become evident very early on and steps can be taken to avoid impacts on Natura 2000 sites where possible.

PIANC Position paper: Working with nature[52]

In October 2008 the world association for waterborne transport infrastructure (PIANC) issued a major new position paper entitled 'working with nature' which calls for an important shift in approach to navigation development.

"Working with nature" is an integrated process which involves working to identify and exploit win-win solutions which respect nature and are acceptable to both project proponents and environmental stakeholders. It is an approach which needs to be applied early in a project when flexibility is still possible. By adopting a determined and proactive approach from conception through to project completion, opportunities can be maximised and - importantly - frustrations, delays and associated extra costs can be reduced.

"Working with nature" requires that a fully integrated approach be taken as soon as the project objectives are known – i.e. before the initial design is developed. It encourages consideration of how the project objectives can be achieved given the particular, site-specific characteristics of the ecosystem.

[52] http://www.pianc.org/downloads/envicom/Workingwithnaturepressrelease.pdf

"Working with nature" is about more than avoiding or mitigating the environmental impacts of a pre-defined design. Rather, it sets out to identify ways of achieving the project objectives by working with natural processes to deliver environmental protection, restoration or enhancement outcomes.

Fundamentally, therefore, "working with nature" means doing things in a different order:

establish project need and objectives;

understand the environment;

make meaningful use of stakeholder engagement to identify possible win-win opportunities

prepare initial project proposals/design to benefit navigation and nature

"Working with nature" thus requires a subtle but important evolution in the way we approach project development. We need to move towards an approach which:

focuses on achieving the project objectives in an ecosystem context rather than assessing the consequences of a predefined project design;

focuses on identifying win-win solutions rather than simply minimizing ecological harm.

For further details go to http://pianc.org/workingwithnature.php

4.2. Application of the integrated approach in international river conventions

This integrated approach is increasingly used in a number of major international and national fora, notably in connection with the Danube river and through the Worldwide Association for Waterborne Transport Infrastructure (PIANC).

In 2007, the International Commission for the Protection of the Danube River (ICPDR), the Danube Commission and the International Sava River Basin Commission joined forces to initiate an intense, cross-sectoral discussion with stakeholders from different countries, sectors and interests on how to ensure sustainable IWT activities along the two rivers. This led to the adoption of a "Joint Statement on Guiding Principles on the Development of Inland Navigation and Environmental Protection in the Danube River Basin" in 2008.

The "Joint Statement" is now being used by all range states as a recommendation for:

- development of the "programme of measures" required by the EU Water Framework Directive;
- maintenance of the current inland navigation;
- planning investments in future infrastructure and environmental protection projects.

Recommendations from the Joint Statement on Guiding Principles on the Development of Inland Navigation and Environmental Protection in the Danube River Basin[53]

In order to implement an integrated planning approach for all plans and projects all involved stakeholders need to agree on common planning principles leading to acceptable solutions for ecological integrity as well as navigation. Such planning principles should be applied to every project within the Danube river basin and include at least the following steps, but first and foremost, joint planning of projects seeking both environment and navigation improvements as the key to accelerate the process.

[53] http://www.icpdr.org/icpdr-pages/navigation_and_ecology_process.htm

To implement the planning principles the following criteria should be applied during the design phase of navigation projects:

- use a case-by-case approach which considers both the ecological requirements for river sections and the basin-wide scale and the strategic requirements of IWT at the basin-wide scale when deciding on adequate fairway width and depth;
- "working with nature" wherever possible through implementation of measures according to given natural river-morphological processes following the principle of minimum or temporary engineering intervention;
- integrated design of regulation structures, equally regarding hydraulic, morphological and ecological criteria;
- implementation of measures in an adaptive form (e.g. river bed stabilisation by granulometric bed improvement, low water regulation by groynes);
- optimal use of the potential for river restoration (e.g. river banks restoration) and side channel reconnection;
- ensuring that flood water levels are not exacerbated and, ideally, are reduced.

In order to provide further guidance on how to apply integrated planning principles, a "Manual on Good Practices in Sustainable Waterway Planning" was prepared under the EU PLATINA project. Published in 2010, the manual provides a practical guide for IWT planners across Europe on how to organise and implement a balanced and integrated planning process for IWT activities.[54]

The manual identifies four essential features of an integrated planning process:

- defining integrated project objectives combining IWT aims, environmental needs and the objectives of other uses of the river reach such as nature protection, flood management and fisheries;
- integrating relevant stakeholders right from the initial phase of the project;
- carrying out an integrated planning process to translate the IWT and environmental objectives into concrete project measures, securing win-win results wherever possible;
- conducting comprehensive environmental monitoring before, during and after the project works to enable an adaptive implementation approach if necessary.

The following recommendations for carrying out an integrated planning approach draw heavily on the above mentioned manual. For a more detailed guidance it is advised to consult the manual directly.

4.3. Applying an integrated planning approach in practice

Each plan or project is of course different and its exact design as well as the extent of integrated planning it requires will be highly dependent upon a wide variety of issues, including the ecological condition and value of the stretch of river involved, but the process for integrated planning remains largely the same whatever the type of project or plan. The basic steps are briefly summarised below and in section 4.4 (as regards stakeholder dialogue).

[54] http://www.naiades.info/platina/downloads

4.3.1. Defining the scope of the project

The starting point of an inland waterway development project should be the identification of **transport needs**. This phase includes a review of the existing national and international policies and strategies to develop the transport network and infrastructure. The main focus, however, is on defining a project that will meet the specific international and regional inland waterway transport needs for the flows of goods and passenger movements being served, taking into account economic and cost-benefit aspects as well as environmental protection requirements.

The next step should be the identification of **environmental needs** of the river and their surrounds. For instance is the river in an already degraded state or is it still relatively pristine? What are the main functions, processes and features that characterise the river and that must be maintained to ensure that it does not deteriorate further, or that could be restored to help improve its ecological condition.

Special attention should be paid to identifying the ecological requirements of any EU protected species and habitat types that are present. In the case one or more Natura 2000 sites might be affected it will be important to find out which species and habitat types of European importance the site has been designated for, what their conservation condition is within each site and what conservation objectives have been set to ensure their long term survival. The Natura 2000 management plans or EU Species Action Plans[55] where they exist also provide a useful source of information in this respect.

Developing integrated projects that support the Natura 2000 site's conservation objectives

As explained in chapter 2, each site is included in the Natura 2000 network because it is of conservation value for one or more of the habitat types listed in Annex I or species listed in Annex II of the Habitats Directive, or species listed in Annex I of the Birds Directive plus regularly occurring migratory bird species. This conservation value of the site is recorded in a **Standard Data Form**[56] (SDF) which is prepared for each site. The SDF records the ecological characteristics of the site which led to its designation as a Natura 2000 site and provides a broad assessment of the conservation condition of each species or habitat type on that site (scored A to D).

These SDFs are used for setting **conservation objectives for each Natura 2000 site**. At a minimum, the conservation objective will be to maintain the conservation condition of species and habitats for which it was designated and not to allow this to deteriorate further (as compared to its status in the SDF). However, as the overal objective of the directive is for the species and habitat types to reach a favourable conservation status, more ambitious conservation objectives may be set to improve the conservation condition of these species and habitat types on a site.

An integrated waterway management project will aim to take account of the Natura 2000 site's conservation objectives and look for ways of integrating these objectives with those for inland waterway transportation with a view to create possible win-wins wherever possible, or at least achieve a maximum gain/ minimum loss scenario.

The needs and policy objectives of other users of the river within the area should also be identified at the outset and examined in detail in order to understand their policy plans and priorities and their on-going activities (e.g. in the field of flood retention, irrigation, water supply, tourism, etc.).

[55] Over 50 EU Bird Species Action Plans have been developed so far: http://ec.europa.eu/environment/nature/conservation/wildbirds/action_plans/per_species_en.htm

[56] SDFs can be accessed through the Natura 2000 viewer http://natura2000.eea.europa.eu/ and are available from authorities responsible for Natura 2000 in each country/ region.

All this information will help to ensure that the project is designed in a way that is as compatible as possible with, and if possible supportive of, the environmental objectives for the river and with the needs of the other river users. It may also highlight opportunities to "join forces" in order to develop a project that helps not only to meet the transportation needs but also addresses other policy priorities along the river as well – e.g. flood protection and river restoration (see box on examples of win-win solutions.).

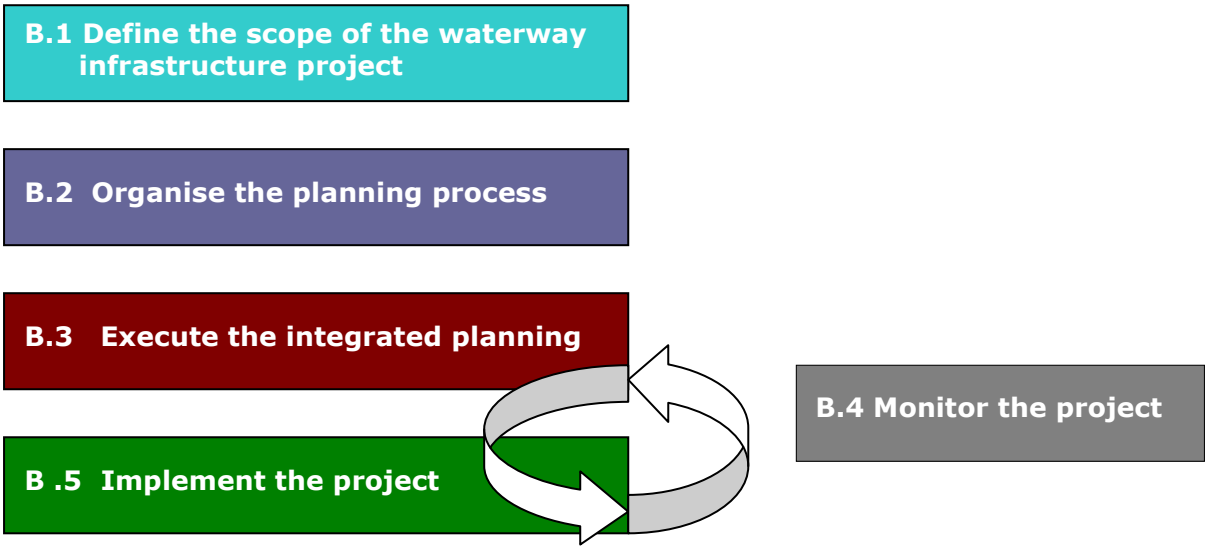
However, it should be recognized that sometimes no common ground can be found between the different interests and that it may not always be possible to implement the planned project because other societal and environmental interests are ranked higher.

4.3.2. Preparing an integrated project

Once this initial scoping has been completed and the integrated project objectives have been identified in function of transport needs and other requirements and priorities for the river, the next step will be to start planning the project design in detail. For this it will be important to establish a clear organisational structure to take the project forward. This might involve, for instance, establishing a multidisciplinary project design team made up of river engineers and river ecologists who will be responsible for carrying out the detailed project planning.

Depending on the scale and scope of the project it may also be useful to set up an interdisciplinary advisory board that can assist in, and advise on, the orientation of the project objectives and measures during the project development phase – particularly in light of their compatibility with other land use activities and plans in the region and with the river's conservation needs.

The advantage of having a multidisciplinary team is that the initial project design scenarios can be developed with the river's ecological functions in mind from the outset (e.g. following a detailed survey of the current ecological conditions of the river). The various scenarios can then be tested out in terms of their potential impact on the river system. This way, adjustments can be made or alternatives considered that minimise the impact on the river before the detailed blueprints for the project are drawn up. It can also help to identify the most cost effective ways of integrating these ecological requirements into the project.



4.3.3. Preparing for the necessary impact assessment procedures

The detailed consideration of technical alternatives and possible variants within the chosen alternatives at the outset not only improves the overall quality of the planning results but is also very useful for the relevant environmental impact assessment that may be required later on. Integrated projects are likely to have gathered a lot of information on the environmental condition of the rivers and on the species and habitats present. They may also have carried out detailed surveys on the ecological status of the river prior to devising the project in order to identify the potential effects –both negative and positive - the project could have on the river. All of this data and information will be very useful for carrying out any subsequent environmental impact assessments of the project prior to its approval as they will help to build up a sound baseline of data and so aide in the assessment of impacts.

They may also have been used to redesign elements of the project or introduce mitigation measures which aim to minimise and mitigate against any possible effects. This again will help with the environmental impact assessment procedure which should, in turn, speed up the decision making process.

An example of an integrated river engineering project on the Danube east of Vienna

The Donau Auen National Park, east of Vienna in Austria, covers a total area of 100 km² and incorporates a 36 km reach of the Danube, all of which is in Natura 2000. It is one of the last major floodplain areas left in central Europe and is exceptionally rich in biodiversity. The former flooding regime of the Danube used to exhibit highly diverse water level fluctuations but this was altered many years ago when several kilometres of flood alleviation embankments and river regulation measures were put in place. The disconnection between the river and the floodplains and the alteration in flood duration and frequency resulted in the drying up of large areas of wetland.

In 2002 the Austrian Federal Ministry of Transport and via donau (the Austrian Waterways Authority) initiated an integrated expert process for an "Integrated River Engineering Project on the Danube East of Vienna" (IREP). The project aimed to balance the interests of inland navigation with the environmental needs of the Danube Floodplains National Park and the conservation objectives of the Natura 2000 site in particular.

The joint process started by looking at the state of the river. It concluded that this free-flowing section of the Danube downstream of Vienna has long been subject to river bed degradation (erosion of 2-3.5 cm/year), leading also to a lowering of the groundwater table. At the same time, insufficient fairway depths during low water periods and strongly varying fairway conditions were hindering the smooth passage of inland navigation. A chain of hydropower plants upstream of the project area, river regulation and bank protection measures had also reduced former morpho-dynamics in this river reach and floods had led to sedimentation of side channels and the inundation area.

The IREP planning process included the following steps:

- First, an Interdisciplinary Steering Group (ISG) consisting of well-known experts from the fields of hydraulic engineering, ecology, inland navigation and regional economy was established. The group analysed in detail several alternatives and some 11 different variants for developing the Danube section east of Vienna. The preferred alternatives were discussed intensively and improved on over several years.

- In parallel to these discussions, a wider stakeholder involvement process was carried out to discuss the interim results of the ISG. This process involved about 40 stakeholders representing NGOs, affected ministries, authorities, communities, the navigation sector, the national park and others. This resulted in proposals for modifying the scenarios which were then assessed and improved by the ISG and the planning team in an intense discussion process.

The environmental impact statement (incorporating the appropriate assessment under Article 6 of the Habitats Directive) was finalised, and accepted by the ISG in 2006. After a total planning period of some three years where both ecology and navigation experts were willing to find a compromise, an agreed set of measures was defined, aiming for a win-win situation for both ecology and navigation. The IREP was thus prepared to improve the navigability as well as to sustain river bank restoration and the lateral connectivity of river with national park side-arms.

The measures leading to a significant improvement of ecology included:

- The granulometric bed improvement: an approximately 25 cm thick layer of 40 to 70 mm coarse gravel material will be added to the bed surface, focussed to pool reaches, to reduce bedload transport capacity and minimise bed degradation.
- River restoration for improving the ecological status consists of riverbank restoration (removal of bank protection at inner bends, allowance of side erosion), side-arm reconnection and the stop of river bed degradation.
- Optimisation of the existing low water regulation: east of Vienna, higher water levels during low flow conditions are a common goal for navigation and ecology. Higher water levels compensate for many years of river bed degradation and improve the reconnection of side-arms. The shape and arrangement of groynes are optimised under ecological criteria, reducing their total number and the length of engineering structures. At the same time the new shape will lead to more dynamics along the river bank.

The measures for the improvement of navigation were:

- optimization of the existing low water regulation to increase its effectiveness, to reduce sedimentation in groyne fields and to reduce maintenance efforts;
- dredging and defined refilling of material (leading to a sediment balance);
- the relocation of certain sections of the existing navigation channel in order to use deeper zones for navigation purposes; this measure also reduces the requirement for dredging;
- granulometric bed improvement; the reduced bedload transport also reduces the need for maintenance dredging.

The realisation of these innovative measures will be carefully monitored by an interdisciplinary team to measure their success. For details go to www.donau.bmvit.gv.at

The Seine Scheldt Waterway link integrating Lys River restoration

The Seine-Scheldt project is one of the 30 priority projects of the TEN-T programme. The Seine-Scheldt link will connect the Seine basin with the Scheldt basin. A new canal will be constructed between Compiègne and Cambrai on French territory and navigability improvements, allowing class Vb on the waterway, will be realised between Deûlémont and Ghent, mainly on Flemish territory. In Belgium, the river Lys, which is 55 kilometres long, forms a part of that link. In the past, this river was canalised and many of the old branches of the river were cut off from the new river. The dynamic system of the river and its valley and moreover the whole landscape was totally changed as a result.

According to the WFD, every Member State must establish a framework for the protection of freshwater bodies in order to secure water supplies as well as to enhance water quality and to mitigate effects of floods and droughts. As a result, the Flemish government decided to incorporate the implementation of the directive directly into the Seine-Scheldt programme, under the name of “Lys river restoration”.

The overall program was tackled as an “integrated area directed policy study”. The methodology consists of different stages, all of which focus on the incorporation of different points of view, whether ecological, economical or technical. Although interviewing all possible stakeholders is very time consuming, one can expect that the total time spent on the study and on the execution of the program will be far less than would be the case when using conventional techniques. In this way, beside the

purpose of the realisation of an inland waterway of European magnitude, the ambition is also the optimisation of the water management, the natural character of the river and its valley, the potentiality of recreation, the historical heritage and the spatial qualities of the surroundings by seeing the Lys river as an arranging element in a spatial structure.

River restoration can be defined as the total set of actions that lead to the restoration of natural conditions and natural processes that are essential for the dynamic balance of the river ecosystem. Such a river ecosystem is built from specific geomorphological components, such as a meandering river, natural embankments and a winter bed which only floods at high water levels, thus creating spawning and breeding places for fauna and good conditions for typical river flora.

The vision of the Lys river restoration project is the Lysas a green valley, containing the canalised Lys as a hard backbone and the natural, meandering Lys as the soft backbone. The canalised Lys is important for economic functions as transportation and industry, and technical functions, such as flood risk management. Although the canalised Lys is the hard backbone of the river, its embankments are constructed according to environmental approaches.

For the meandering Lys, two major objectives are formulated: the protection of the historical landscape on the one hand, and the restoration of the ecological values on the other hand. This more natural meandering Lys will aim to provide the soft functions of the river system, such as recreation, ecology and agriculture. In developing the related opportunities, the overall continuity alongside the Lys river was always be kept in mind.

Although none of the stretch of the Lys is currently in Natura 2000 it could well be that some day, that rare and endangered species, such as the kingfisher, reappear along this river in due course thanks to the restoration of the river in the context of the TEN-T project.

For further details go to: www.seineschelde.be

Monitoring the impact of navigation project on the lower Danube (Romania)

In 2011 a comprehensive monitoring programme was elaborated to monitor the impacts of a major navigation project along a stretch of the lower Danube between Calarasi and Braila. According to the agreement concluded between the River Administration for the Lower Danube and the international consortium contracted for carrying the monitoring work, the monitoring project should aim to ensure that the impact of the project on the aquatic and terrestrial ecosystems are minimized, mainly concerning Natura 2000 features and sturgeon migration. In particular, it entailed a commitment that, if it appeared that sturgeon migration would be affected by the original design, alternative designs would be used - particularly for the bottom sill.

The monitoring programme will also ensure compliance with the Environmental Management Plan and the use of best environmental practices, as well as prevent and control any risks of accidental pollution of any activity that may result from the construction activities.

The monitoring started in spring 2011 and within six months the following progress was achieved:

- 10 acoustic telemetry cable arrays have been installed;
- 8 more acoustic telemetry automatic receivers were installed using a new system with textile ropes and Hull anchors;
- 14 acoustic transmitters have been implanted to adult sturgeons (10 stellate sturgeons, 2 belugas, 1 sterlet, 1 Russian sturgeon);
- potential wintering and spawning sites were detected on Borcea branch and are now being monitored;
- young sturgeons of 2011 (sterlets, stellate and beluga sturgeons) were captured;
- data on movements/behaviour of tagged sturgeons were downloaded from automatic receivers in July and October 2011 and currently are being interpreted.

For further information go to River Administration of the Lower Danube website (www.afdj.ro).

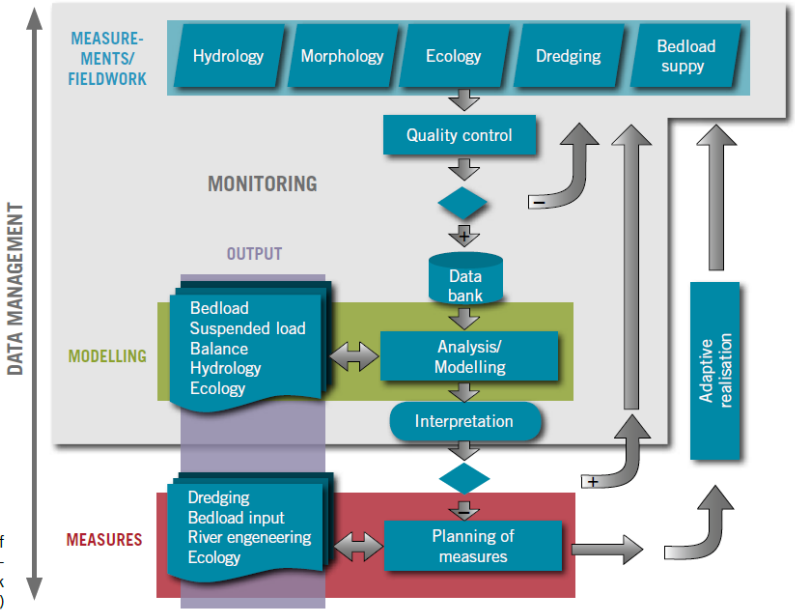
4.3.4. Establishing an integrated monitoring programme to accompany the project

In light of the ecological dynamics and increasing climatic uncertainties surrounding river ecosystems, monitoring new river modifications technically and ecologically, and in an integrated manner, is also of key importance to ensure that there are no unforeseen repercussions from the project over the long term on either the river or on transportation.

In the case of inland waterway projects potentially affecting Natura 2000 sites, the monitoring programme should ideally include regular surveys of the status of the habitats and species for which the site is designated to confirm that they have not been affected by the project and that the mitigation measures which were introduced were effective in avoiding any deterioration in their conservation state. This monitoring may sometimes identify an unforeseen problem that could not have been predicted in advance. The monitoring programme should foresee a procedure to allow for taking corrective or adaptive measures to be taken to respond to this unforeseen problem as required.

The timing, degree and focus of the monitoring programme will depend on the type and complexity of the works, but should be defined in the planning process and then re-assessed

at regular intervals. Ideally the post project monitoring of the project objectives (increased navigability, restored habitats, etc.) should be verified over a period of five years or more (recommendation of the PLATINA Manual). The possible interaction between planning, adaptive implementation and monitoring is shown in the following table from the PLATINA manual.



Schematic flow chart of the integrated monito-ing concept (Habersack et al., 2004)

The Integrated SIGMA plan: protecting against flooding by making room for the river

The use of integrated planning is a very effective tool for plans and programmes as well for individual projects). The new SIGMA plan in Belgium is an example of how such an integrated plan has been successfully developed and implemented.

After the disastrous floods in 1976, the planners decided to develop a flood protection plan, called "SIGMA plan". As scientific knowledge evolved, it became clear that due to global warming, sea levels will rise and the SIGMA plan had to be adapted to this. Therefore a revised SIGMA plan was developed in 2005. The objective remains the same: to protect the Scheldt basin against floods caused by the North Sea and, through dialogue and consultation with other sectors and stakeholders, combine this objective with other objectives such as nature conservation and recreation to the mutual benefit of all.

This lead to the adoption of the SIGMA plan which provides a development framework that maintains a balance between environmental, economical, societal and agricultural evaluations. All projects identified within the SIGMA plan have been developed on the basis not only of detailed technical analyses of the effectiveness and feasibility of measures but also through close collaboration with experts from the other relevant policy sectors in order to maximise the potential for win-win solutions.

Throughout the entire process, particular attention was paid to various EU directives, including:

- **Birds and Habitats Directives**: the Scheldt estuary is a Natura 2000 site with defined conservation objectives for species, functions and required minimum areas of different habitats. Special attention was therefore paid in every planning step to the Natura 2000 goals and the nature component of the SIGMA plan is now specifically designed to reach the Natura 2000 conservation objectives.

- **Compliance with the Flood Risk Directive:** historical records, together with new flood hazard and flood risk maps, were used to prepare a flood risk management plan, taking into account aspects of costs, benefits, strategic environmental impact analysis, transboundary effects and strategies as well as the work related to the WFD river basin management plans and communication with the public.

The "most desirable scenario" for the Scheldt estuary is an optimised consensus scenario that was constituted interactively during the environmental impact assessment procedure for the Sigma flood defence plan and that has a certain degree of societal acceptance. The ratification of the integrated SIGMA Plan by the Flemish government paved the way for a Long Term Vision for the Schelde (LTVS) estuary in the Flemish part of the Scheldt estuary, which aims to integrate as much as possible the transport and flooding objectives with the requirements and objectives of the WFD and Bird and Habitats Directives.

The concept agreed upon involves the controlled inundation during dangerous water levels in the tidal river. The original Scheldt dike will become an overflow dike where the rising waters are directed into a controlled area until the Scheldt level allows drainage via an outlet. The integration of ecological objectives into the SIGMA plan will also lead to the restoration of several ecologically valuable habitats (500 ha of mudflats, 1500 ha of tidal marshes, 1500 ha of grassland, 2000 ha of reed and riparian zones and 400 ha of marsh woodland).

The SIGMA plan is part of the LTVS estuary which aims for the “development of a healthy and multi-functional estuarine water system that can be utilized in a sustainable way for human needs”. This Dutch-Flemish management plan sets quality targets for the condition of the estuary by the year 2030 and the management measures required to achieve them.

MONEOS is an integrated monitoring plan designed to follow up the evolution of the ecosystem ecological status, safety against floods and accessibility. An integrated evalutation system is being developed to assess distance to LTVS targets as well as the WFD ecological status and the improvement in the conservation status of habitats and species protected under the Birds and Habitats Directives. .

Further details available from http://www.gogkbr.be/index.php?page=sigmaplan&hl=en_US

4.4. Early consultation

Early consultation with environmental stakeholders, and indeed all stakeholders, is important in ensuring that acceptable and sustainable solutions are found. It is equally important to reach a common understanding of the issues at stake and to foster a co-operative search for solutions, especially if the ecological impacts of a project prove not to be amenable to conventional mitigation approaches.

In an analysis of a range of case studies done under the framework of the European Conference of Ministers of Transport, 2006[57], it was found that all conflicts identified stemmed from failure to involve environmental stakeholders early enough in project planning. Expensive procedures were then required to seek compromises after lengthy and costly delays. Ideally, stakeholders and the wider public should participate in all stages of project development. Participation is especially important in the project definition phase and in the process of working out realistic alternative solutions for problematic projects.

European legislation and procedures are not very specific on the arrangements for public consultation and participation and usually envisages formal steps for public consultation only after completion of environmental impact studies and submission of projects for approval.

[57] OECD report: Inland waterways and environmental protection by the European Conference of Ministers of Transport ECMT 2006: http://www.internationaltransportforum.org/europe/ecmt/pubpdf/06WaterEnv.pdf

But, this should not prevent project developers from making their own arrangements for organising the process of public consultation from as early on as possible in the project's development.

The general objectives of any communication and active involvement strategy should be to:

- ensure a transparent planning and decision-making process of the infrastructure project and an openness as regarding all relevant information and data;
- raise awareness about the overall project objectives and related issues of the project;
- gain public support for the planning process and project implementation;
- integrate key stakeholders in the planning phase to create an atmosphere of mutual trust and respect, and thus facilitate the public acceptance and successful implementation of the project.

In practice the following are particularly important for ensuring a successful stakeholder consultation and participation process:

- Timing of public participation: Public involvement should begin in the earliest stages of a project so that environmental information can be used in the consideration of alternatives for design, location and financial arrangements. Public involvement should continue throughout the environmental assessment process and project cycle.

- Identifying relevant interest groups: Identification of the relevant interest groups or stakeholders is critical to successful public involvement, whether it concerns a policy, plan, program (e.g. sectoral or regional) or project. Analysis of the social composition of the society in which the project is planned will also help ensure that all relevant social actors or stakeholders are identified and included in consultation. In addition, social analysis will identify local values, organisational structures and approaches to communication, negotiation and decision making.

- Choosing the right form of communication and consultation: Public involvement can range from simple dissemination of information to consultation and through to full participation in decision making:

  - **Informing***:* one-way flow of information from proponent to public.

  - **Consulting**: two-way flow of information between proponent and public, giving the latter an opportunity to express views.

  - **Participating**: two-way flow of information and ideas in which the proponent and the public are involved in shared analysis and agenda setting and the public is voluntarily involved in decision making on project design and management through consensus on the main elements. It should be noted that good public participation processes go beyond simply introducing formal consultation procedures. They enable stakeholders who are participating to also provide technically qualified and relevant contributions.

  The level of public involvement required for a specific project will vary according to the social and political context. A participation matrix can be drawn up for each of the main stakeholder groups to help determine the appropriate degree of participation. The matrix also can be used as a systematic tool for defining roles and responsibilities of a stakeholder and identifying areas of potential disagreement between groups.

- "Ownership" and commitment: Early consultations with potentially affected groups can improve the environmental information supplied to decision makers (e.g. through identification of environmental impacts or the design of suitable mitigation measures), thus minimising conflict and delay. In addition, genuine efforts to provide the public with information and respond to suggestions or concerns helps prevent miss understandings and can result in more widely accepted projects with a greater sense of local ownership.

Undoubtedly, public consultation and participation can be time-consuming and demanding, but when used positively they will improve a project, reduce antagonism and enhance the potential for long-term success.

Techniques for public involvement

A range of methods and techniques can be used to promote public involvement. During the early stages of a project, when the intention is to maximise public contact, mass media and public displays or leaflets describing the project and its objectives and potential positive and negative impacts may be the most appropriate mode of involvement.

As the proposal progresses, workshops and small group meetings may be the best way of identifying problems relevant to specific interests. Identifying which possible representatives of affected groups of local people will be most effective in communicating these groups' views can be a useful strategy. Representatives can advise and help organise public involvement and reduce the risk of a breakdown in communications between stakeholders.

Other good practice principles that help ensure successful public involvement:

- Develop a public involvement framework as early as possible to establish the scope, timing and resource requirements necessary to support the process.
- Identify the participants or stakeholders and establish their legitimacy and representativeness (using social analysis). Not all social actors can or should be consulted on every detail of the proposed project.
- Identify appropriate techniques of public participation/communication and provide relevant information in an easily understood form.
- Hold events at a time and venue that will encourage maximum attendance and free exchange of views by all interested groups.
- Allow stakeholders sufficient time to assimilate the information provided, consider the implications and present their views.
- Identify mechanisms to ensure that decision makers consider stakeholder views and suggestions, e.g. by integrating recommendations into the environmental assessment report, financing proposal and agreement.
- Ensure that responses and feedback are given on any issues or concerns raised.

Source: OECD report: Inland waterways and environmental protection by the European Conference of Ministers of Transport ECMT 2006[58].

[58] http://www.internationaltransportforum.org/europe/ecmt/pubpdf/06WaterEnv.pdf

5. CARRYING OUT AN APPROPRIATE ASSESSMENT OF IWT DEVELOPMENTS LIKELY TO HAVE A SIGNIFICANT (NEGATIVE) EFFECT ON NATURA 2000 SITES

5.1. Introduction

Strategic planning and integrated management approaches based on the concept of 'working with nature'[59], as described in the previous chapter, can do a lot to help find win-win solutions for reconciling different societal needs. They should also facilitate the environmental approval procedure of the plan or project.

As stated before, EU nature legislation does not exclude development activities in and around Natura 2000 sites. Instead, it requires that any plan or project that is likely to have a significant negative effect on one or more Natura 2000 sites undergoes an appropriate assessment (AA) in accordance with Article 6(3) of the Habitats Directive in order to assess the implications of that plan or project on the site(s).

This chapter provides a step-by-step guide on how to carry out an appropriate assessment under Article 6, paying particular attention to inland waterway plans and projects.

Because Natura 2000 concerns Europe's most valuable and endangered habitats and species, it is only logical that the procedures for approving developments that are likely to have a significant negative effect on these sites are sufficiently rigorous to avoid undermining the overall objectives of the Birds and Habitats Directives. Particular attention is therefore given to the need for decisions to be taken on the basis of sound scientific information and expertise. Delays in the approval process are very often caused by poor quality appropriate assessments that do not allow the competent authorities to make a clear judgement on the impacts of the plan or project.

It is also important to avoid confusion over the environmental impact assessments carried out under the EIA and SEA Directives and the appropriate assessment carried out under Article 6(3) of the Habitats Directive. Whilst these asssessments are very often carried out together, as part of an integrated procedure each assessment has a different purpose and assesses impacts on different aspects of the environment. A**n SEA or an EIA cannot therefore replace, or be a substitute for, an appropriate assessment** (see chapter 6**)**.

The outcome of each assessment procedure is also different. In the case of the EIA or SEA assessment, the authorities simply have to take the impacts into account. For the **appropriate assessment**, however, the outcome is **legally binding** for the competent authority and conditions its final decision. Thus, if the appropriate assessment has ascertained that there will be an adverse effect on the integrity of the Natura 2000 site, despite the introduction of mitigation measures, then the plan or project can only be approved if the conditions in the derogation procedure foreseen under Article 6(4) are met.[60]

[59] PIANC 2008.
[60] See European Court of Justice ruling C-418/04.

5.2. When is the Article 6 procedure required?

The procedural and substantive safeguards that must be applied to any plan and project that is likely to have a significant effect on a Natura 2000 site(s) are laid down in Article 6 of the Habitats Directive.

This procedure is designed to:

- Assess the implications of a plan or project that is likely to have a significant effect on a Natura 2000 in view of the site's conservation objectives;
- Ascertain whether these implications will not adversely affect the integrity of the site
- Provide a mechanism for approving plans and projects that do have an adverse affect if they are considered to be necessary for imperative reasons of overiding public interest and if no less damaging alternative solutions exist. In such case compensatory measures must be taken to ensure the overall coherence of Natura 2000 is protected.

Article 6(3) and (4) of the Habitats 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.

Several terms are used in article 6(3) to define when an appropriate assessment is required. It is required for if all of the following criteria are met:

- concerns a plan or a project;
- which is likely to have a significant effect on at least oneNatura 2000 site;
- alone or in combination with other plans or projects;
- but which is not directly connected with the conservation management of the site.

Each of these terms are explained further below.

- <u>Plans or projects:</u>

The directive does not define the scope of the term "plan" or a "project" by reference to particular categories. Instead, the key defining factor is whether or not they are likely to have a significant effect on a site.

The term "project" should therefore be given a broad interpretation to include both construction works and any other interventions in the natural environment[61]. The term "plan" should also be considered to have a broad meaning, and should include any plan or programme that serves as a framework for development consents.

In this context it is worth explaining the relationship between Article 6(2) and 6(3). The intention of these two articles is broadly the same – to prevent deterioration within Natura 2000 sites. In the case of Article 6(2) the intention is to avoid *"deterioration …or significant disturbance".* In the case of Article 6(3) the aim is to avoid any new plans or projects *"adversely affecting the integrity of the site"*.

Because both paragraphs serve the same overall objective, it is follows that any plans or projects which do not require an appropriate assessment under Article 6(3) must nevertheless still conform to the provisions of Article 6(2).[62]

Dredging – when does it require an appropriate assessment?

Capital dredging involves the excavation of materials from the main river channel in order to deepen the channel for ship navigation. If such an intervention is likely to have a significant effect on one or more Natura 2000 sites it will require an appropriate assessment before the works can be approved.

As sediments tend to build up naturally in some rivers, it may also be necessary to carry out regular **maintenance dredging** to keep the river at the required depth. The question has arisen if such regular maintenance dredging works also require an appropriate assessment if they are likely to have a significant effect on one or more Natura 2000 sites.

The only case, in which the European Court of Justice referred to maintenance dredging, was within the context of its judgement C226/08.[63] The case was refered to the ECJ by the Administrative Court of Oldenburg who had been asked rule on whether the city of Papenburg was entitled to prevent the German Federal Government from designating Natura 2000 sites along the river Ems near port town of Papenburg in Lower Saxony. This stretch of river had been deepened in 1994 to enable ships with a draught of 7.3 metres to navigate between the shipyard and the North Sea and has been regularly dredged since in order to maintain this depth. The city of Papenburg cited socio-economic reasons for not designating these sites and claimed that their designation would breach the administrative autonomy, granted to the local communities by the German constitution.

The ECJ ruled that the first subparagraph of Article 4(2) of the Habitats Directive, must be interpreted in such a way that a Member State may only refuse to agree to the inclusion of one or more sites in the draft list of SCI drawn up by the Commission on scientific ground.

Concerning the issue of ongoing maintenance dredging, the Court ruled that: *"Article 6(3) and (4) of Directive 92/43 must be interpreted as meaning that ongoing maintenance works in respect of the navigable channels of estuaries, which are not connected with or necessary*

[61] European Court of Justice Ruling C-127/02.
[62] European Court of Justice Ruling C-127/02.
[63] OJ C 63 of 13.03.2010, p.5 available from http://curia.europa.eu/

to the management of the site (and which were already authorised under national law before the expiry of the time-limit for transposing Directive 92/43), must, ***to the extent that they constitute a project*** *and are likely to have a significant effect on the site concerned, undergo an assessment of their implications for that site".*

Maintenance dredging works normally only maintain a certain state of infrastructure and, under these circumstances, do not qualify as a project in the sense of Article 6(3) of the Habitats Directive. Nevertheless, maintenance operations may sometimes need to be regarded as constituting distinct projects for example because of changing techniques, conditions or regularity under which they are carried out. In such a case each of those projects must, to the extent that they are likely to have a significant effect on the site concerned, undergo an assessment of their implications pursuant to Article 6(3) of the Habitats Directive.

In the same judgement the Court, clarified that: *"If, having regard in particular to the regularity or nature of those works or the conditions under which they are carried out, they can be regarded as constituting a single operation, in particular where they are designed to maintain the navigable channel at a certain depth by means of regular dredging necessary for that purpose,* ***the maintenance works can be considered to be one and the same project for the purposes of Article 6(3)*** *of Directive 92/43".*

Furthermore, the ECJ explicitly granted grandfathering rights to maintenance dredging projects, which were authorised before the expiry of the transposition period of the directive.

In any case, if Article 6(3) does not apply, the provisions of Article 6(2) must still be respected, i.e. appropriate steps must be take to avoid *"the deterioration of habitats and the habitats of species as well as the disturbance of species for which the site has been designated, insofar as such disturbance could be significant in relation to the objectives of the Habitats Directive"*.

Ideally, recurring maintenance dredging should be designed and performed in a way to ensure that they contribute to achieving both navigation Natura 2000 conservation objectives and might even be included into the management plan of the protected area in question.

Maintenance dredging in the Thames, UK

When conflicts arose between the Port of London Authority and environmental associations in terms of environmental implications of maintenance dredging on the tidal Thames they were solved by:

- creating a ‘dredging liaison group’ in order to ensure dialogue and information exchange among stakeholders,
- setting up a web-based GIS information exchange system enabling stakeholders to better understand the location and scale of the dredging activity and participate during the decision making of dredging licence application.

Besides data collection programmes, modelling and monitoring, the whole effort also included a change in the dredging techniques from conventional dredging and disposal to more sustainable sediment management and recirculation. Stakeholders subsequently had greater confidence in the identification and mitigation of ecological impacts and improved planning of dredging programmes in periods of lower ecological sensitivity.[64]

[64] DEFRA guide on sustainable Maintenance Dredging Schemes.

- Which is likely to have a significant effect on a Natura 2000 site

It is clear that the focus of the appropriate assessment is on species and habitat types protected by the Birds and Habitats Directives, and in particular those species and habitats for which the Natura 2000 sites concerned have been designated. The appropriate assessment does not have to assess the impact on other fauna and flora unless they are ecologically relevant for the EU protected species and habitats present on this site[65]. An appropriate assessment under Article 6(3) is therefore narrower in scope than an assessment under EIA and SEA Directives, being confined to implications for Natura 2000 sites in view of their conservation objectives.

As regards its geographical scope, the provisions of Article 6(3) are not restricted to plans and projects carried out exclusively in a Natura 2000 site; they also target developments situated outside Natura 2000 sites but which are likely to have a significant effect thereon. Just because a proposed development is not within the boundary of a Natura 2000 site, this does not exclude it from requiring an appropriate assessment under Article 6(3). The trigger for such an assessement is not based on whether the project is located inside the Natura 2000 or not but on whether it is likely to have a significant effect on a Natura 2000 site and its conservation objectives. For instance a project located upstream of a Natura 2000 site may still cause negative effects to the site located downstream as a result of water flow disruptions or barriers to species migration. In such cases, the project would still need to be assessed according to the Article 6(3) procedure.

This includes the consideration of any likely transboundary effects. If a plan or project in one country is likely to have a significant effect on Natura 2000 site in a second country, either individually or in combination with other plans or projects, then an appropriate assessment must be undertaken which assesses, inter alia, the effects on the integrity of Natura 2000 sites in that second country. This is in line with the Espoo Convention which is implemented within the EU through the EIA and SEA Directives. As those directives cover plans or projects that are likely to require an assessment pursuant to Article 6(3) of the Habitats Directive, it follows that transboundary effects must also be studied in the context of appropriate assessments undertaken under the Habitats Directive.

As stated above the effects need to be determined in function of the species and habitat types for which a particular site has been designated. This will influence how far from the project area one should look for possible effects. For instance, a rare plant which is very localised and only occurs in specialised habitat conditions may only be affected by projects in the immediate vicinity compared to a migratory species which has wider habitat requirements and may therefore be affected by plans or projects further afield.

- *Alone or in combination with other plans or projects*

A series of individually modest impacts may on their own be insignificant but when seen together they may lead to a significant impact. Article 6(3) addresses this by taking into account the combination of effects from other plans or projects. Article 6(3) does not explicitly define which other plans and projects are within the scope of the combination provision but it is is clear that the underlying intention is to take account of cumulative impacts that may occur over time. In that context, one should consider plans or projects which are completed, approved but uncompleted, or actually proposed.

It should be understood that, in considering a proposed plan or project, Member States do not create a presumption in favour of other similar but as yet unproposed plans or projects in the future. On the contrary, if one or more projects have already been approved in an area,

[65] This may however be required within the context of the assessment under the EIA or SEA Directives.

this may lower the ecological threshold as regards the significance of the impacts for future plans or projects in that area.

For instance, if waterway development projects within or around a series of Natura 2000 sites are submitted one after another. The assessment of the first or second projects concludes that the project will not adversely affect the Natura 2000, but later projects may not be approved because their effects when combined with those of the previous projects becomes significant enough that the site's integrity will be adversely affected. In this context, it is important for IWT projects along a particular river are looked at strategically and in combination with each other, and not simply viewed as individual isolated projects.

- *Not directly connected with the conservation management of the site*

From the context and purpose of Article 6, it is apparent that the term "management" refers to the "conservation" management of a site, i.e. the term "management" is to be seen in the sense in which it is used in Article 6(1).

5.3. A step-by-step procedure for carrying out appropriate assessments

The procedure laid out in Articles 6(3) and 6(4) must be carried out in sequential order. Every step determines whether a further step in the process is required. For instance if, after the screening, it is concluded that there will be no negative effects on the Natura 2000 site, then the plan or project can be approved without the need for further assessment.

The steps are as follows (see diagram):

- **Step one: screening** – this initial step is to determine whether a plan or project has to undergo an appropriate assessment or not. If it is likely to have a significant negative effects on a Natura 2000 site, then an appropriate assessment is required.

- **Step two: appropriate assessment** – once it has been decided that an appropriate assessment is required under Article 6(3), a detailed analysis must be undertaken of the effects of the plan or project, alone or in combination with other plans or projects, on the integrity of Natura 2000 site(s) in view of its conservation objectives. If the appropriate assessment concludes that there is an adverse effect on integrity of the site (despite the introduction of mitigation measures) then the competant authorities must refuse the plan or project or apply the derogation procedure under Article 6(4).

- **Step three: exceptional cases** – Article 6(4) provides for derogations to Article 6(3). Thus if it is concluded that the plan or project wull have an adverse effect on a Natura 2000 site, it can still be approved in exceptional circumstances provided the conditions of Article 6(4) are met.

It is clear from the above that this decision-making process is underpinned by the **precautionary principle.** The emphasis should be on objectively demonstrating, with reliable supporting evidence, that there will be no adverse effects on the Natura 2000 site.

5.4. Step one: screening

The first step in the Article 6(3) procedure is to determine whether or not an appropriate assessment is actually needed, i.e. if a plan or project is **likely** to have a **significant effect** on a Natura 2000 site. If it can be determined with sufficient certainty that the plan or project

is not likely to have a significant effect, either individually or in combination with other plans or projects, then it can be approved without further assessment.

However, if there is any doubt, an appropriate assessment must be undertaken so that these effects can be studied in full. This was confirmed by the ECJ in the Waddensea ruling (C-127/02) in which the Court concluded that: *"the environmental protection mechanism provided for in Article 6(3) does not presume that the plan or project considered definitely has significant effects on the site concerned but follows from the mere probability that such an effect attaches to that plan or project. In case of doubt as to the absence of significant effects such an assessment must be carried out, this makes it possible to ensure effectively that plans or projects which adversely affect the integrity of the site concerned are not authorised, and thereby contributes to achieving, the overall objectives of the Habitats Directive."*

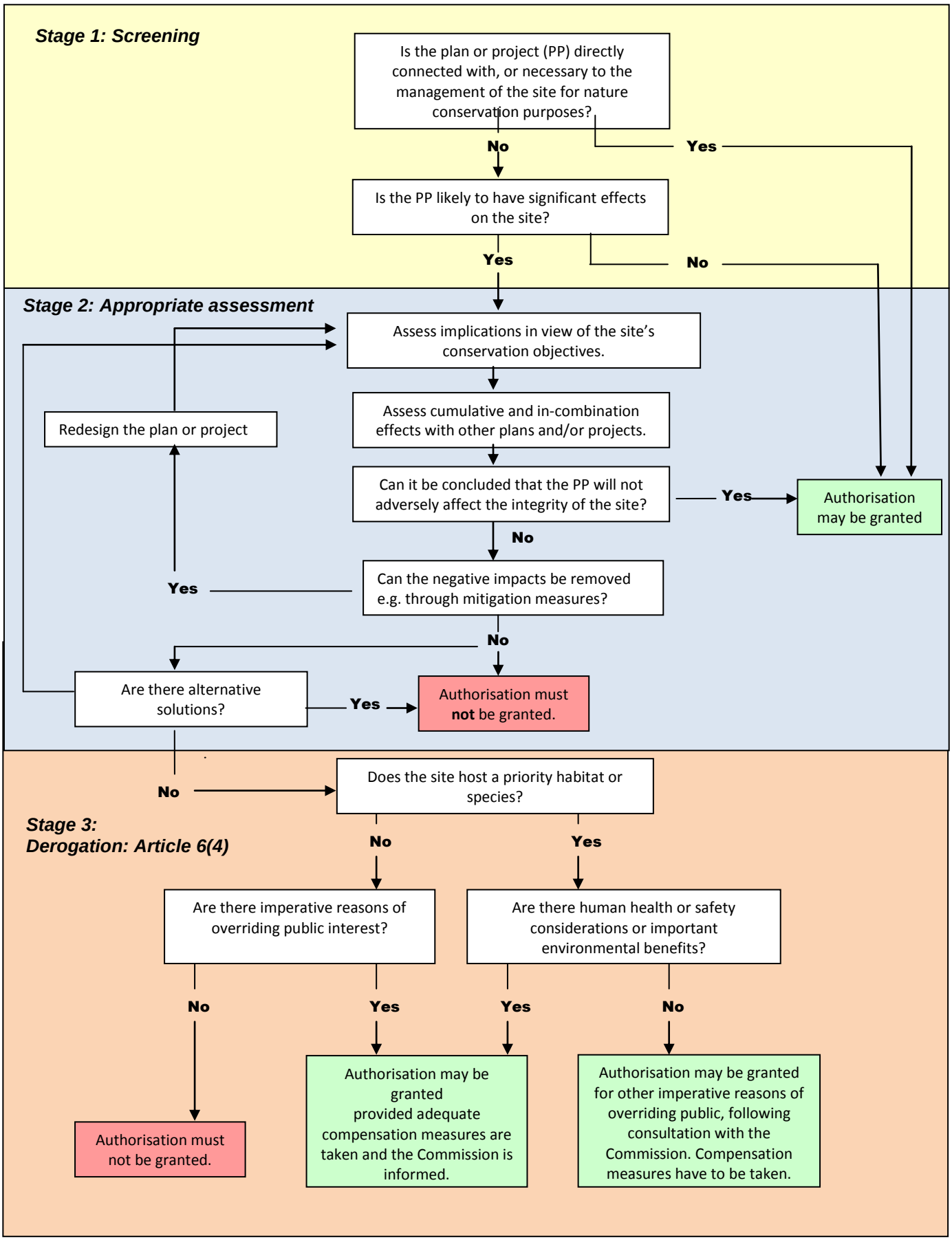
The notion of what is a "significant effect" in this context is clearly linked to the specific features and ecological conditions of the Natura 2000 site as well as its designated habitat types and species. Therefore, the site's conservation objectives and the ecological characteristics of the site as recorded in the Standard Data Form should be used to help to identify the conservation sensitivities at each site and the likelihood of significant effects on these (see section 5.5.1 for full explanation on what is a site conservation objectives).

The reasons for the final decision as to whether or not to carry out an appropriate assessment should be recorded and sufficient information should be given to justify the conclusion that has been reached.

Key issues to consider during screening:

- Identify the geographical scope of the plan or project, and its main characteristics.
- Identify all Natura 2000 sites that might be affected by the plan or project, bearing in mind also possible effects in other countries and/or possible effects further downstream or upstream from the ptoject and in the surrounding catchment area.
- Identify the habitat types and species for which the Natura 2000 sites has been designated, their conservation condition and the sites' conservation objectives (e.g. by consulting the Standard Data Forms for the site(s) or Natura 2000 management plan(s), if they exist).
- Identify which species and habitats could be significantly affected by the planned activities.
- Identify other plans or projects which could, in-combination with the planned activities, give rise to a likely significant effect on Natura 2000 sites.
- Consider the possible interactions between the plan or project activities, either individually or in combination with other plans or projects, and the qualifying interests, the ecological functions and processes that support them.

Figure : Flow chart of Article 6(3) and (4) procedure (based on Commission Article 6 methodological guide)



5.5. Step two: appropriate assessment

Once it has been decided that an appropriate assessment is required, such an assessment will need to be carried out before the competent authority makes its decision on whether or not to authorise the plan or project (C-127/02). As stated above the purpose of the appropriate assessment is to assess the implications of the plan or project on the site in view of its conservation objectives, either individually or in combination with other plans or projects.

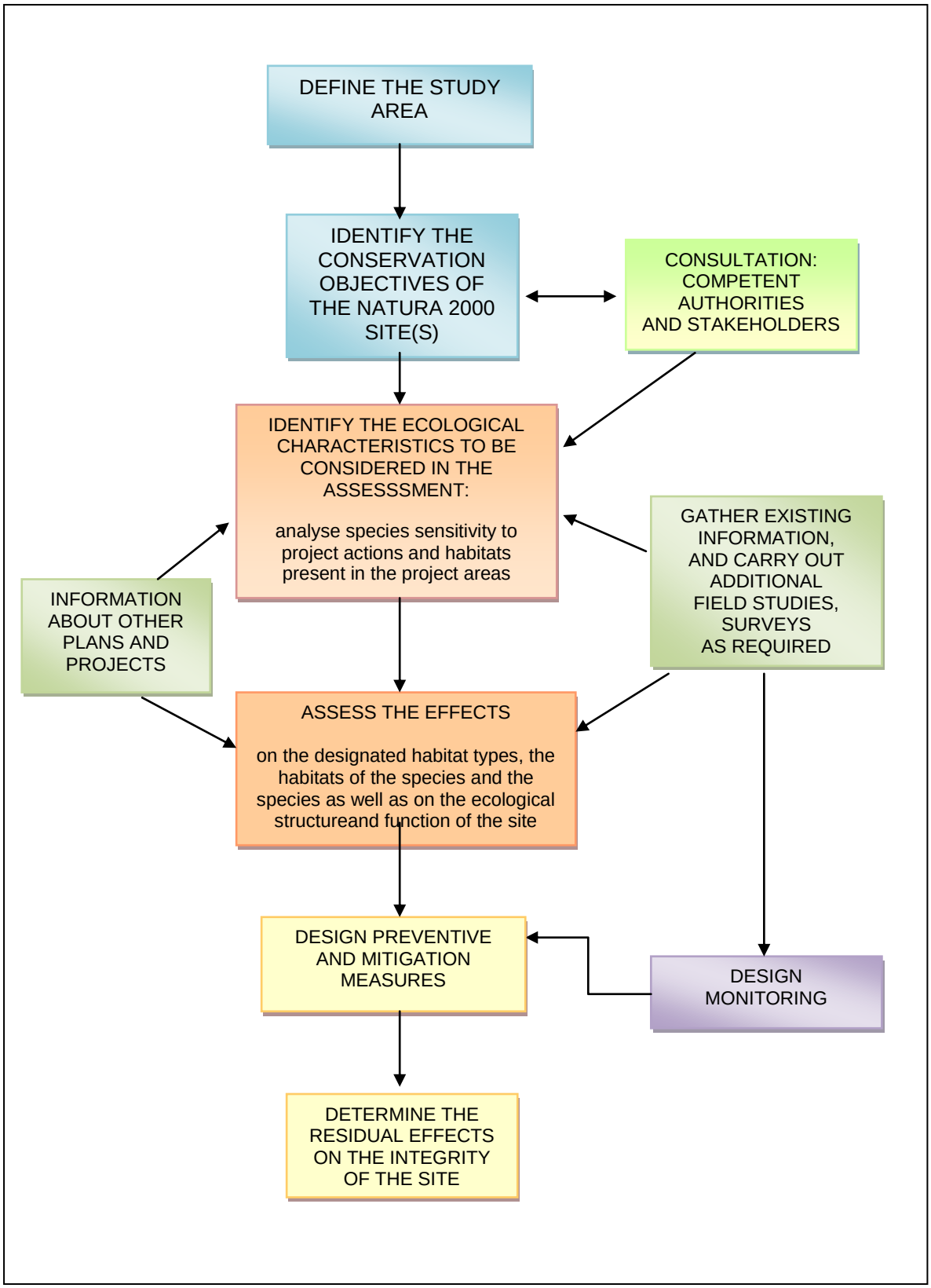
The term "appropriate" essentially means that the assessment needs to be appropriate to its purpose under the Birds and Habitats Directives, i.e. that of safeguarding rare and endangered species and habitat types listed under the two directives. "Appropriate" also means that the assessment has to be a reasoned decision. If the report does not include a sufficiently detailed assessment of the effects of the Natura 2000 site or does not provide enough evidence to draw clear conclusions as to whether or not the site's integrity is adversely affected then the assessment does not fulfil its purpose and cannot be considered "appropriate".

Assessments that confine themselves to general descriptions and provide only a superficial review of existing data on nature within the area are not considered as "appropriate" for the purposes of Article 6(3). This has been confirmed by the European Court of Justice which has ruled that *"the appropriate assessment should contain complete, precise and definitive conclusions capable of removing all reasonable scientific doubt as to the effects of the works proposed on the site concerned"* (Commission/Italy, C-304/05).[66]

The Court also emphasised the importance of using best scientific knowledge when carrying out the appropriate assessment in order to enable the competent authorities to conclude with a sufficient degree of certainty that there will be no adverse effects on the site's integrity. In this respect it considered that *"all the aspects of the plan or project which can, either individually or in combination with other plans or projects, affect those objectives must be identified in the light of the best scientific knowledge in the field."* (C-127/02, Para 54).

[66] See also ECJ ruling Castro Verde C-239/04 case C-239/04 concluding that *"any reasonable scientific doubt as to the absence of adverse effects on the integrity of the site must be removed before the project is authorised."*

Steps to be undertaken as part of the appropriate assessment



Because of the specialised nature of the appropriate assessment, it is strongly recommended that the assessment is based on analyses carried out by suitably qualified ecologists.

The appropriate assessment report should in particular:

- describe the project or plan in sufficient detail for members of the public to understand its size, scale and objectives;
- describe the baseline conditions and conservation objectives of the Natura 2000 site;
- identify the adverse effects of the project or plan on the Natura 2000 site;
- explain how those effects will be avoided through mitigation;
- set out a timescale and identify the mechanisms through which the mitigation measures will be secured, implemented and monitored.

Finally, it should be noted that it is the competent authorities' responsibility to ensure that the appropriate assessment has been carried out correctly and is capable of objectively demonstrating, with supporting evidence, that there will not be any adverse effects on the integrity of the Natura 2000 site, in light of its conservation objectives.

5.5.1. Assessing effects in light of the site's conservation objectives

As stated above, the assessment should assess the possible implications for the site of the plan or project in view of the **site's conservation objectives**.

To understand what conservation objectives are, it is necessary to look back at how Natura 2000 sites are selected. As explained in chapter 2, each site is included in the Natura 2000 network because it is of conservation value for one or more of the habitat types listed in Annex I or species listed in Annex II of the Habitats Directive, or species listed in Annex I of the Birds Directive as well as regularly occurring migratory bird species.

This conservation value of the site is recorded in a **Standard Data Form**[67] (SDF) which is prepared for each site. In addition to providing the site's formal identification code, its name, location and size, and detailed map, the SDF records the ecological characteristics of the site which led to its designation as a Natura 2000 site and provides a broad assessment of the conservation condition of each species or habitat type on that site (scored A to D).

The SDF is therefore the reference base not only for measuring any change in the conservation condition of the designated habitat types and species within the site (Article 6(2) and 6(3)) but also for setting conservation objectives for the site, in line with the overall objectives of the Habitats Directive (Article 6(1)).

At a minimum, the sites' conservation objective will be to maintain the species and habitats for which it was designated in the same condition (as recorded in the Standard Data Form). This means ensuring that they will not deteriorate below that level.

However, the overall aim of the Habitats (and Birds) Directives is not only to prevent further deterioration but also to ensure that EU protected species and habitat types reach a favourable conservation state across their natural range in the EU. Thus more ambitious conservation objectives may be required to restore and improve the conservation condition of the EU protected species and habitat types present on that site (under Article 6(1)).

[67] The SDFs can be accessed through the Natura 2000 viewer http://natura2000.eea.europa.eu/ and are available from authorities responsible for Natura 2000 in each country/ region.

3.2.C. MAMMALS listed in Annex II of the Council Directive 92/43/EEC

		POPULATION				SITE ASSESSMENT		
Code	Name	Migratory						
		Resident	Breed	Winter	Population Stage	Conservation	Isolation	Global
1337	Castor fiber	I P			B	A	C	A
1355	Lutra lutra	I P			B	A	C	B
1318	Myotis dasychema	I P			C	B	C	C
1324	Myotis myotis	I P			C	B	C	C

3.2.D AMPHIBIANS AND REPTILES listed in Annex II of the Council Directive 92/43/EEC

		POPULATION				SITE ASSESSMENT		
Code	Name	Migratory						
		Resident	Breed	Winter	Population Stage	Conservation	Isolation	Global
1188	Bombina bombina	I P			B	C	C	C
1166	Triturus cristatus	I 11-50			C	B	C	B

3.2.E FISHES listed in Annex II of the Council Directive 92/43/EEC

		POPULATION				SITE ASSESSMENT		
Code	Name	Migratory						
		Resident	Breed	Winter	Population Stage	Conservation	Isolation	Global
1130	Aspius aspius	I C			C	A	C	B
1149	Cobitis taenia	I R			C	A	C	B
1124	Gobio albipinnatus	I C			A	A	C	A
1099	Lampetra fluvialis	I V			C	B	C	B

Extract of a Standard Data Form

If more ambitious conservation objectives have been set, then the impacts of the plan or project must be measured against these more ambitious objectives. For instance, if the objective is to restore the population of kingfisher to a certain population level within 8 years and conservation measures are foreseen to ensure this happens, it has to be assessed if the plan or project will or will not prevent this conservation objective from being realised.

If no specific conservation objectives have been set then it can be taken that the conservation objective for the Natura 2000 site is to maintain the conservation conditions of the species and habitat types for which the site has been designated (as recorded in the SDF) and to avoid any deterioration of that condition.

It is recommended that the project planner consults with the competent authorities responsible for the Natura 2000 sites as early as possible to find out about the Natura 2000 site, its conservation objectives and the conservation condition of the habitat types and species for which it is designated. They will also be to indicate if there are more detailed sources of information available on this – for instance a management plan adopted for the site or monitoring reports and studies about the conservation condition of the species and habitat types concerned within that region, or country.

5.5.2. Collecting the necessary information

Gathering all the necessary information on both the project and the Natura 2000 site is an important first step of the appropriate assessment. This is usually an iterative process. If the first identification and analysis reveals that there are important gaps in knowledge, then further baseline ecological and survey field work may be necessary to supplement existing data. As stated before it is important that the appropriate assessment is based on the the best scientific knowledge in the field and is capable of removing all reasonable scientific doubt as to the effects of the works proposed on the site concerned.

Detailed surveys and fieldwork should focus on those target features that are sensitive to the project actions. Sensitivity should be analysed taking into account the possible interactions between the project activities (nature, extent, methods, etc.) and the habitats and species concerned (location, ecological requirements, vital areas, behaviour, etc.). Any field studies must be sufficiently robust and long-lasting to take account of the fact that ecological conditions may vary significantly according to the seasons. For instance, undertaking a field survey on a species for a few days in winter will not capture their habitat usage during other more important periods of the year (e.g. during migration or breeding).

Gathering information for the appropriate assessment

The **information about the plan or project** should contain details of all elements that are relevant for the assessment. They should include at least the folllowing:

- detailed information on the design of the IWT activities;
- detailed maps of precise location of the IWT activities and the associated works in relation to the Natura 2000 site(s) in the given area;
- details about the activities foreseen during construction works and their duration and timing;
- activities foreseen during operation and management;
- provisions for maintenance;
- details of any other plans or projects in the area whether planned or already on-going.

The **information about the Natura 2000 site** should contain at least the following:

- details on each species and habitat type for which the site is designated and and their conservation condition;
- data, including ecological maps, on their location and overall habitat usage within and around the site during their lifecyle (e.g. for foraging, breeding, resting, staging or hibernating); these data should be up-to-date as species and habitats are dynamic entities and their occurrence and composition may vary over a relatively short periods of time;
- data on their representativity, degree of isolation and population or range both within that site and within the region or country (including, data on population size, ecotype, age class structure etc.);
- data on ecological structure and functioning of the habitats within the site;
- details of the conservation objectives of the site (including any management plans, etc.);
- the role of the site within the biogeographical region and the Natura 2000 network;
- any other aspects of the site or its wildlife that is likely to have an influence on its conservation state and objectives (e.g. current management activities or other developments);
- information about any other plans or projects which could give rise to cumulative effects.

Potential **sources of information** for the Natura 2000 site include:

- Natura 2000 Standard Data Forms;
- Natura 2000 management plans;
- up-to-date data published in technical and scientific literature;
- nature conservation authorities, scientific experts and species or habitat specialists, conservation organisations, local experts;
- Article 17 reports on the conservation status of EU protected habitats and species at national and biogeographical level.[68]

At this stage it is also useful to define the study area bearing in mind that the negative effects may be felt over a much wider area than the immediate location of the inland waterway project, for instance further up or down stream in the river and laterally into the catchment area. It is especially important, in the case of inland waterway projects, not to define the study area too narrowly in view of the river's longitudinal and lateral connectivity. The study area can always be narrowed down later on, once there is enough sound data available to exclude certain areas.

Consulting with nature authorities, other scientific experts and conservation organisations early on will help ensure that as complete a picture as possible is built up about the site, the species/habitats present and the type of effects to be analysed. They can also offer advice on the updated scientific information that is available on the site and its EU protected species and habitat types (including Natura 2000 management plans) and on what additional baseline studies and field surveys may be needed in order to assess the likely impacts of the project.

Other stakeholders such as conservation NGOs, research institutions or local organisations may also be able to provide further local knowledge and ecological information useful for the appropriate assessment.

5.5.3. Assessing the implications for the site

Once all the necessary baseline data has been gathered and checked for completeness, the assessment of the implications of the plan or project on the Natura site can be undertaken.

As described above this should be done in light of:

- best scientific knowledge in the field;
- site's conservation objectives;
- ecological characteristics and conservation condition of the site and the habitat types and species for which it has been designated.

It is evident that the effects of each project will be unique and must be evaluated on a case-by-case basis. This is in line with the ECJ Waddensea ruling: *"in assessing the potential effects of a plan or project, their significance must be established in the light, inter alia, of the characteristics and specific environmental conditions of the site concerned by that plan or project."*

[68] A first health check (known as the Aritcle 17 report) on the conservation status of each of the species and habitats protected under the Habitats Directive was published in 2009. The status is assessed at both country and biogeographical level. See: http://biodiversity.eionet.europa.eu/article17 and http://ec.europa.eu/environment/nature/knowledge/rep_habitats/index_en.htm

The first step is to identify which target features within each site could be potentially affected and should be subject to further assessment. This is important as every species and habitat type has its own ecological lifecycle and conservation requirements. The impacts on each will also vary from one site to another depending on their conservation state and the underlying ecological conditions of that particular site.

As with all impact assessments, the assessment should be undertaken within a structured framework to ensure that the predictions can be made as objectively and accurately as possible. For this purpose, impacts are often categorised into the following types:

- direct and indirect effects;
- short and long-term effects;
- effects during different stages of the project (construction, operation, decommissioning);
- isolated and in-combination effects;
- cumulative effects.

For each effect identified, the assessment should also look at the magnitude of the impact, type of impact, extent, duration, intensity and timing.

The appropriate assessment itself involves looking at all aspects of the plan or project that could have implications for the site. Each element of the plan or project should be examined in turn and the potential effects of that element should be considered in relation to each of the species or habitat types for which the site has been designated Thereafter, the effects of the different features should be looked at together, and in relation to one another, so that the interactions between them can be identified.

Whilst the focus should be on the species and habitats of Community interest that have justified the site designation, it should not be forgotten that these target features also interact with other species and habitats, as well as with the physical environment in complex ways. It is therefore important that all the elements considered essential for the structure, functioning, and dynamics of the river ecosystem are examined as any alteration could also have a negative effect on the habitat types and species present.

The description of potential negative impacts of inland waterway development and management activities on Natura 2000 sites as described in chapter 3 should help to identify the type of effects to look out for.

Impacts should be predicted as precisely as possible, and the basis of these predictions should be made clear and recorded in the appropriate assessment (this means also including some explanation of the degree of certainty in the prediction of effects). As with all impact assessments, the appropriate assessment should be undertaken within a structured framework to ensure that the predictions can be made as objectively as possible, using quantifiable criteria wherever possible. This will also greatly facilitate the task of designing mitigation measures that can help remove the predicted effects or reduce them to a non-significant level.

Predicting the likely impacts can be difficult as one needs a good understanding of ecological processes and conservation requirements of particular species or habitat types likely to be affected. It is therefore recommended that the necessary expert advice and scientific support is secured when carrying out the appropriate assessment.

Commonly used methods for predicting impacts:

The appropriate assessment should also apply the best available techniques and methods to estimate the extent of the effects. Some of the techniques commonly used are listed in the following box.

- **Direct measurements**, for example of areas of habitat lost or affected, proportionate losses from species populations, habitats and communities.

- **Flow charts, networks and systems diagrams** to identify chains of impacts resulting from direct impacts; indirect impacts are termed secondary, tertiary, etc. impacts in line with how they are caused. Systems diagrams are more flexible than networks in illustrating interrelationships and process pathways.

- **Quantitative predictive models** to provide mathematically derived predictions based on data and assumptions about the force and direction of impacts. Models may extrapolate predictions that are consistent with past and present data (trend analysis, scenarios, analogies which transfer information from other relevant locations) and intuitive forecasting. Normative approaches to modelling work backwards from a desired outcome to assess whether the proposed project will achieve these aims. Predictive modelling often plays an important role as the main impacts often follow from changing in hydromorphological structures resulting in changes in sedimentation regime with serious consequences for the underwater biota.

- **Population level studies** are potentially beneficial for determining population level effects of impacts to bird or bat or marine mammal species, for instance.

- **Geographical information systems (GIS)** used to produce models of spatial relationships, such as constraint overlays, or to map sensitive areas and locations of habitat loss. GIS are a combination of computerised cartography, storing map data, and a database-management system storing attributes such as land use or slope. GIS enable the variables stored to be displayed, combined, and analysed speedily.

- **Information from previous similar projects** may be useful, especially if quantitative predictions were made and have been monitored in operation.

- **Expert opinion and judgment** derived from previous experience and consultations on similar inland waterway development projects.

- **Description and correlation:** physical factors (e.g. water regime, current, substrate) may be directly related to distribution and abundance of species. If future physical conditions can be predicted then it may be possible to predict future developments of habitats and populations or responses of species and habitats on this basis.

- **Carrying out capacity analyses** involves identifying the threshold of stress below which populations and ecosystem functions can be sustained. It involves the identification of potentially limiting factors, and mathematical equations are developed to describe the capacity of the resource or system in terms of the threshold imposed by each limiting factor.

Adapted from: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/natura_2000_assess_en.pdf.

As mentioned above, the **cumulative effects** must not be overlooked during the assessment; not only is this a legal requirement but it can also influence the assessment of the plan or project, as well as other subsequent plans or projects which are put forward in the same area. Cumulative effects may arise in particular when several projects are planned within a given river system, or as the result of the combined impacts of a waterway project and another type of activity (e.g. hydroelectricity, water abstraction, industrial cooling, flood protection, etc.).

5.5.4. Determining the significance of the effects

Once the effects have been identified, there should be an appraisal of their significance for the site and its target features. The following parameters can be considered when assessing significance:

- **Quantitative parameters of the target feature**: for instance, how much habitat is lost for that species or habitat type. For some the loss of even single units or small percentage areas of occurrence within a given Natura 2000 site (e.g. for priority habitat types and species) should be taken as being a significant impact. For others the significance threshold may be higher. Again it depends on the species and habitat types, their state of conservation in that site as well as their future prospects.

- **Qualitative parameters of the target feature**: independent of these quantitative parameters, the significance of the impacts should also take account of the quality of occurrence of the target feature, for instance it may be:
  - the only site in a particular region/ country where the target features is present (i.e. the target feature may be rather abundant in a given site but this is the only place where it occurs and is protected);
  - a site with an important occurrence of the species (e.g. a core area for the occurrence, larger areas of representative stands, etc.);
  - a site where the species is at the limit of its existing distribution range.

- **Importance of the site from the point of view of the species´ biology** e.g.:
  - site of reproduction (nesting places, spawning area, etc.);
  - feeding habitat;
  - sheltering possibilities;
  - migration pathways.

- **Ecological functions** necessary for maintenance of target features as well as site integrity.

Where there is doubt or differences of opinion over the degree of significance, it is best to find a broader agreement amongst relevant experts, e.g. regional and/or national specialists in the affected target feature so that a consensus be built up over this.

The following flow chart provides an illustration of a structured approach to assessing the likely effects on a Natura 2000 site, using a functional approach to Natura 2000 features (e.g. location in the river floodplain system, habitat/process dependencies). This approach can also be used as an early warming risk screening process for inland waterway projects during their design and conceptualisation phases.

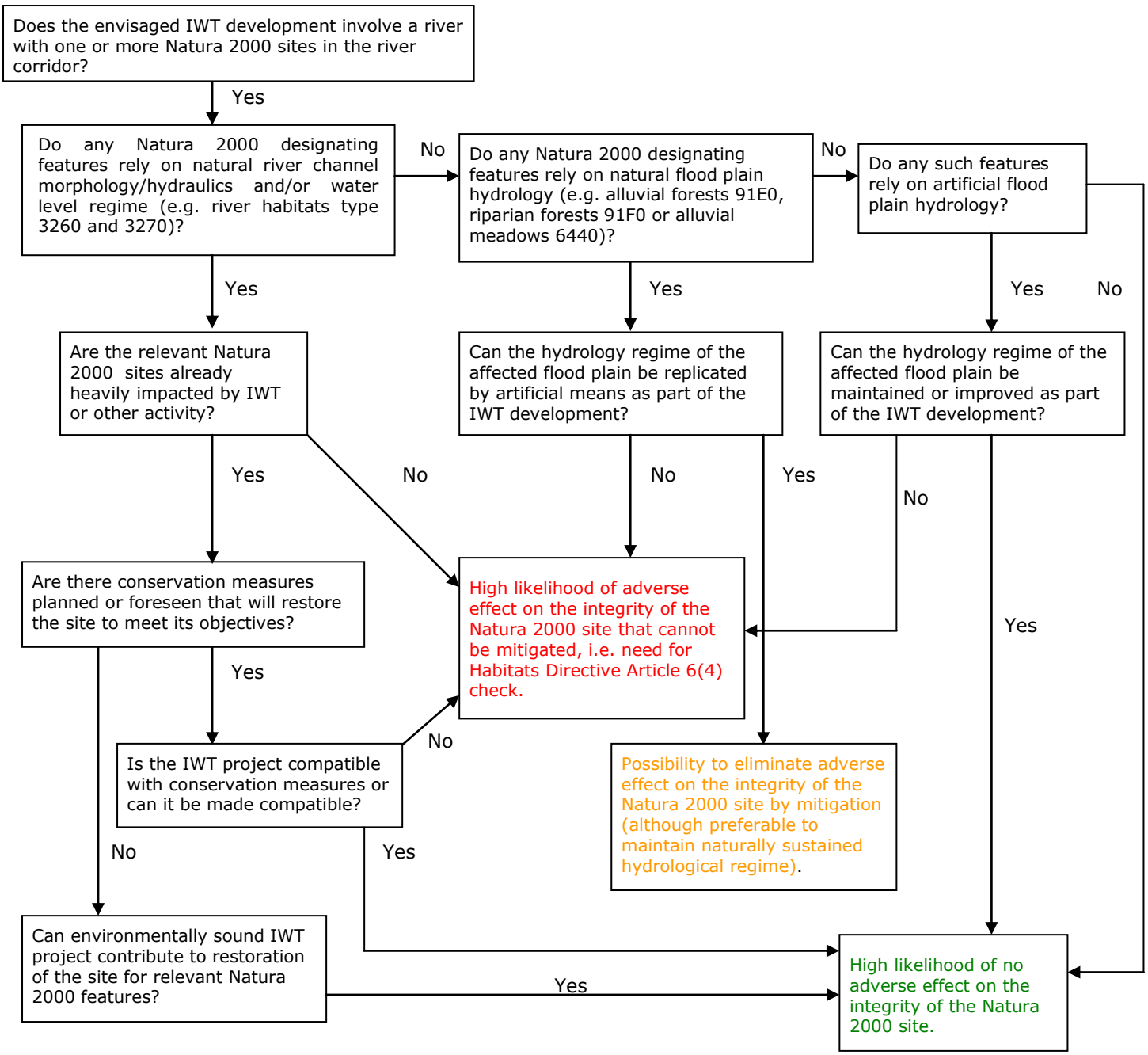


Figure 1: Scenarios relating to morphological/hydrological impacts of IWT development on the integrity of Natura 2000 sites.

5.5.5. Determining whether the site's integrity is affected

Once the effects of the project have been predicted as accurately as possible and their level of significance assessed, the appropriate assessment must reach a final conclusion as to whether they will adversely affect the integrity of the Natura 2000 site.

The term "integrity" clearly relates to **ecological integrity**. This can be considered as a quality or condition of being whole or complete. In a dynamic ecological context, it can also be considered as having the sense of resilience and ability to evolve in ways that are favourable to conservation. The "integrity of the site" can be usefully defined as the coherent sum of the site's ecological structure, function and ecological processes, across its whole area, or the habitats, complex of habitats and/or populations of species for which the site is designated.

A site can be described as having a high degree of integrity where the inherent potential for meeting site conservation objectives is realised, the capacity for self-repair and self-renewal under dynamic conditions is maintained, and a minimum of external management support is required.

The "integrity of a site" also clearly relates to the site's conservation objectives (see above). If a plan or project adversely affects the integrity of a site only in a visual sense or causes significant effects to habitat types or species other than those for which the site was designated as Natura 2000, this is not an adverse effect for purposes of Article 6(3). On the other hand, if one of the species or habitat types for which the site has been designated is significantly affected then the site integrity is necessarily also adversely affected.

The expression "integrity of the site" shows that the focus is on the specific site. Thus, an argumentation that damage to a site or part of it can be justified on the basis that the conservation status of the habitat types and species it hosts will anyway remain favourable within the European territory of the Member State cannot be accepted.

When looking at the integrity of the site, it is important to take into account a range of factors, including the possibility of effects manifesting themselves in the short, medium and long-term. In practice the assessment of site integrity should focus in particular on identifying whether the project:

- causes changes to significant ecological functions necessary for the target features;
- significantly reduces the area of occurence of habitat types (even of those of lower quality) or viability of species populations in the given site which are target features;
- reduces the site diversity;
- leads to the site fragmentation;
- leads to a loss or reduction of the key site characteristics (e.g. tree cover, regular annual floodings) which the status of the target feature depends on;
- disturbs meeting the site conservation objectives.

5.5.6. Introducing mitigation measures to remove adverse effects

If an appropriate assessment concludes that there are significant impacts on one or more of the target features within the site and/or on the site's overall integrity, the developer/ authority should consider whether it is possible to introduce mitigation measures into the

project which will eliminate some or all of these negative impacts, or to reduce them to a level where they no longer undermine the conservation objectives of the site concerned and adversely affect the integrity of the site.

The competent authority, upon the advice of its ecological experts or the relevant nature authorities, may make the approval of the project conditional upon the introduction of such mitigation measures.

It is clear from the above that the **mitigation measures** must be **specifically designed to eliminate or reduce negative effects identified during the appropriate assessment**. They must not be confused with compensation measures which are intended to compensate for the damage caused. Compensation measures can only be considered if the plan or project has been accepted as being necessary for imperative reasons of overriding public interest and where no alternatives exist (under Article 6(4) – see below).

These mitigation measures should contain:

- details of each of the measures proposed and an explanation of how it will eliminate or reduce the adverse impacts which have been identified;
- evidence of how they will be implemented and by whom;
- a timetable for implementation relative to the plan or project (some may need to be put in place before the development can proceed);
- details of how the measure will be monitored and how the results will be fed back into the day to day operation of the IWT project (adaptive management – see below).

This will enable the competent authority to evaluate the mitigation measures as part of the appropriate assessment (second round) and determine whether or not they are sufficient or suitable for eliminating or removing the adverse effects which have been identified (and do not inadvertently cause other adverse effects on the species and habitat types in question). If the mitigation measures are deemed sufficient, they will become an integral part of the specification of the final plan or project.

In the case of inland waterway development projects mitigation can involve a wide range of measures depending on the species or habitat types. They could for instance involve:

- planning of construction and maintenance activities so that they are undertaken outside important periods of the protected species' life cycle (e.g. outside breeding or migration times) – so-called "environmental windows";
- building fish passes or side channels on weirs and dams to facilitate the migration and dispersal of species – especially fish – up and down stream of the river;
- use and design of more natural river bank stabilisation measures (instead of rip-raps) and groynes to maintain or encourage re-development of natural habitat features important for the benthic fauna and flora and for all higher plants and animal species normally present on the site;
- prohibition of certain activities such as bilge cleaning, regulation of ship speed or innovative designs of ships to reduce the adverse effects etc.[69]

When exploring suitable mitigation measures it is important to consider first those that can remove impacts at source and, only if these are not possible, should other mitigation

[69] Consideratins to reduce environmental impacts of vessels – report of PIANC February 2008.

measures be examined that can at least significantly reduce or abate the negative effects of the project.

When undertaking an appropriate assessment, the developer may wish to propose mitigation measures already at this stage. However, the fact that the developer submits a proposal for mitigation measures along with the project does not exempt the project from undergoing an appropriate assessment; it should, nonetheless, speed up the approval process.

In addition to identifying the possible effects on the site in light of its conservation objectives, the appropriate assessment will be able to examine whether the proposed mitigation measures are sufficient to remove the identified adverse effects or reduce them to a level where they no longer affect the integrity of the site, in which case the project can be approved immediately. Such an approach is less time consuming than having to wait until the assessment concludes presence of significant effects and only then start identifying possible mitigation measures to address these.

5.5.7. Monitoring and adaptive management

In carrying out appropriate assessments for plans or projects in the sense of Article 6(3) of the Habitats Directive, it may be necessary to take recourse to the precautionary principle. The focus of the assessment should be on objectively demonstrating, with supporting evidence, including undertaking the necessary studies, and based on best available scientific knowledge, that there will be no adverse effects on the integrity of the Natura 2000 site.

However adaptive management may be used to address situations when, because of science limits or uncertainty about the functioning of complex and dynamic ecosystems, it is not possible for the competent authorities to fully ascertain the absence of adverse effects despite having removed all reasonable scientific doubt.

In case of any remaining scientific uncertainty with regard to the effects of mitigation or compensatory measures, a rigorous monitoring scheme and a pre-defined validated package of appropriate corrective measures must be foreseen. Such measures must enable adjustment to be made to the mitigation and/or compensatory measures in function of the impacts identified by that way, make sure that the initially unforeseen adverse effects are neutralized.

5.6. Appropriate assessment of plans and programmes

The procedure described above relates to appropriate assessments carried out on individual projects. Appropriate assessments are, however, also required for plans and programmes, for instance national or regional inland waterway infrastructure plans.[70] An appropriate assessment of a plan or programme will of course be at a more strategic level but the process is essentially the same as for projects. Thus, the appropriate assessment should consider the effect of the plan or programme on the integrity of the Natura 2000 sites, alone and in combination with other plans or projects.

[70] The European Court of Justice confirmed that Article 6(3) of the Habitats Directive must be applied to land-use plans likely to have a significant effect on a Natura 2000 site. ECJ ruling on case C-6/04, Commission v. United Kingdom, 20 October 2005.

The comprehensiveness of the assessment work undertaken should be proportionate to the geographical scope of the plan and the nature and extent of any effects identified. An appropriate assessment need not be done in any more detail, or using more resources, than is necessary for its purpose. It would be inappropriate and impracticable to assess the effects in the degree of detail that would normally be required for the appropriate assessment at the project level. However, sufficient information must be obtained to allow the appropriate assessment to be carried out which may require additional surveys.

The proportionality principle also applies for more strategic plans, or strategies, where it is not possible to identify effects on individual sites. In this case the analysis should focus on broad constraints and major risks. Nevertheless, the underlying aim at all times is to avoid or remove any foreseeable adverse effect on the integrity of Natura 2000 sites, or to remove any reasonable grounds for concern that such an adverse effect may occur. If the plan changes significantly at any time before adoption, the changes should be also addressed in the appropriate assessment.

At a high level of planning (e.g. national/regional plans), mitigation is likely to mean setting out the broad parameters that should be worked up in more detail at a lower level, where it should be possible to set out the ecological, location, temporal, legal and financial parameters that need to be met by any planning application. These should be validated by relevant bodies such as nature conservation authorities to ensure they are both appropriate and capable of being implemented.

A key benefit of carrying out appropriate assessments at a plan or project level is that it can pre-empt any potential conflicts with Natura 2000 sites later on, when it comes to assessing the impacts of individual projects by, for instance, zoning activities away from Natura 2000 sites. It requires those involved to consider less damaging solutions to meet the plan's objectives at a very early stage in the planning process but also encourages them to develop a more integrated and holistic approach to IWT developments (for details see chapter 6 on good practices in integrated IWT planning).

5.7. Conclusions of the appropriate assessment

It lies with the competent national authorities, in the light of the conclusions of the appropriate assessment of the implications of a plan or project for the Natura 2000 site concerned, to approve the plan or project. This can be done only after having ascertained that it will **not** adversely affect the integrity of that site. If the conclusions are positive, in the sense that no reasonable scientific doubt remains as to the absence of effects on the site, the competent authorities can give their consent to the plan or project.

The onus is therefore on **proving the absence of effects rather than their presence**, reflecting the precautionary principle (Case C-157/96). This has been confirmed by several ECJ rulings. In the Waddensea case (C-127/02) the Court confirmed that *"a plan or project […] may be granted authorisation only on the condition that the competent national authorities are convinced that it will not adversely affect the integrity of the site concerned. Where doubt remains as to the absence of adverse effects on the integrity of the site linked to the plan or project being considered, the competent authority will have to refuse authorization.[…] the competent national authorities are to authorise (a plan or project) only if they have made certain that it will not adversely affect the integrity of that site. That is the case **where no reasonable scientific doubt remains** as to the absence of such effects."*

The appropriate assessment and its conclusions should be clearly **recorded**. In this respect, the appropriate assessment report should be sufficiently detailed to demonstrate how the final decision was reached, and on what scientific grounds the decision was made.

5.8. The derogation procedure under Article 6(4)

Article 6(4) provides for exceptions to the general rule of Article 6(3). It lays down the conditions that need to be respected and the steps that need to be followed before a competent national authority can authorise a plan or project that has been assessed as adversely affecting the integrity of a site under Article 6(3).

Article 6(4) requires that the competent authorities ensure the following conditions are respected before a decision can be taken on whether or not to authorise a plan or project that may adversely affect a site:

1. The **alternative** put forward for approval is the least damaging for habitats, for species and for the integrity of a Natura 2000 site, and no other feasible alternative exists that would not affect the integrity of the site.

2. There are **imperative reasons of overriding public interest** that justify the authorisation of the plan or project, including those of a social or economic nature.

3. All **compensatory measures** required to ensure the protection of the overall coherence of the Natura 2000 network have been taken.

The order in which these conditions are examined is important as each step determines whether the next step is required. If, for instance, it is found that there is an alternative to the plan or project in question, then it is not necessary to examine whether the original plan or project is of overriding public interest or to develop suitable compensation measures since that plan or project could not, in any case, be authorised if a viable alternative exists.

5.8.1. Demonstrating the absence of alternative solutions

The search for alternatives can be quite broad and should be linked to the public interest objectives of the plan or project. It could involve alternative locations, different scales or designs of development, or alternative processes. Such solutions could involve, inter alia:

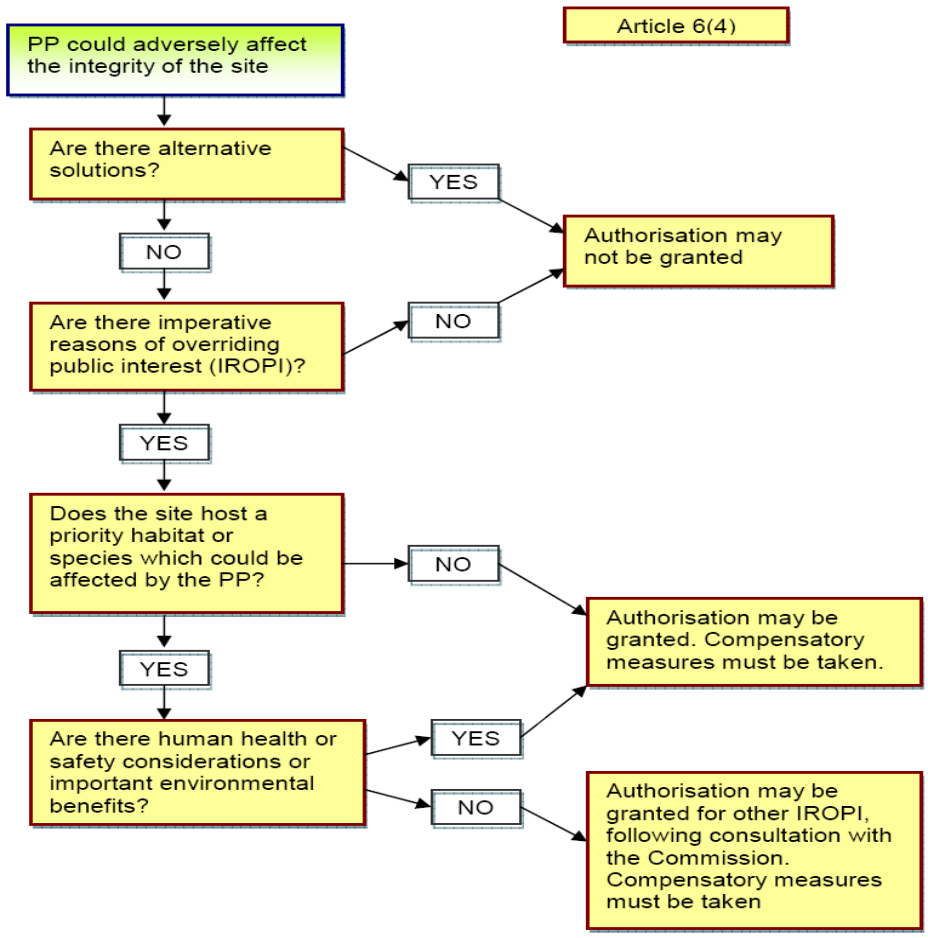
- alternative locations or routes, not just within the area but also in other regions/countries
- different scales or designs of development
- different methods of construction, or
- alternative processes
- alternative approaches to meeting the plan or project objectives

Although the requirement to search for alternatives falls within the scope of Article 6(4), in practice it is useful for the planner to consider all possible alternatives as early as possible when initially planning their development project, and especially to investigate those that produce win-win solution for both navigation and nature conservation (see chapter 4). If an appropriate alternative is found at this stage which is not likely to have a significant effect on a Natura 2000 site, then it can be approved immediately and an appropriate assessment will not be required.

However, in the case where the project has gone through an appropriate assesment which has concluded that there will be an adverse effect on the integrity of the site, it is then for the competent authority to determine whether alternative solutions exist. All feasable alternatives, in particular, their relative performance with regard to the conservation objectives of the Natura 2000 site and the site’s integrity should be analysed.

The alternative solutions chosen should also be subject to a new appropriate assessment if it is likely to have a significant effect on the same or another Natura 2000 site. Usually, if the alternative is similar to the original proposal, the appropriate assessment may be able to draw a lot of the information needed from the first appropriate assessment.

Flow chart of the Article 6(4) conditions



5.8.2. Imperative reasons of overriding public interest (IROPI)

In the absence of alternative solutions, or in the presence of solutions having even more negative effects on the conservation objectives or integrity of the site concerned, the competent authorities must examine whether there are imperative reasons of overriding public interest which justify the authorisation of the plan or project in spite of that fact that it may adversely affect the integrity of a Natura 2000 site(s).

The concept of "imperative reason of overriding public interest" is not defined in the directive. However it is clear from the wording that, for a plan or project to be authorised in the context of Article 6(4), it must meet all three of the following conditions:

- there must be **imperative** reasons for undertaking the plan or project – imperative in this sense clearly means that the project is essential for society, rather than merely desirable or useful;

- the plan or project must be of **overriding** interest – in other words it must be demonstrated that implementing the plan or project is even more important than fulfilling the objectives of the Birds and Habitats Directives. It is clear that not every kind of public interest of a social or economic nature is sufficient, in particular when seen against the particular weight of the interests protected by the directive (see e.g. its 4th recital stating "Community's natural heritage"). It seems also reasonable to assume that the public interest can only be overriding if it is **a long-term interest**; short term economic interests or other interests which would only yield short-term benefits for the society would not be sufficient to outweigh the long-term conservation interests protected by the directive.

- be of **public** interest - it is clear from the wording that only public interests, can be balanced against the conservation aims of the directive. Thus, projects developed by private bodies can only be considered where such public interests are served and demonstrated.

Article 6(4) second subparagraph mentions human health, public safety and beneficial consequences of primary importance for the environment as examples of such imperative reasons of overriding public interests. It also refers to "other imperative reasons of overriding public interest" of social or economic nature. TEN-T projects which contribute to the attainment of major Union objectives, such as the smooth functioning of the internal market and the strengthening of economic and social cohesion and which also have the specific objectives of allowing the mobility of persons and goods and ensuring accessibility for all regions of the Union can undoubtedly be considered as important investments in public interest. Nevertheless, the decision if these projects are imperative and overriding needs to be always taken on a case by case basis.

It should be noted that the conditions of overriding public interest are even stricter when it comes to the realisation of a plan or project likely to adversely affect the integrity of a Natura 2000 site that hosts priority habitat types and/or species, where those habitat types and/or species are affected. These can only be justified if the imperative reasons of overriding public interest concern:

- human health and public safety or;
- overriding beneficial consequences for the environment, or;
- for other imperative reasons if, before granting approval to the plan or project, the opinion of the Commission has been given.

The opinions delivered by the Commission in the framework of Article 6(4) illustrate the kind of projects that have been considered of imperative reasons of overriding public interest.[71] As example, the following reasons, among others, have been considered overriding by the Commission in the opinions adopted so far: creation of a substantial number of workplaces, significant positive impact on regional and national economy, improvement of living conditions of the local population.

5.8.3. Compensatory measures

If the above two conditions are met then the authorities must also ensure that compensatory measures are adopted and put in place before the project can begin. Compensatory measures therefore constitute the "last resort" and are used only when the decision has been taken to proceed with a plan or project because it has been demonstrated that there are no alternative solutions and that the project is necessary for imperative reasons of overriding public interest under the conditions described above.

[71] http://ec.europa.eu/environment/nature/nature_conservation/eu_nature_legislation/specific_articles/art6/index_en.htm

Compensatory measures under Article 6(4) are clearly distinct from the mitigation measures introduced through Article 6(3). Mitigation measures are those measures which aim to minimise, or even cancel, the negative impacts on a site that are likely to arise as a result of the implementation of a plan or project. Compensatory measures on the other hand are sensu stricto independent of the project They are intended to make up for or offset the residual negative effects of the plan or project (after all possible mitigation measures have been introduced to the plan or project) so that the overall ecological coherence of the Natura 2000 network is maintained.The compensatory measures must be able to compensate fully for the damaged caused to the site and to its target features and must be sufficient to ensure that the overall coherence of Natura 2000 is protected.

To ensure that the overall coherence of Natura 2000 is protected, the compensatory measures proposed for a plan or project should in particular:

a) contribute to the conservation of affected habitat types and species within the biogeographical region concerned or within the same range, migration route or wintering area for species in the Member State concerned;

c) provide functions comparable to those which had justified the selection of the original site, particularly regarding the adequate geographical distribution;

d) have to be additional to the normal duties under the directive, i.e. they cannot substitute existing commitments, such as the implementation of Natura 2000 management plans.

According to existing Commission guidance[72], compensatory measures under Article 6(4) can consist of one or more of the following:

- the recreation of a comparable habitat or the biological improvement of a substandard habitat within an existing designated site provided this goes beyond the site's conservation objectives;
- the addition to the Natura 2000 network of a new site of comparable or better quality and condition to the original site;
- the recreation of a comparable habitat or the biological improvement of a substandard habitat outside a designated site which is then included in the Natura 2000 network.

The habitat types and species negatively affected must as a minimum be compensated for in comparable proportions, but, considering the high risks and scientific uncertainty involved in attempting to recreate or restore substandard habitats it is strongly recommended that ratios well above 1:1 or more are applied to be sure that the measures really do deliver the necessary compensation.

It is considered good practice to adopt compensatory measures as close as possible to the affected area in order to maximise chances of protecting the overall coherence of the Natura 2000 network. Therefore, locating compensation within or nearby the Natura 2000 site concerned in a location showing suitable conditions for the measures to be successful is the most preferred option. However, this is not always possible and it is necessary to set a range of priorities to be applied when searching locations that meet the requirements of the Habitats Directive. Under these circumstances, the likelihood of long-term success is best evaluated by peer-reviewed scientific studies of trends.

[72] Guidance document on article 6(4) of the Habitats Directive; clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, Commission opinion: http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/guidance_art6_4_en.pdf

Member States should pay particular attention when the negative effects of a plan or project are produced in rare natural habitats or in natural habitats that need a long period of time to provide the same ecological functionality. For some habitats and species it may simply not be possible to compensate for any loss within a reasonable time frame as their development may take decades.

Finally, the compensatory measures should be in place and fully functional before the work on the plan or project has begun. This is to help buffer the damaging effects of the project on the species and habitats by offering them suitable alternative locations in the compensation area. If this is not fully achievable, the competent authorities should require extra compensation for the interim losses that would occur in the meantime.

The information on the compensatory measures should be submitted to the Commission before they are implemented and before the realisation of the plan or project concerned. It is therefore advised that information on compensatory measures should be submitted to the Commission as soon as they have been adopted in the planning process in order to allow the Commission, within its competence of guardian of the treaty, to assess whether the provisions of the directive are being correctly applied.

6. THE RELATIONSHIP BETWEEN THE BIRDS AND HABITATS DIRECTIVES AND THE WFD, EIA, SEA DIRECTIVES

6.1. Introduction

There are a number of other EU environmental laws, in addition to the Birds and Habitats Directives, which are relevant to inland waterway transport. They concern in particular the Water Framework Directive, the Strategic Environmental Assessment Directive, the Environmental Impact Assessment Directive and the Flood Risk Directive.[73] The present chapter looks at how these directives interact with the Birds and Habitats Directives in the context of inland waterway transportation.

In view of the multifunctional character of rivers in general, there is considerable merit in applying a more holistic and coordinated approach to their management and development, also in relation to the implementation of EU environmental legislation.

6.2. Links between the WFD and the Birds and Habitats Directives

It is clear that there are strong links between the WFD and the Birds and Habitats Directives. They both operate at least in part on the same environment – that of aquatic ecosystems and terrestrial ecosystems and wetlands directly dependent on them – and they have broadly similar ambitions in terms of aiming to ensure the non-deterioration of the rivers and to enhance the ecological condition of these aquatic ecosystems.

There are clear references in the WFD to the Birds and Habitats Directives which ensure full cross compliance between them (Articles 4(1)(c), 4(2), 4(8), 4(9), Article 6 and Annex IV, Article 8 and Annex V (1.3.5), Article 11(3)(a), and Annexes VI and VII of the WFD).

- Article 6, in particular, calls on Member States to establish a register of all areas lying in each river basin district which have been designated as requiring special protection under specific Community legislation for the protection of their surface water and groundwater or for the conservation or habitats and species directly depending on water. This includes areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor for their protection, including relevant Natura 2000 sites designated under the Birds and Habitats Directives. Maps of these areas should be included in the river basin management plan.
- Article 8: requires that programmes are established for the monitoring of water status in order to establish a coherent and comprehensive overview of water status within each river basin district. As the Birds and Habitats Directives also require monitoring of the status of the species and habitat types they protected, there is considerable opportunity to coordinate these monitoring programmes so that they are mutually supportive of each other and result in cost savings.
- Article 11, which outlines the contents of the programme of measures, also requires that measures are included for the implementation of the Birds and Habitats Directives, in so

[73] There are also a number of EU environmental Directives addressing air, water pollution, and energy consumption which may also be relevant to the IWT sector but these are not covered in this guide.

far as these measures are needed for those protected species and habitats, covered by the two directives, which are directly dependent on water. In other words, measures in protected areas should be integrated into the Programme of Measures of the RBMP. These measures represent additional measures to achieve the more stringent conservation objectives of protected areas, which may well go beyond the achievement of "good ecological status", and that are defined by the other Union legislation under which these protected areas have been designated. The fact that the WFD sets a deadline of 2015 for achieving "good ecological status" should provide added impetus for an early implementation of conservation measures for the species and habitat types protected under the Birds and Habitats Directives.

River basin management plans (RBMP) and Natura 2000:

Linking habitats to conserve Danube fish[74]

Integrated approaches are central to the RBMP initiative, which promotes joined-up planning and harmonised action in riparian habitats. Several different LIFE projects are actively involved in supporting such co-ordinated RBMP activities, and a good example of what can be achieved through linked-up wetland conservation work is demonstrated by the results of a recently completed LIFE project on the Danube, in Austria.

The Danube and its tributaries are one of the most important waterway systems in the EU, and a large number of natural hydrological features in the Danube basin have been altered to help strengthen their socio-economic potential. However, the impacts of these interventions can have negative effects on fish or other species that rely on the rivers for migration and spawning.

Austrian nature conservation partners involved in the development of the Danube RBMP had identified a programme of actions to help improve habitat conditions for protected fish species. As part of this wider RBMP programme, LIFE support was awarded to a river management project involving two inter-linked actions near the mouth of the Ybbs tributary in lower Austria. Both parts of the LIFE's 'Donau-Ybbs Linkage' project have been highly successful, up to forty different fish species have benefitted, which involved restoring natural habitat conditions at the mouth of the Ybbs and establishing a fish bypass around the Melk hydo-power station.

The latter now enables fish to migrate once again along the Danube, past the station, and opens up a river continuum of 22 km on the Danube, plus 13 km on the Ybbs. These outcomes complement the actions of two other LIFE projects operating in the vicinity, which aim to improve habitat over a 90 km stretch of the river. Endangered species, including zingel (*Zingel zingel*), streber (*Zingel streber*) and schraetzer (*Gymnocephalus schraetzer*), are among the fish that have already been recorded using the 2 km-long LIFE-funded bypass. High-tech engineering solutions ensure a dynamic flow of water through the meandering channel, which has been constructed from natural materials – some 5 000 willow trees were planted on the banks.

The new fish migration route is supplemented by the activity nearby at the mouth of the Ybbs to improve fish spawning areas. Here natural hydrological functions have been restored by removing infrastructure that previously controlled the Ybbs' merger with the Danube. Results from the project actions allowed the two rivers to re-create a natural confluence containing a diversity of habitat structures. This new delta has already been colonised as a spawning ground by Danube fish, including protected species like the Danube roach (*Rutilus pigus*),), as well as by birds and mammals such as Common sandpiper (*Actitis hypoleucos*), kingfisher (*Alcedo atthis*), beaver (*Castor fiber*).

By reconnecting migratory routes and restoring natural spawning grounds for endangered fish species, LIFE's Donau- Ybbs Linkage project demonstrates the type of synergies that can be achieved by co-ordinated planning of different conservation actions in EU river basins. This example of good practice in Austria is expected to be the first of many throughout Europe to result from RBMPs.

[74] http://ec.europa.eu/environment/life/publications/lifepublications/bestprojects/documents/bestnat09.pdf

The extent to which the measures to achieve good ecological status coincide with those needed for the conservation of EU protected species and habitats will of course depend on the individual circumstances surrounding each water body. Nevertheless, by linking the WFD and nature directives so closely together, authorities can ensure that the different actions introduced under each one are well coordinated and mutually supportive of one another.

The WFD should have a major beneficial effect on the conservation of species and habitat types protected under EU legislation in general. By operating at the level of the whole catchment area and adopting an ecosystem based approach, the WFD will improve the quality of all surface and groundwater in the EU, both within Natura 2000 sites and across the broader countryside which should help alleviate many of the pressures facing biodiversity in general and threatened species and habitat types in particular.

There are, however, also some important distinctions to be made between these directives. To assist in the understanding of how the three directives interact, the Commission has produced a "Frequently Asked Questions" paper.[75] Key elements are highlighted below.

What happens if one directive sets different standards than the other?

According to Article 4(2) of the WFD 'where more than one of the objectives […] relates to a given body of water, the most stringent shall apply'. This refers to situations in which the two objectives affect the same aspect of water quality. For instance, if a certain concentration of phosphorus is needed to achieve good ecological status, but a more stringent value is needed to help achieve the favourable conservation status of, for example, a freshwater pearl mussel then the latter applies. Once again, the situation needs to be judged on a case by case basis.

6.2.1. Different environmental objectives but a coordinated approach

The first, most important distinction is that, whilst the WFD, Birds and Habitats Directives apply to similar environments, they have different objectives. The WFD aims to protect and enhance all surface waters and groundwater so that they reach a good status as a rule by 2015. The Birds and Habitats Directives, on the other hand, aim to protect, maintain and restore selected species and habitat types within these waters. The aim is to bring them up to a favourable conservation status, for instance by designating specific areas (Natura 2000 sites), preventing further deterioration and introducing positive management measures to ensure their recovery.

So whilst the WFD may make a significant contribution to the implementation of the Birds and Habitats Directives and vice versa they have different legal requirements. This is reflected in Article 4(1)(c) of the WFD which recognises that the WFD objective may need to be complemented by additional measures in order to ensure that the conservation objectives for protected areas are achieved.

For instance, if a Natura 2000 site is designated because of the presence of otters, additional measures on top of those required for achieving good ecological status of the water body may also be necessary in order to conserve the species, for instance to regulate overfishing, to protect the species from disturbance, or to restore and defragment its habitat. These measures are not relevant for fulfilling the objectives of the WFD as they do not contribute to achieving 'good ecological status' but they are directly relevant to the Habitats as they help the species reach a favourable conservation status across its range.

[75] FAQ on links between the WFD and the Nature Directives is available on Circa webpage: http://circa.europa.eu/Public/irc/env/wfd/library?l=/framework_directive/thematic_documents/biodiversity_water/faq-wfd-bhd_20dec2011/_EN_1.0_&a=d

Natura 2000 sites are often designated not just for freshwater species but also for other non water dependent habitat types and species as well. For instance, a typical Natura 2000 site can contain a stretch of river, an area of wetlands and a patch of dry forest on a hill above the river valley. The forest habitat and its associated species (e.g. woodpeckers) are an integral part of the Natura 2000 site but they are not directly dependent upon the maintenance or improvement of the status of water. Therefore, the WFD does not cover the protection and enhancement of these other non water related species and habitats. Their conservation will depend instead on the implementation of measures established under the Birds and Habitats Directives alone.

6.2.2. Good ecological status versus favourable conservation status

As can be seen the objectives of each directive are clearly judged on different criteria. In the case of the Habitats Directive "success" is measured according to whether a protected species or habitat has reached a favourable conservation status. In the case of the WFD, success is measured, inter alia, according to whether the surface water bodies within a river basin district reach good ecological status (or potential) and good chemical status and if the groundwater bodies have reached good quantitative and chemical status. At the core of the WFD assessment are the so-called type-specific reference conditions. The status of each water body is judged by comparing its status against these reference conditions.

As the table below illustrates the WFD takes particular account of the composition and abundance of selected species (phytoplankton, aquatic flora, benthic invertebrates and fish fauna) as well as of the hydro-morphological quality elements, the chemical and physico-chemical conditions (which includes the specific pollutants at national level). But it does not take account of the conservation status of other riverine species protected under the Birds and Habitats Directives such as the kingfisher or European pond turtle or beaver.

Box : Good ecological status versus favourable conservation status?

The good ecological status of a river under the WFD is determined by a number of factors:

(a) biological elements:

- the composition and abundance of aquatic flora;
- the composition and abundance of benthic invertebrate fauna;
- the composition, abundance and age structure of fish fauna;

(b) hydromorphological elements supporting the biological elements:

- the quantity and dynamics of river flows;
- connection to groundwater bodies;
- river continuity;
- river depth and width variation;
- structure and substrate of the river bed;
- structure of the riparian zone;

(c) chemical and physico-chemical elements supporting the biological elements:

- thermal conditions, oxygenation conditions, salinity, acidification status, nutrient conditions;
- specific pollutants identified at national level.

These are all key elements of a healthy functioning riverine ecosystem but they do not include the assessment of the status of specific species or habitat types listed under the Birds and Habitats

Directives present in the water body. Only if such a species is an essential part of the biological elements (e.g. a dominant fish species) will it also influence the ecological status of the water body.

In the same way the Habitats Directive only measures favourable conservation status on the basis of features such as range, area, population size and structure and functions of the habitats or species for which the site is designated – not the aquatic community in general. In the case of a species protected under the Habitats Directive, a favourable conservation status is achieved when the species:

- has a stable population that is maintaining itself on a long term basis as a viable component of its natural habitats;
- the natural range of the species is neither reduced nor likely to be reduced in near future;
- there is and probably will continue to be, a sufficiently large habitat to maintain its populations in the long term.

In the case of habitat types protected under the Habitats Directive, a favourable conservation status is achieved when:

- its natural range and areas it covers within that range are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of both habitat types and species is determined at biogeographical level (i.e. not at the level of each individual site or water body).

Achieving a good ecological status for rivers should in general be beneficial also for rare and endangered species and habitat types protected under the Birds and Habitats Directives, but there may be a need to adopt additional conservation measures to ensure that the objectives of the two nature directives are achieved.

6.2.3. Heavily modified water bodies or artificial water bodies and Natura 2000

According to Article 4(3) of the WFD, some water bodies heavily influenced by human activities may be designated as heavily modified water bodies (HMWB) or as artificial water bodies (AWB) if they are newly created by human activities.[76] In 2005 Member States made their initial designations which resulted in about 15% of the EU's surface water bodies being identified as heavily modified and a further 4% as artificial. The situation varies widely between Member States. For these water bodies the objective is to achieve good ecological "potential" rather than "status". But how does this relate to the Birds and Habitats Directives?

Again, it is important to bear in mind that the three directives have different objectives. Even though a site is designated as a HMWB or AWB, it may still harbour protected species or habitat types of EU importance and it may therefore be designated under Natura 2000. This means that measures still need to be taken to ensure the protected species and habitat types present are maintained or restored to a favourable conservation status.

Also if the Natura 2000 measures require stricter ecological conditions in terms as regards hydro- morphological elements than those required for achieving "good ecological potential" under the WFD then the stricter measures must be applied. This is in line with Article 4(2).

[76] For further details see EC Guidance doc N°4 on the identification and designation of heavily modified and artificial water bodies.

6.2.4. Assessing new developments under the WFD: a comparison with the appropriate assessment under the Birds and Habitats Directives

According to Article 4(7) of the WFD, exemptions can be made for new modifications and sustainable human development activities that result in the deterioration of the status of the water body or prevent the achievement of good ecological status or potential or good groundwater status. This may for instance include new developments related to navigation.

These exemptions must however respect the following conditions (Article 4(7) (a)-(d)), and Articles 4(8) and 4(9):[77]

- the project must be of overriding public interest and/or the benefits of achieving the WFD objectives must be outweighed by the benefits of the new modification to human health, to the maintenance of human safety or to sustainable development;
- all practical steps must be taken to mitigate the adverse impacts on the status of the water body;
- the beneficial objectives of the modification cannot be achieve by other means which are a significantly better environmental option;
- the reasons for the modification are explained in the RBMP;
- the achievement of WFD goals in other water bodies within the same river basin district will not be compromised or excluded;
- the project is consistent with the implementation of other Community environmental legislation;
- steps are taken to ensure that the at least the same level of protection as in the existing Community legislation is guaranteed.

Under the Habitats Directive (Article 6(3)), plans or projects that are likely to affect a Natura 2000, either individually or in combination with other plans or projects, must undergo an appropriate assessment if the development may have potentially negative effects on a Natura 2000 site, in view of the site's conservation objectives. The approval authority can only agree to the plan or project if it has been ascertained with sufficient certainty that it will not adversely affect the integrity of the site (unless the derogation provision under Article 6(4) is invoked).

If the development potentially affects both a WFD objective and a Natura 2000 site then both procedures must be undertaken as they will have a different focus. One will assess if the project is likely to compromise the objectives of the WFD, the other will assess whether it will adversely affect the integrity of a Natura 2000 site.

However, the WFD makes it clear that a development cannot go ahead if it is not consistent with other EU environmental legislation. In other words, if the project does not compromise the objectives of the WFD but does adversely affect the integrity of a Natura 2000 then it cannot be approved under the WFD unless the derogation procedure under Article 6(4) of the Habitats Directive has also been accepted.

[77] Guidance doc N° 20 on exemptions to the environmental objectives

EU WFD and Natura 2000 guidelines for cross border implementation in Germany and Austria

The aim of this research and development project "EU-Water Framework Directive and Natura 2000 – the cross-border implementation in Germany and Austria" is to develop and test a harmonised procedure and detailed guidelines for the trans-sectoral and cross-border implementation of the Water Framework Directive and the Birds and Habitats Directives.

The main tasks are to:

- develop EU-wide recommendations for a harmonised implementation procedure of the EU Directives based on the results and experiences in the investigation areas;
- clarify the methodological approach and the coordination of the planning process in two different water bodies;
- calibrate aims and conservation and development measures for habitats and species according to Annexes I, II and IV of the Habitats Directive;
- harmonise public participation according to the Water Framework Directive and Habitats Directive, and according to the individual regulations of the federal states.

The project was commissioned by the German Federal Agency for Nature Conservation in Bonn (BfN), the contractors are the Bavarian Academy for Nature Conservation and Landscape Management (ANL) and BOKU University of Natural Resources and Applied Life Sciences, Vienna, Inst. for Hydrobiology & Aquatic Ecosystem Management (IHG) and Inst. of Landscape Development, Recreation and Conservation Planning (ILEN).

More details: http://www.wrrl-natura2000.info/en/index.html and

http://www.buchweltshop.de/bv-heft-85-wasserrahmenrichtlinie-und-natura-2000.html

6.3. Flood Risk Management Directive

In November 2007, Directive 2007/60/EC on the assessment and management of flood risk was adopted. It establishes a framework for the assessment and management of flood risks, aiming at the reduction of the adverse consequences for human health, the environment, cultural heritage and economic activity associated with floods in the Community.

The Directive requires Member States to undertake:

- Preliminary flood risk assessment, which identifies areas where serious floods have occurred in the past and where there is a likelihood of significant floods again in the future (deadline December 2011).

- Flood hazard and flood risk maps, which map out the identified flood risk areas per river basin (or other agreed unit area of management). These maps should also show the potential adverse consequences associated with different flood scenarios, including information on potential sources of environmental pollution as a consequence of floods, as well as protected areas such as Birds and Habitats Directives in those areas (deadline December 2013).

- Flood risk management plans on the basis of the above, flood risk management plans should then be established focusing on managing and reducing the potential adverse consequences of flooding. These plans should include a prioritised set of measures, addressing all aspects of flood risk management from prevention and protection to preparedness (e.g. flood forecasts and early warning systems) taking into account the characteristics of the particular river basin or sub-basin (deadline December 2015).

Because of the diversity in flood events and impacts throughout Europe, the directive does not prescribe any further detailed community-wide objectives for managing flood risks; this is left up to the Member States to define.

6.3.1. Interactions between the Floods Directive and the Birds and Habitats Directives

Although flood protection measures are often identified as one of the drivers for hydro-morphological alterations, there are important links between the purposes and methods of flood risk management and the achievement of water quality objectives under the Water Framework Directive. The Floods Directive therefore includes a number of cross-linkages with the WFD to ensure coordination in the two implementation processes.

In particular, the flood risk management plans could make use of the administrative arrangements developed under the WFD (Article 3(1), 3(2)) and. The flood risk maps and management plans should also be carried out in such a way that they shall be coordinated with, or where possible integrated into, the review of the river basin management plans from 2015. The flood risk management plans shall also take into account the environmental objectives of Article 4 of the WFD.

The Floods Directive (recital19) also defers to the WFD in cases of multi-purpose use of bodies of water for different forms of sustainable human activities (e.g. flood risk management, ecology, inland navigation or hydropower) and the impacts of such use on the bodies of water, because the WFD provides for a clear and transparent process for addressing such uses and impacts, including possible exemptions from the objectives of "good status" or of "non-deterioration" in Article 4 thereof.

As regards the Birds and Habitats Directives, there is, in addition to the requirement to include protected areas in the flood risk maps (as listed in point 1(i), (iii) and (v) of Annex IV to the WFD), there is also a specific reference in Article 7 to the need to take into account nature protection in the flood risk management plans. Through the links to the WFD it is also clear that all activities under the Floods Directive must be in line with the requirements of these two directives as well, for instance if a flood protection measure risks affecting one or more Natura 2000 site, it too, must follow the procedure under Article 6 of the Habitats Directive, and where necessary an appropriate assessment should be carried out to assess the potential effects of the plan or project on the integrity of the Natura 2000 site(s).

The Floods Directive also recognises (recital 14) that *"with a view to giving rivers more space, the flood risk management should consider where possible the maintenance and/or restoration of floodplains"*. There is ample evidence these days to show that maintaining and restoring healthy ecosystems can be a very effective way of preventing and mitigating floods, and will be an important tool in adapting to climate change as well. They are often also much more cost-effective than manmade constructions and provide added benefits for the environment in terms of ecosystem services and habitats for biodiversity.

In light of the above, it would not appear that the Floods Directive will cause any additional concerns for inland waterway transportation than those already in place for the WFD, the SEA and EIA Directives and the Birds and Habitats Directives since all its activities are to be fully coordinated with these directives. Also, according to Article 7(3) 2nd paragraph, of the Flood Risks Directive, the flood risk management plans shall take into consideration relevant aspects such as navigation and port infrastructure.

6.4. The SEA Directive and the EIA Directive

Two other key pieces of EU environmental legislation are directly relevant to IWT developments:

- Directive 2001/42/EC on the evaluation of the effects of certain plans and programmes on the environment (commonly referred to as "SEA Directive");[78]

- Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment, amended in 1997 (97/11/EC) and 2003 (2003/35/EC) – commonly referred to as the "EIA Directive"[79] as amended by Directive 209/31/EC.

6.4.1. The SEA Directive

The purpose of the SEA Directive is to ensure that the environmental consequences of certain plans and programmes are identified, assessed and taken into account during their preparation and before their adoption.

In this respect, Member States are required to:

- prepare an environment report which identifies and assesses the likely significant environmental effects of the plans and programmes, and of any reasonable alternatives;

- provide certain authorities and the general public with an opportunity to express their opinion on the environmental report as well as on the draft plan or programme. Consultation not only helps to ensure that the information supplied for the assessment is comprehensive and reliable but also provides more transparency in the decision making process.

Ultimately, the strategic environmental assessment (SEA) aims to encourage a more integrated and efficient approach to territorial planning where environment, including biodiversity considerations, are taken into account much earlier on in the planning process and at a much more strategic level. This usually leads to fewer conflicts further down the line at the level of individual projects. It also allows for a more appropriate siting of future developments away from areas of potential conflict with nature conservation (see also chapter 4 for details on integrated planning and management).

An SEA is mandatory for a variety of plans and programmes (i.e. prepared for agriculture, forestry, fisheries, energy, industry, transport, waste management, water management, telecommunications, tourism, town and country planning or land use) which set the framework for future development consent of projects listed in the "EIA Directive"[80]. An SEA should also be carried out on any plans or programmes, which, in view of the likely

[78] Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment, OJ L 197, 21.7.2001, p. 30–37 – see http://ec.europa.eu/environment/eia/home.htm

[79] Directive 2003/35/EC providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC, OJ L 156, 25.6.2003, p. 17.

[80] Useful guidance on how to carry out SEAs for transport plans and programmes is provided in the BEACON Manual (Building Environmental Assessment Consensus) available from: http://ec.europa.eu/environment/eia/sea-studies-and-reports/beacon_manuel_en.pdf

significant effect on sites, have been determined to require an assessment pursuant to Article 6(3) of the Habitats Directive.

6.4.2. The EIA Directive

While the SEA process operates at the level of plans and programmes, the EIA Directive operates at the level of individual public and private projects. Thus, development consent for projects[81] which are likely to have significant effects on the environment should be granted only after an assessment of its likely environmental effects has been carried out.

The EIA Directive distinguishes between projects requiring a mandatory EIA (so-called "Annex I projects") and those where Member State authorities must determine, in a procedure called “screening”, if projects are likely to have significant effects, taking into account criteria in Annex III of the Directive (so-called "Annex II projects"). Projects that fall under Annex I include those for inland waterways and ports for inland-waterway traffic which permit the passage of vessels of over 1,350 tonnes. Projects that fall into Annex II include those inland-waterway construction project not included in Annex I, as well as canalisation and flood-relief works.

6.4.3. The relationship between SEA, EIA and appropriate assessments

There are many similarities between the procedures for SEA and EIA, and the appropriate assessments carried out for plans or projects affecting Natura 2000 sites under the Habitats Directive. But this does not mean they are one and the same, there are some important distinctions too (see table). Therefore, an **SEA and EIA cannot replace, or be a substitute for, an appropriate assessment** as neither procedure overrides the other.

They may of course run alongside each other or the appropriate assessment may form part of the EIA/SEA assessment but, in such cases, the appropriate assessment should be clearly distinguishable and identifiable in the SEA’s environmental report or in the EIA’s environmental documentation, or should be reported on separately so that its findings can be differentiated from those of the general EIA or SEA.[82]

One of the key distinctions between SEAs/EIAs and Habitats Directive’s appropriate assessments is that they measure different aspects of the natural environment and have different criteria for determining "significance". Another is the scope of the directives; SEAs/EIAs apply in the case of all plans and projects that fall within their scope irrespective of where they are proposed to be located in the EU territory. The appropriate assessment, on the other hand, is only applicable to those plans and projects that could have a negative effect on a Natura 2000 site.

There is also an important distinction as regards the outcome of the assessment. The assessments under the SEA and EIA lay down procedural requirements and do not establish obligatory environmental standards. The assessment under the Habitats Directive, on the other hand, lays down obligations of substance. In other words, if the appropriate assessment determines that the plan or project will adversely affect the integrity of a Natura

[81] The EIA Directive defines "project" as the execution of construction works or of other installations, schemes, or interventions in the natural surroundings and landscape.

[82] See the Commission guidance document: “Assessments of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC."

2000 site, the authority cannot agree to the plan or project as it stands unless, in exceptional cases, they invoke special procedures under Article 6(4).

This contrasts with the SEAs/ EIAs which are merely designed to make the planning authorities fully aware of the environmental implications of the proposed plan or project so that these are taken into account in their final decision.

Table 2: Comparison of procedures under AA, EIA and SEA

	AA	EIA	SEA
Which type of developments are targeted ?	Any plan or project which - either individually or in combination with other plans/projects - is likely to have an adverse effect on a Natura 2000 site (excluding plans or projects directly connected to the management of the site).	All projects listed in Annex I. For projects listed in Annex II the need for an EIA shall be determined on a case by case basis and depending on thresholds or criteria set by Member States (taking into account criteria in Annex III).	Any plans and programmes or amendments thereof which are (a) prepared for agriculture, forestry, fisheries, energy, industry, transport, waste management, water management, telecommunications, tourism, town and country planning or land use and which set the framework for future development consent of projects listed in Annexes I and II to Directive 85/337/EEC, or (b) which, in view of the likely effect on sites, have been determined to require an assessment pursuant to Article 6 or 7 of Directive 92/43/EEC; (c) which set the framework for future development consent of projects other than those referred to in (a) and that have been determined to be likely to have significant environmental effects.
What impacts need to be asssessed relevant to nature?	The assessment should be made in view of the site's conservation objectives (which are set in function of the species/ habitat types for which the site was designated).The impacts (direct, indirect, cumulative, etc.) should be assessed to determine whether or not they will adversely affect the integrity of the site concerned.	Direct and indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative significant effects on, amongst others, fauna and flora.	Likely significant effects on the environment, including on issues such as biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship between the above factors;
Who carries out the assessment?	It is the responsibility of the competent authority to ensure that the AA is carried out to the required standard. In that context the developer may be required to carry out studies and to provide all necessary information to the competent authority in order to enable the latter to take a fully informed decision. The competent authority should also collect relevant information from other sources as appropriate.	The developer/authority.	The competent planning authority.

Are the public/ other authorities consulted?	Not obligatory but encouraged "if appropriate".	Compulsory – consultation to be done before adoption of the development proposal. Member States shall take the measures necessary to ensure that the authorities likely to be concerned by the project are given an opportunity to express their opinion on the request for development consent. The same principles apply for consulting the public.	Compulsory –consultation to be done before adoption of the plan or programme. The authorities and the public shall be given an early and effective opportunity within appropriate time frames to express their opinion on the draft plan or programme and the accompanying environmental report before the adoption of the plan or programme or its submission to the legislative procedure. Member States must designate the authorities to be consulted which, by reason of their specific environmental responsibilities, are likely to be concerned.
How binding are the outcomes?	Binding. The competent authorities can agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site.	The results of consultations and the information gathered as part of the EIA *"must be taken into consideration*" during the approval procedure.	The environmental report, as well as the opinions expressed *"shall be taken into account"* during the preparation of the plan or programme and before its adoption or submission to the legislative procedure.

ANNEX I

Natura 2000 sites along 13 of Europe's major lowland rivers

Maps of Natura 2000 sites along 13 rivers

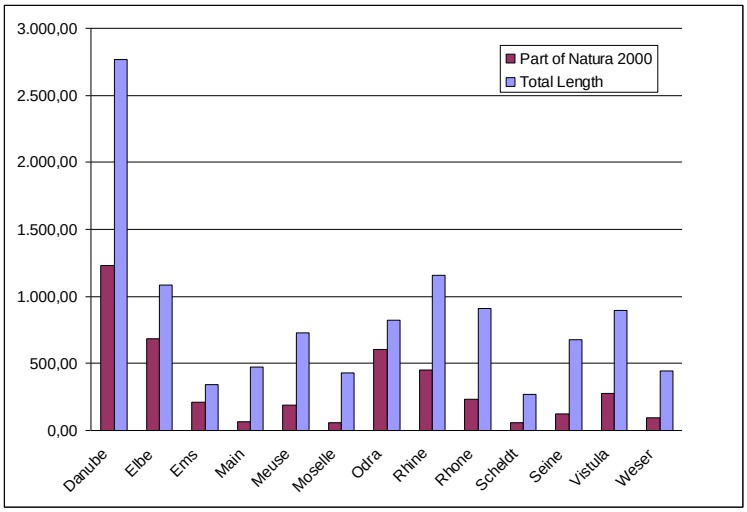
In order to illustrate the kind of sites that have been included in the Natura 2000 network along Europe's major rivers and the type of protected species and habitat types for which they have been designated, an analysis was done for 13 of the most important lowland rivers in Europe. These 13 rivers were selected because they best represent the type of rivers that are normally used for inland navigation.

For each of these main rivers, the Natura 2000 spatial dataset was overlaid on the river spatial dataset created by Water Information System for Europe (WISE) for the Water Framework Directive in order to identify and map those Natura 2000 sites which fall within a 2.5 km buffer zone either side of the river. A 2.5 km buffer zone had to be used because of the low resolution of the spatial data in the river spatial data which did not allow for narrower buffers to be created.

This large buffer introduces a risk that some of the sites identified are not directly associated with the rivers but just happen to lie within the 2.5 km buffer zone either side. For instance Natura 2000 sites may be included which contain forests or grassland located on hill slopes above a river valley and which are therefore not connected hydrologically with the river. Moreover, because Natura 2000 sites are often made up of a range of different habitats within a single area, it may be that only a part of the site contains freshwater habitats or habitats that are dependent upon the river.

Therefore the results presented below should be treated with caution as they represent an overview of all Natura 2000 sites within a 2.5 km buffer on either side of the river and are not restricted to those that are entirely or mostly linked to or dependant on the river itself. Nevertheless, the information is useful for the purposes of this guide as it gives the IWT stakeholders an indication which stretches of these rivers are in Natura 2000. At the end of this annex is a series of more detailed maps for each of the 13 rivers.

For more detailed information on individual Natura 2000 sites, the reader should go to the Natura 2000 viewer website: http://natura2000.eea.europa.eu/#



Proportion and number of Natura 2000 sites along 13 major lowland rivers in the EU; source: European Commission, DG ENV.B.2, September 2010.

Typical species and habitat types for which Natura 2000 sites have been designated

The following tables provide a list of the freshwater species and habitat types which were most frequently cited as the reason for designating these above Natura 2000 sites along the 13 main rivers. The tables contain species and habitat types that may be found in the river itself, or in the riparian zone or in wetland habitats which depend on, are or connected to, the river (floodplain forests, wet meadows, fens, marshes, etc.).

This provides an indication of the kind of species and habitat types which need to be given special attention when developing integrated projects as described in chapter 4 or when carrying out an appropriate assessment under the Habitats Directive as described in chapter 5.

The list does not provide a complete overview of all EU protected freshwater species or habitat types listed in the two nature directives which are found in rivers in Europe, it only identifies those that are most typically found along the 13 lowland rivers under investigation. Otherwise, the list would be much longer as it would, for instance, include species found in smaller mountain rivers and watercourses as well.

Natura 2000 sites have been designated for instance for the Pyrenean desman *Galemys pyrenaicus,* but that species is not listed below since it only occurs in small mountain streams in the Pyrenees which are obviously not used for commercial inland navigation. The same is true of habitat types like the 6450 *Northern boreal alluvial meadows* or 3290 *Intermittently flowing Mediterranean rivers of the Paspalo-Agrostidion*, which are covered by the Natura 2000 network but are generally not present in the larger rivers of central Europe.

Table 1: Habitat types protected under the Habitats Directive (Annex I) for which Natura 2000 sites have been designated along one or more of the 13 major EU rivers:

Habitat Code	Habitat type
3130	Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*
3140	Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.
3150	Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* — type vegetation
3160	Natural dystrophic lakes and ponds
3260	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation
3270	Rivers with muddy banks with *Chenopodion rubri* p.p. and *Bidention* p.p. vegetation
3280	Constantly flowing Mediterranean rivers with *Paspalo-Agrostidion* species and hanging curtains of *Salix* and *Populus alba*
6410	*Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)
6420	Mediterranean tall humid grasslands of the *Molinio-Holoschoenion*
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
6440	Alluvial meadows of river valleys of the *Cnidion dubii*

6510	Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*)
7140	Transition mires and quaking bogs
7230	Alkaline fens
91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)
91F0	Riparian mixed forests of *Quercus robur, Ulmus laevis* and *Ulmus minor*, *Fraxinus excelsior* or *Fraxinus angustifolia*, along the great rivers (*Ulmenion minoris*)
92A0	*Salix alba* and *Populus alba* galleries
92d0	Southern riparian galleries and thickets (*Nerio-Tamaricetea* and *Securinegion tinctoriae*)

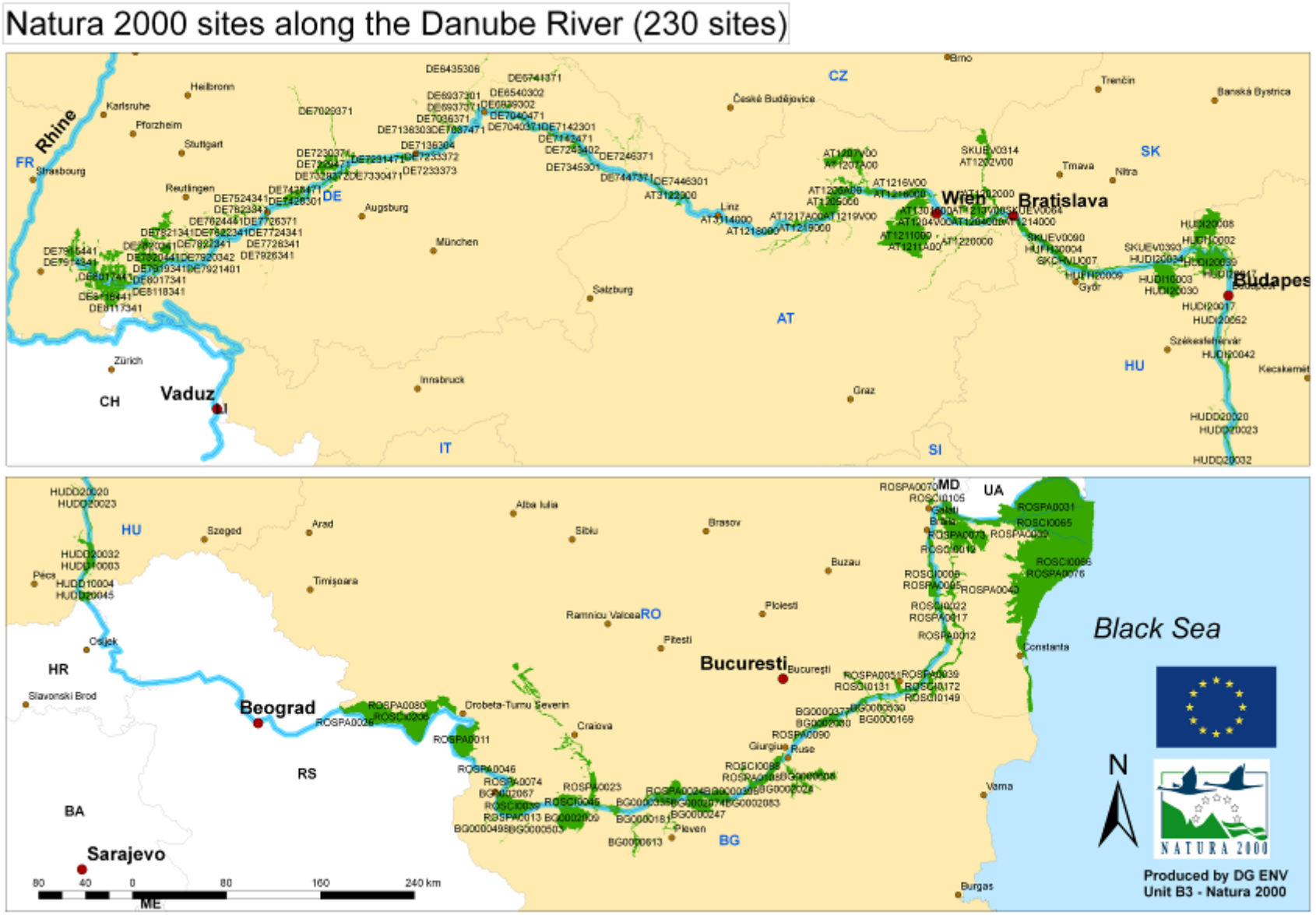
Table 2: Species protected under the Habitats Directive (Annex II) and the Birds Directive (Annex I) for which Natura 2000 sites have been designated along one or more of the 13 major EU rivers[83]:

HABITATS DIRECTIVE	freshwater	associated wetland habitats	N° river N2000 sites with this species
Fish species			
Cottus gobio	x		191
Rhodeus sericeus amarus	x		171
Cobitis taenia	x		155
Aspius aspius	x		151
Misgurnus fossilis	x		129
Lampetra planeri	anadromous		114
Lampetra fluviatilis	x		97
Salmo salar			78
Gobio albipinnatus	x		76
Petromyzon marinus -	anadromous		66
Zingel zingel	x		61
Zingel streber	x		59
Gymnocephalus schraetzer	x		58
Gymnocephalus baloni	x		44
Pelecus cultratus	x		42
Leuciscus souffia	x		30
Rutilus pigus	x		28
Alosa fallax	anadromous		27
Sabanejewia aurata	x		27
Eudontomyzon spp (Danube)	x		25
Alosa alosa			25
Barbus meridionalis	x		24
Cobitis elongata	x		22
Gobio kessleri	x		18
Hucho hucho	x		16
Chondrostoma toxostoma	x		12
Gobio uranoscopus	x		9
Alosa pontica	x		8
Coregonus oxyrhynchus	anadromous		8
Alosa immaculata	x		7
Umbria krameri	x		7
Invertebrates			
Maculinea nausithous		x	120
Lycaena dispar		x	77
Ophiogomphus cecilia	x		74
Unio crassus	x		70
Maculinea teleius		x	79
Coenagrion mercuriale	x		52
Vertigo angustior		x	44
Leucorrhinia pectoralis	x		31
Vertigo moulinsiana		x	30
Austropotamobius pallipes	x		15
Austropotamobius torrentium	x		15
Anisus vorticulus		x	13
Oxygastra curtisii	x		12
Theodoxus tranversalis	x		12
Coenagrion ornatum	x		9
Graphoderus bilineatus	x		8
Coenonympha oedippus		x	5
Margaritifera margaritifera	x		3
Plants			
Dicranum viride		x	38
Liparis loeselii		x	27
Trichomanes speciosum		x	20
Apium repens		x	17
Drepanocladus vernicosus		x	11
Marsilea quadrifolia		x	10
Luronium natans	x		9
Oenanthe conioides	x		8
Myotis rehsteineri	x		6
Gladiolus palustris		x	4
Aldrovanda vesiculosa	x		3

BIRDS AND HABITATS DIRECTIVES	fresh water	forests associated with rivers	associated wetland habitats	N° river N2000 sites with this species
Birds				
Alcedo atthis	x			279
Circus aeruginosus			x	232
Ciconia ciconia			x	161
Picus canus		x		164
Ciconia nigra		x		150
Botaurus stellaris			x	134
Crex crex			x	129
Ixobrychus minutus			x	129
Mergus albellus	x			129
Sterna hirundo	x			128
Pandion haliaetus	x			117
Chlidonias niger	x		x	116
Luscinia svecica			x	116
Philomachus pugnax			x	116
Tringa glareola			x	109
Egretta alba			x	107
Porzana porzana			x	104
Cygnus cygnus	x		x	98
Ardea purpurea			x	81
Nycticorax nycticorax			x	80
Egretta garzetta			x	75
Grus grus			x	72
Aythya nyroca	x		x	71
Pluvialis apricaria			x	68
Larus melanocephalus	x		x	55
Chlidonias hybridus			x	53
Larus minutus	x		x	50
Platalea leucorodia			x	50
Phalacrocorax pygmeus	x		x	47
Gavia arctica	x			45
Porzana parva			x	44
Gavia stellata	x			41
Recirvirostra avosetta			x	40
Ardeola ralloides			x	38
Himantopus himantopus			x	38
Podiceps auritus	x			26
Pelecanus crispus	x			22
Plegadis falcinellus			x	21
Pelecanus onocrotalus			x	18
Anser erythropus			x	15
Acrocephalus melanopogon			x	14
Acrocephalus paludicola			x	14
Tadorna ferruginea			x	11
Gallinago media			x	9
Porzana pusilla			x	8
Larus genei			x	6
Phoenicopterus ruber			x	3
Xenus cinereus			x	3
Oxuyra leucocephala			x	2
Porphyrio porphyrio			x	1
Mammals*				
Castor fiber	x			171
Lutra lutra	x			161
Myotis dasycneme	x			43
Microus oeconomus mehelyi			x	7
Microtus oeconomus arenicola			x	1
Mustela lutreola	x			1
Amphibians				
Triturus cristatus			x	212
Bombina bombina			x	138
Bombina variagata			x	136
Triturus dobrogicus			x	50
Triturus karelinii			x	6
Triturus carnifex			x	4
Reptiles				

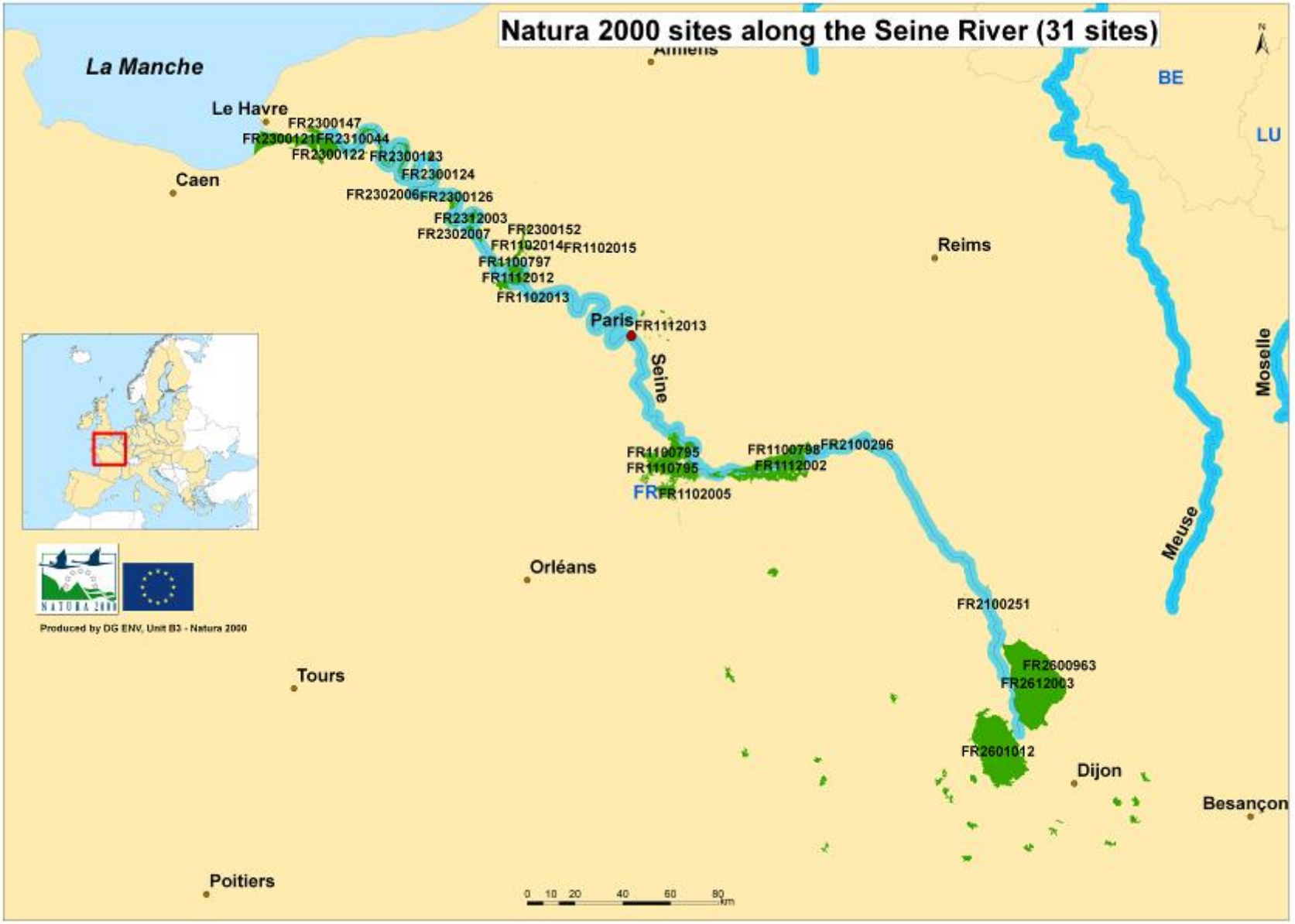
[83] The scientific names of the species correspond to those given officially in the annexes to the Birds and Habitats Directives.


Natura 2000 sites
along the Rhine River (199 sites)
Produced by DG ENV, Unit B3 - Natura 2000
NATURA 2000
Almere
Deventer
Almelo
Apeldoorn
Enschede
Hengelo (O.)
Utrecht
Ede
Arnhem
Nijmegen
NL
's-Hertogenbosch
Tilburg
Eindhoven
Helmond
Venlo
Münster
Hamm
Paderborn
Recklinghausen
Bottrop
Herne
Dortmund
Moers
Essen
Duisburg
Bochum
Hagen
Wuppertal
Mönchengladbach
Solingen
Bergisch Gladbach
Köln
Siegen
Maastricht
Heerlen
Aachen
Liège
BE
Hannover
Wolfsburg
Wiesbaden
DE
Darmstadt
Würzburg
Main
Erlangen
Fürth
Nürnberg
LU
Luxembourg
Trier
Meuse
Metz
Saarbrücken
Heidelberg
Heilbronn
Pforzheim
Stuttgart
Nancy
Moselle
Danube
Reutlingen
Ulm
Augsburg
FR
Freiburg im Breisgau
Zürich
Besançon
CH
Bern
Vaduz
LI
AT
IT
N
0 15 30 60 90 120 km


Natura 2000 sites along the Danube River (230 sites)
Rhine
FR
DE
CH
AT
CZ
SK
HU
SI
IT
HR
RS
BA
ME
BG
RO
MD
UA
Vaduz
Wien
Bratislava
Budapest
Beograd
Sarajevo
Bucuresti
Black Sea
Produced by DG ENV
Unit B3 - Natura 2000
NATURA 2000
240 km

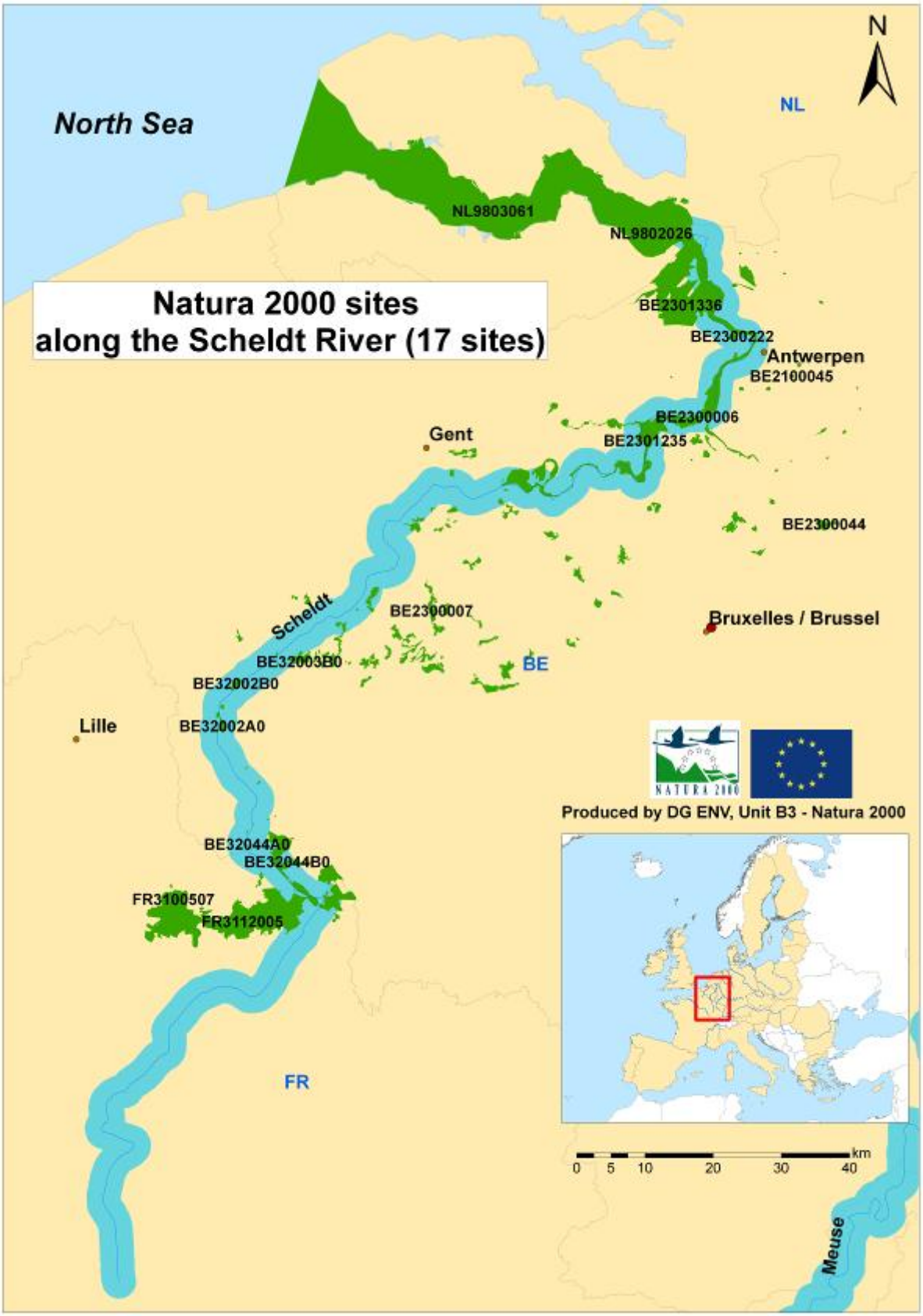

Natura 2000 sites along the Main River (100 sites)
N
Wiesbaden
Darmstadt
Ludwigshafen am Rhein
Heidelberg
Heilbronn
Karlsruhe
Erlangen
Fürth
Nürnberg
Rhine
FR
DE
DE5914450
DE5914351
DE5916301
DE5916304
DE5916401
DE5916402
DE5917303
DE5917305
DE5917401
DE5917302
DE5818304
DE5818401
DE5819309
DE5919303
DE5920401
DE6019401
DE6021371
DE6020301
DE6121371
DE6321371
DE5823301
DE6023302
DE5923302
DE5923301
DE6023301
DE6024371
DE6022371
DE6022471
DE6024301
DE6124372
DE6124373
DE6124371
DE6123371
DE6123302
DE6221401
DE6222341
DE6222371
DE6223341
DE6323341
DE6225371
DE6225372
DE6326371
DE6226471
DE6426471
DE6028301
DE5728471
DE5929302
DE5927372
DE5927471
DE5927371
DE5928371
DE5929371
DE5929372
DE5929471
DE6027472
DE6029471
DE6029371
DE6125301
DE6127371
DE6027471
DE6227371
DE6227471
DE6227372
DE5732372
DE5732373
DE5733371
DE5833371
DE5831471
DE5831373
DE5831372
DE5933371
DE5933471
DE5931374
DE5931371
DE5931471
DE6030371
DE6031371
DE5934302
DE6035372
DE6035373
DE6135302
NATURA 2000
Produced by DG ENV, Unit B3 - Natura 2000
0 5 10 20 30 40
km


Natura 2000 sites along the Elbe River (174 sites)
N
WaddenSea
Baltic Sea
Ems
Weser
Odra
Elbe
Berlin
Praha
Hamburg
Bremerhaven
Kiel
Lübeck
Rostock
Schwerin
Szczecin
Koszalin
Gorzów Wielkopolski
Poznań
Frankfurt (Oder)
Potsdam
Cottbus
Zielona Góra
Leeuwarden
Groningen
Oldenburg (Oldenburg)
Bremen
Emmen
Zwolle
Almelo
Deventer
Apeldoorn
Enschede
Hengelo (O)
Osnabrück
Arnhem
Nijmegen
Münster
Bielefeld
Paderborn
Hannover
Wolfsburg
Braunschweig
Hildesheim
Salzgitter
Göttingen
Kassel
Halle an der Saale
Leipzig
Erfurt
Weimar
Gera
Chemnitz
Zwickau
Ústí nad Labem
Karlovy Vary
Liberec
Jelenia Góra
Wałbrzych
Legnica
Wrocław
Kladno
Praha
NL
DE
PL
CZ
BE
LU
NATURA 2000
Produced by DG ENV, Unit B3 - Natura 2000
0 35 70 140 210 280 km

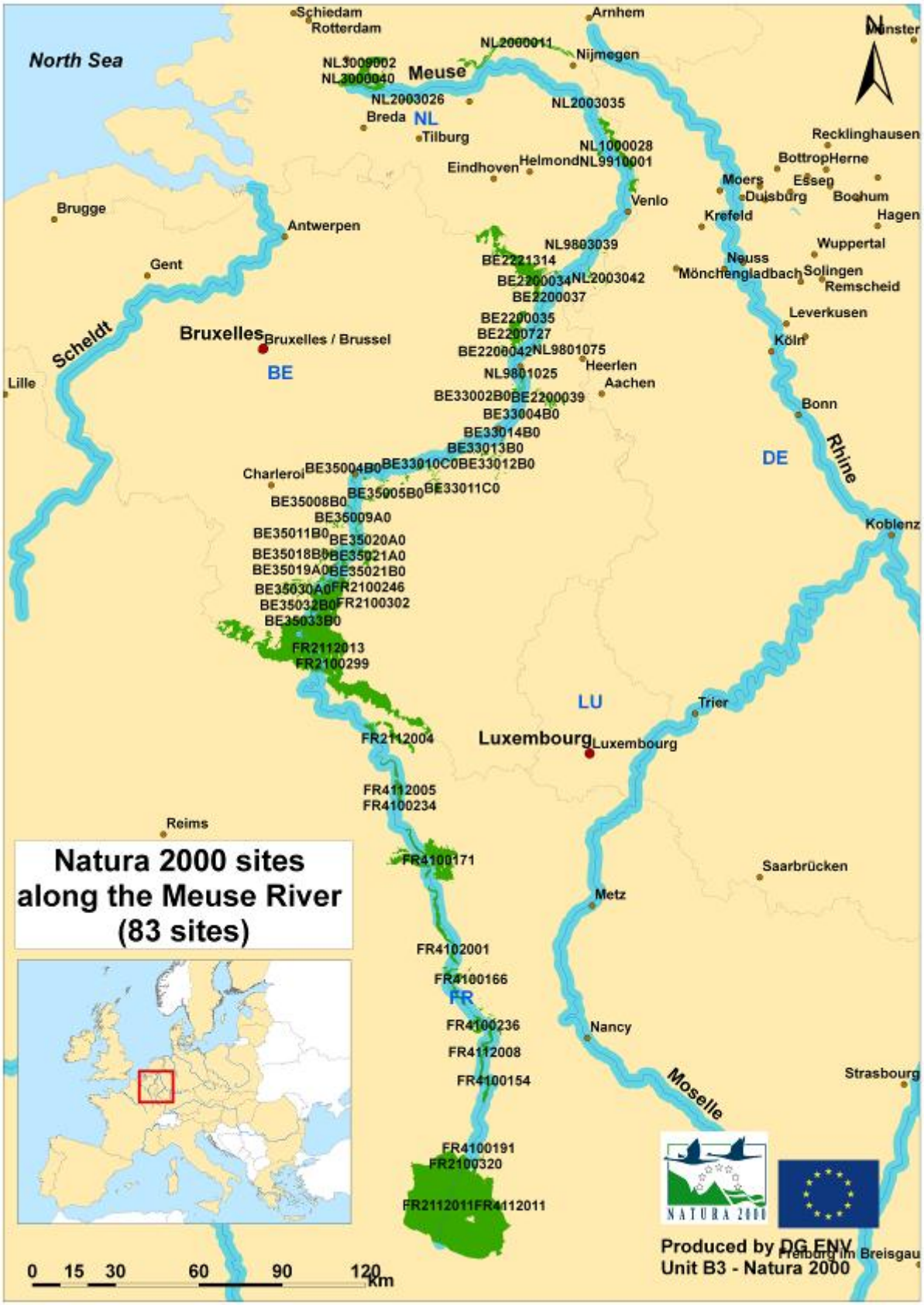

Natura 2000 sites along the Seine River (31 sites)
La Manche
Le Havre
FR2300147
FR2300121
FR2310044
FR2300122
FR2300123
FR2300124
Caen
FR2302006
FR2300126
FR2312003
FR2302007
FR2300152
FR1102014
FR1102015
FR1100797
FR1112012
FR1102013
Paris
FR1112013
Seine
Reims
BE
LU
Moselle
Meuse
FR1100795
FR1110795
FR1100798
FR2100296
FR1112002
FR1102005
Orléans
FR2100251
FR2600963
FR2612003
FR2601012
Dijon
Besançon
Tours
Poitiers
Produced by DG ENV, Unit B3 - Natura 2000
0 10 20 40 60 80 km


Natura 2000 sites along the Weser River (66 sites)
N
Wadden Sea
DE2210401
DE2306301
Ems
Elbe
Hamburg
DE2417370
DE2416431
Bremerhaven
DE2316331
DE2517331
DE2516331
DE2617401
Groningen
DE2817370
Oldenburg (Oldenburg)
DE2817401
DE2918401
DE2918370
NL
DE2716331
DE2919401
DE2817331
Emmen
DE3120332
DE3021335
DE3021331
DE3222401
DE3320331
DE3321331
DE3420401
DE3319332
DE3420331
Almelo
DE
DE3519401
DE3619301
Hannover
Enschede
Osnabrück
DE3719301
DE3720301
DE3817301
DE3820331
Hildesheim
DE3821331
DE3822331
Bielefeld
Münster
DE3922301
DE4023331
DE4023332
DE4022431
DE4022302
0 10 20 40 60 80 km
DE4222303
Paderborn
DE4222301
DE4223401
DE4320305
DE4222331
DE4322304
DE4322301
DE4323331
Göttingen
DE4423350
DE4523303
DE4523331
Kassel
Du
NATURA 2000
Produced by DG ENV, Unit B3 - Natura 2000
Bergisch Gladbach

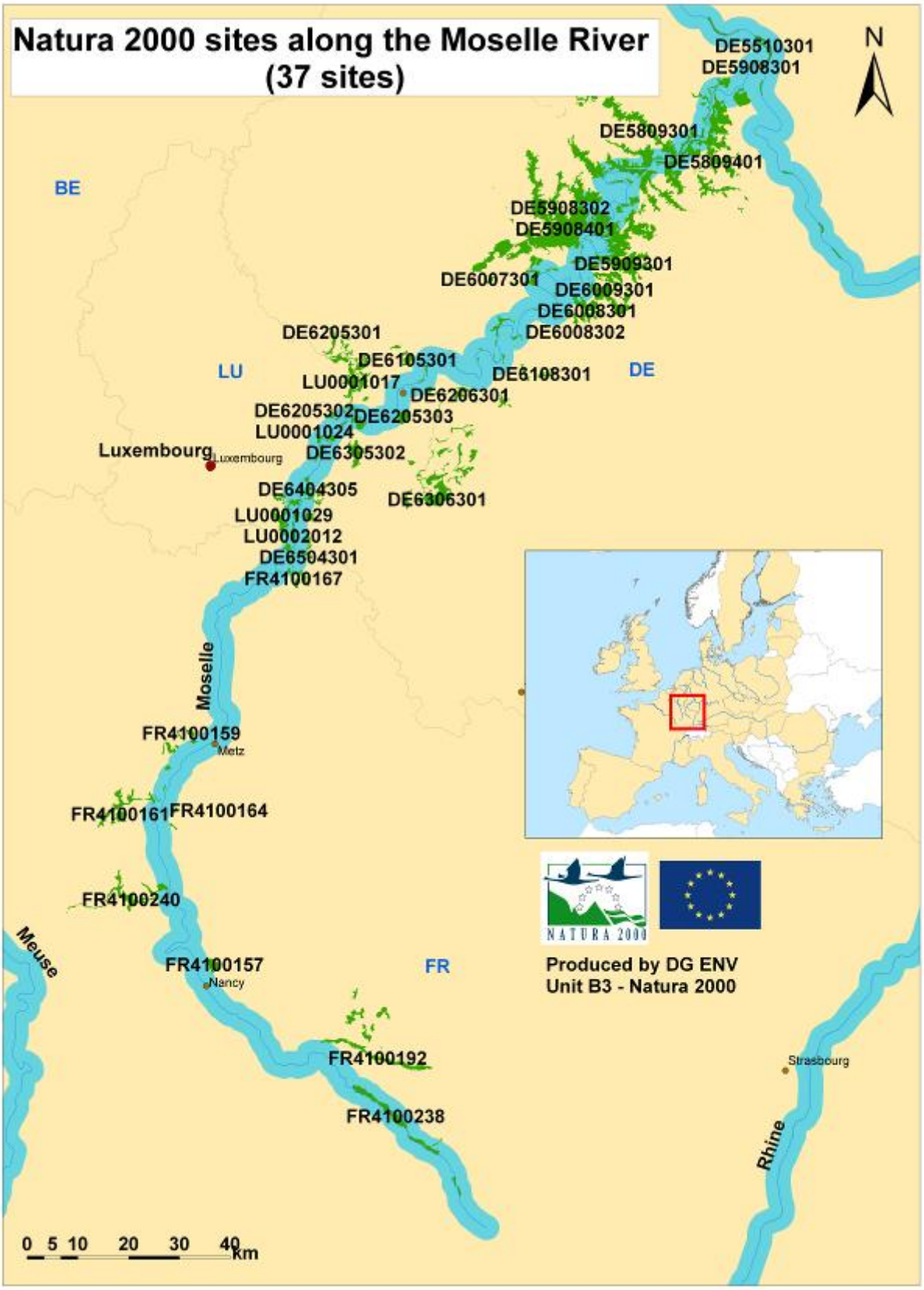

Baltic Sea
RU
LT
N
Gdynia
Gdańsk
PLB220004
Elbląg
Suwałki
Natura 2000 sites
along the Vistula River (53 sites)
Produced by DG ENV, Unit B3 - Natura 2000
NATURA 2000
PLH220033
PLH280001
PLH040014
PLB040003
PLH040025
PLH040040
PLH040003
Bydgoszcz
PLH040011
PLH040001
PLH040012
PLH040039
Włocławek
PLB040005
Płock
PLH140020
PLH140048
PLH140029
PLC140001
PLH140041
Warszawa
Warszawa
PL
Konin
PLB140004
PLH140050
PLH140023
PLH140016
PLB140003
Kalisz
Łódź
PLB140013
PLH060055
Radom
PLB140006
PLH140008
PLH060045
Vistula
PLH260019
Kielce
PLH260022
PLH180020
PLH260036
PLH180049
częstochowa
PLH260003
PLB260001
PLH260034
km
0 12,5 25 50 75 100
Odra
Bytom
PLH120014
PLH180053
Rzeszów
Gliwice
Zabrze
PLH240038
Chorzów
PLH120066
Ruda Śląska
Tychy
PLH120008
PLH120067
Tarnów
PLH120069
PLB120002
Rybnik
Żory
PLH120077
PLH120055
PLB120005
PLH120085
CZ

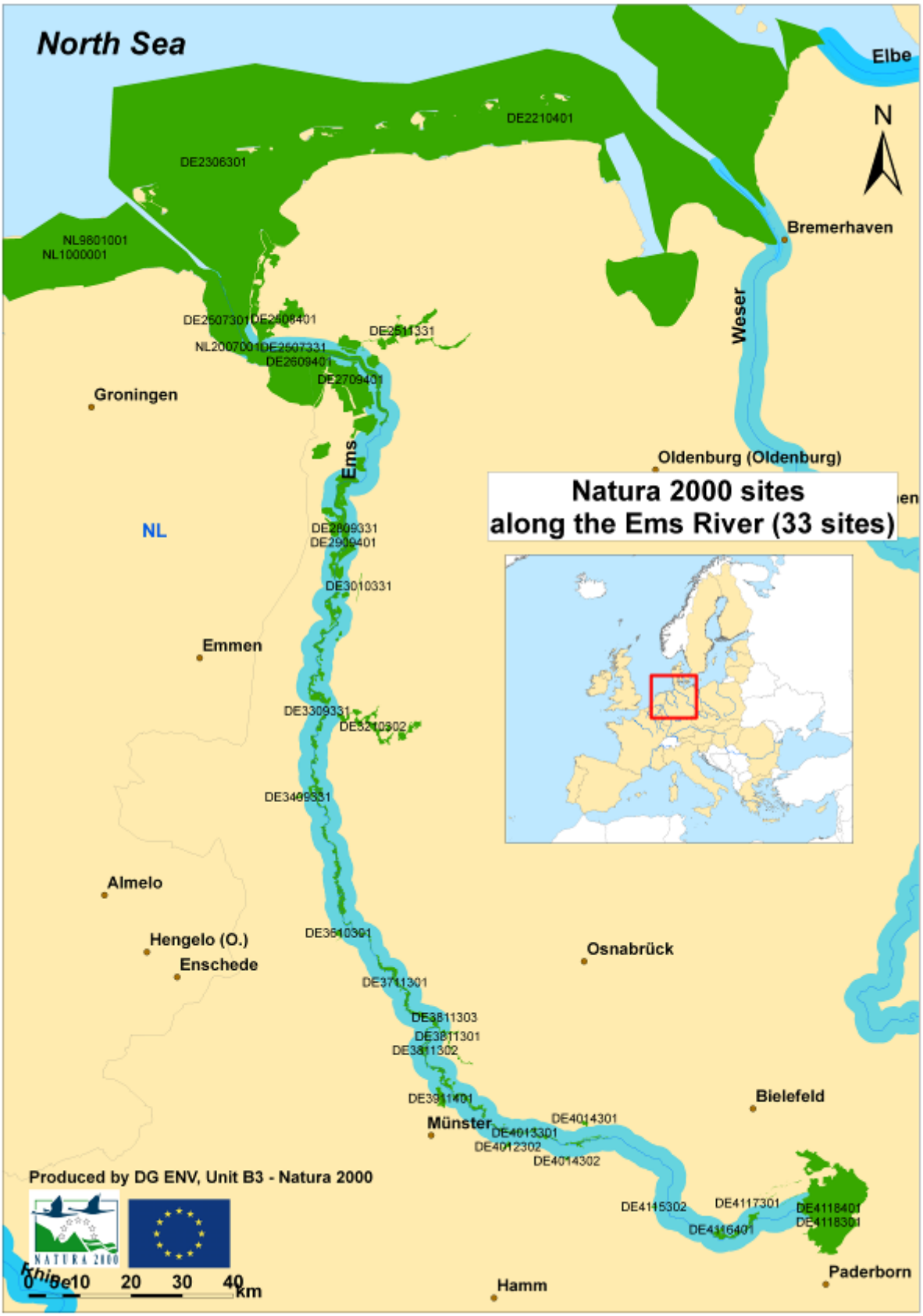

Natura 2000 sites
along the Scheldt River (17 sites)
North Sea
NL
N
NL9803061
NL9802026
BE2301336
BE2300222
Antwerpen
BE2100045
BE2300006
BE2301235
Gent
BE2300044
Scheldt
BE2300007
Bruxelles / Brussel
BE32003B0
BE
BE32002B0
Lille
BE32002A0
Produced by DG ENV, Unit B3 - Natura 2000
BE32044A0
BE32044B0
FR3100507
FR3112005
FR
0 5 10 20 30 40 km
Meuse


Natura 2000 sites along the Rhone River (52 sites)
Produced by DG ENV, Unit B3 - Natura 2000
NATURA 2000
Dijon
Zürich
Bern
Bern
CH
Lausanne
FR8210018
FR8212020
FR8201723
FR8201643
FR8201724
FR8212025
Genève
FR8212022
FR8201711
Rhone
IT1140021
N
FR8201653
FR8201641
FR8210016
FR8201785
Lyon
FR8201727
FR8201771
FR8212004
FR8201770
FR8212003
Saint-Etienne
FR8212012
FR8201749
FR
Novara
Grenoble
Torino
FR8201663
FR8201662
FR8201658
FR8212010
FR8201669
IT
FR8201677
FR8201654
FR9101399
FR9312006
FR9301590
FR9312003
FR9101405
FR9112001
FR9301596
FR9101406
FR9310064
FR9112013
FR9301592
FR9301595
FR9310019
FR9312001
FR9301589
Aix-en-Provence
Nice
Monaco
0 15 30 60 90 120 km
Marseille
Toulon
Mediterranean Sea


North Sea
Schiedam
Rotterdam
Arnhem
Nijmegen
Meuse
NL2000011
NL3009002
NL3000040
NL2003026
NL2003035
Breda
NL
Tilburg
Eindhoven
Helmond
NL1000028
NL9910001
Venlo
Recklinghausen
Bottrop
Herne
Moers
Essen
Duisburg
Bochum
Krefeld
Hagen
Brugge
Antwerpen
Gent
Scheldt
NL9803039
BE2221314
BE2200034
NL2003042
BE2200037
Neuss
Mönchengladbach
Solingen
Remscheid
Wuppertal
Leverkusen
Köln
Bruxelles
Bruxelles / Brussel
BE
BE2200035
BE2200727
BE2200042
NL9801075
NL9801025
Heerlen
Aachen
Lille
BE33002B0
BE2200039
BE33004B0
BE33014B0
BE33013B0
Bonn
Rhine
DE
Charleroi
BE35004B0
BE33010C0
BE33012B0
BE35005B0
BE33011C0
BE35008B0
BE35009A0
BE35011B0
BE35020A0
BE35018B0
BE35021A0
BE35019A0
BE35021B0
BE35030A0
FR2100246
BE35032B0
FR2100302
BE35033B0
FR2112013
FR2100299
Koblenz
LU
Trier
FR2112004
Luxembourg
Luxembourg
FR4112005
FR4100234
Reims
FR4100171
Saarbrücken
Metz
FR4102001
FR4100166
FR
FR4100236
Nancy
FR4112008
FR4100154
Strasbourg
Moselle
FR4100191
FR2100320
FR2112011
FR4112011
Freiburg im Breisgau
Natura 2000 sites along the Meuse River (83 sites)
0 15 30 60 90 120 km
NATURA 2000
Produced by DG ENV
Unit B3 - Natura 2000


Baltic Sea
Koszalin
N
Natura 2000 sites
along the Odra River (71 sites)
Grudziądz
Bydgoszcz
Toruń
Vistula
Włocławek
PLH320018
PLB320009
PLB320012
PLH320033
PLH320015
Szczecin
PLH320020
DE2951401
DE2751421
PLB320003
PLH320037PLH320050
DE2951302
PLB320017
DE2948401
DE3151301
Gorzów Wielkopolski
DE3453422
DE3352301PLC080001
DE3453301
DE3553306
DE3553308
PLH080013
PLH080015
DE3754303
DE
PLH080011
PLH080048
PLH080067
DE3954301PLB080004
PLH080031
PLH080012
Zielona Góra
PLH080014
Cottbus
PLH020100
PLB020008
PLH020018
PLH020053
Legnica
PLH020036
PLH020069
Wrocław
PLH020017
PLB020002
Odra
Dresden
Jelenia Góra
Wałbrzych
Opole
Liberec
Ústí nad Labem
PLH160019
PLH160011
PLH240010
Hradec Králové
Elbe
PLB240003
PLH240013
CZ0811021
Kladno
Praha
CZ
Pardubice
Ostrava
CZ0814092
CZ0813810
CZ0811020
CZ0711019
CZ0813438
Olomouc
CZ0714133
Praha
Produced by DG ENV, Unit B3 - Natura 2000
NATURA 2000
0 15 30 60 90 120 km
SK


Natura 2000 sites along the Moselle River
(37 sites)
N
DE5510301
DE5908301
DE5809301
DE5809401
BE
DE5908302
DE5908401
DE5909301
DE6007301
DE6009301
DE6008301
DE6008302
DE6205301
DE6105301
LU
DE6108301
DE
LU0001017
DE6206301
DE6205302
DE6205303
LU0001024
Luxembourg
Luxembourg
DE6305302
DE6404305
DE6306301
LU0001029
LU0002012
DE6504301
FR4100167
Moselle
FR4100159
Metz
FR4100161
FR4100164
FR4100240
Meuse
FR4100157
Nancy
FR
FR4100192
FR4100238
Strasbourg
Rhine
0 5 10 20 30 40 km
NATURA 2000
Produced by DG ENV
Unit B3 - Natura 2000


North Sea
Elbe
N
DE2306301
DE2210401
NL9801001
NL1000001
Bremerhaven
Weser
DE2507301
DE2508401
DE2511331
NL2007001
DE2507331
DE2609401
DE2709401
Groningen
Ems
Oldenburg (Oldenburg)
Natura 2000 sites
along the Ems River (33 sites)
NL
DE2809331
DE2909401
DE3010331
Emmen
DE3309331
DE3210302
DE3409331
Almelo
Hengelo (O.)
Enschede
DE3610301
Osnabrück
DE3711301
DE3811303
DE3811301
DE3811302
DE3911401
Bielefeld
Münster
DE4014301
DE4013301
DE4012302
DE4014302
Produced by DG ENV, Unit B3 - Natura 2000
DE4115302
DE4117301
DE4116401
DE4118401
DE4118301
Paderborn
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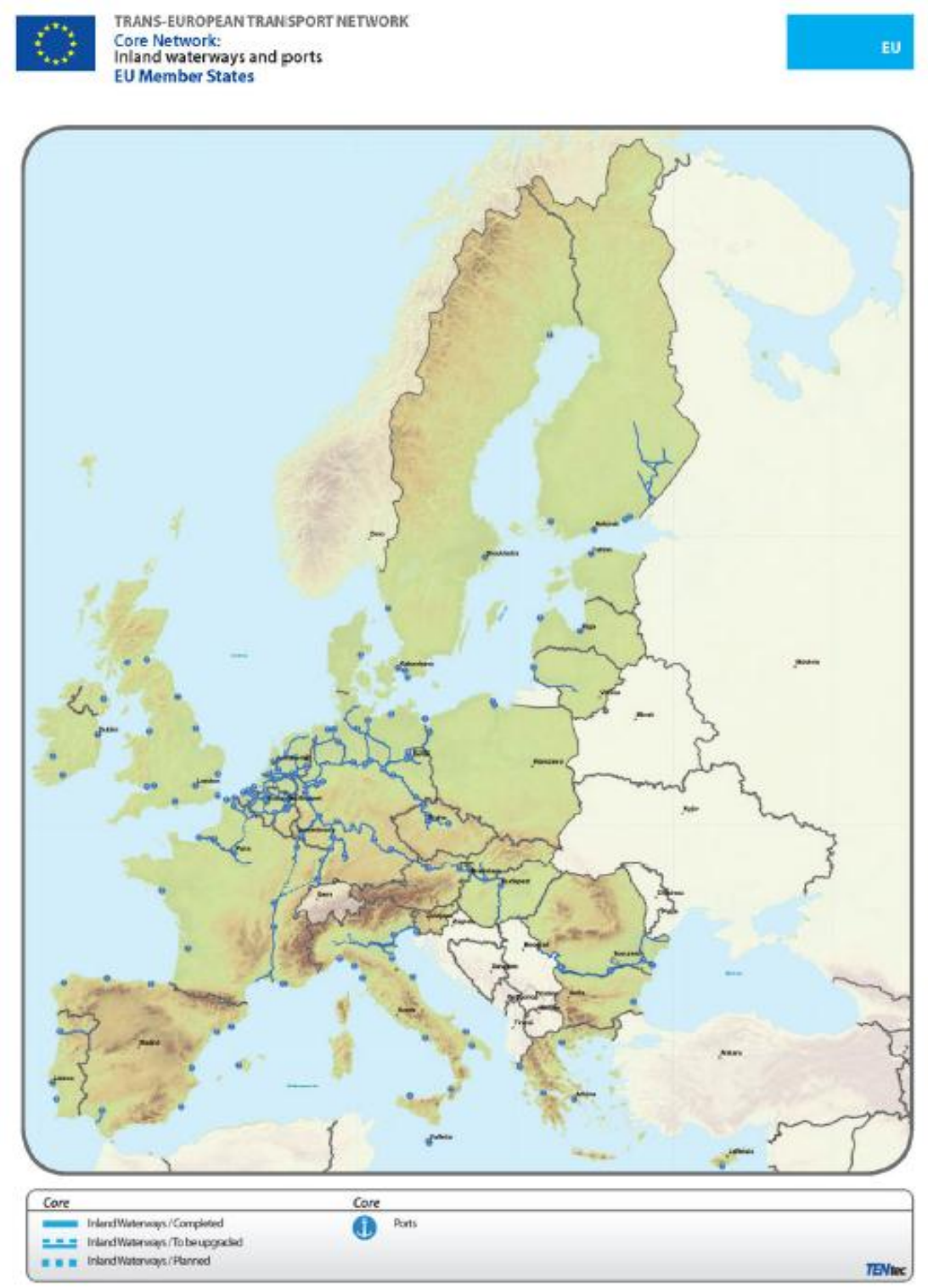
ANNEX II

Inland waterways in the new proposed TEN-T core network[84]



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