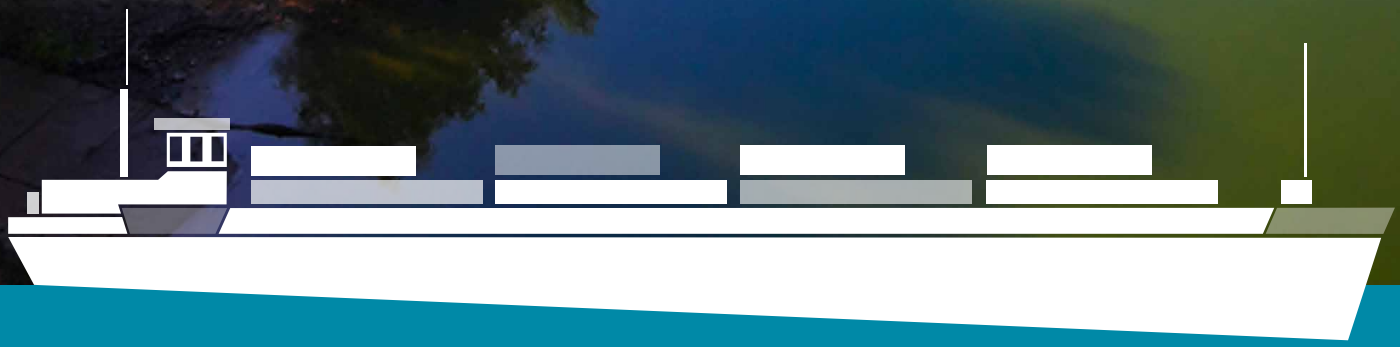
platina

Manual

on Good Practices in Sustainable Waterway Planning



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- the general planning guidelines of the Joint Statement on Guiding Principles for the Development of Inland Navigation and Environmental Protection in the Danube River Basin (2007);
- input from various expert and stakeholder meetings, notably the Joint Statement meetings on 29-30 January 2009 in Budapest and on 9-10 March 2010 in Zagreb;
- discussions of the early draft Manual by the participants of the two PLATINA SWP 5.3 training workshops on integrated IWT planning (9-10 June 2009 in Zagreb/Croatia and 15-16 September 2009 in Ruse/Bulgaria).

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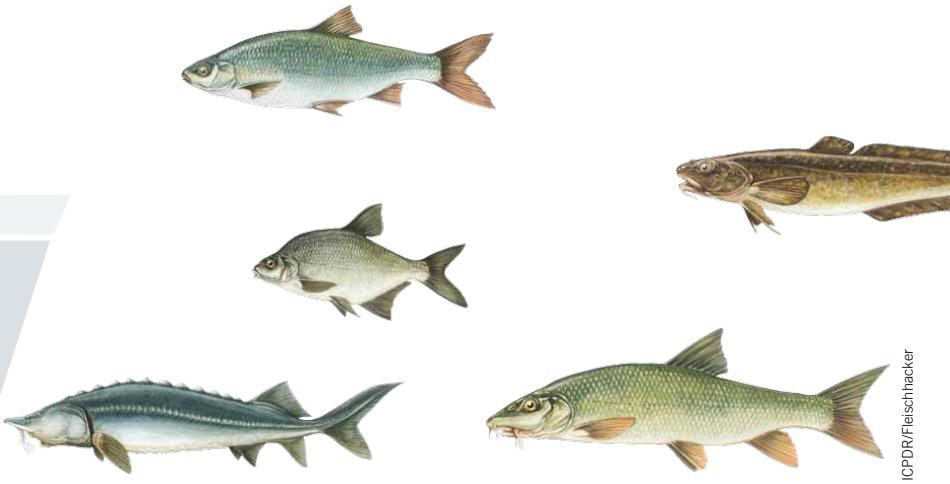

ABBREVIATIONS AND ACRONYMS

AGN	European Agreement on Main Inland Waterways of International Importance
BD	EU Wild Birds Directive (79/409/EC)
BfG	Bundesanstalt für Gewässerkunde (Federal Institute of Hydrology, Germany)
BOKU	University of Natural Resources and Life Sciences Vienna
CCNR	Central Commission for the Navigation of the Rhine
CEDA	Central Dredging Association
Ch	Chapter
CIS	Common Implementation Strategy (WFD)
DC	Danube Commission (Budapest)
EC	European Commission
ECJ	European Court of Justice
ECMT	European Conference of Ministers of Transport
EIA	Environmental Impact Assessment – Directive (85/337/EEC)
EIS	Environmental Impact Study
FCS	Favourable Conservation Status (FFHD)
FD	EU Floods Directive (2007/60/EC)
FFHD	EU Fauna-Flora-Habitat Directive (92/43/EC)
FGP	Flußbauliches Gesamtprojekt (see IREP)
GEP	Good ecological potential (WFD)
GES	Good ecological status (WFD)
HD	see FFHD
HMWB	Heavily Modified Water Body (WFD)
IAB	Interdisciplinary Advisory Board
IAD	International Association for Danube Research
ICPDR	International Commission for the Protection of the Danube River (Vienna)
IREP	Integrated River Engineering Project (at the Danube east of Vienna)
ISRBC	International Sava River Basin Commission (Zagreb)
IWT	Inland Waterway Transport
JS	Joint Statement on Guiding Principles for the Development of Inland Navigation and Environmental Protection in the Danube River Basin (2007)
MS	Member State
MZB	Macrozoobenthos
NAIADES	Navigation and Inland Waterway Action and Development in Europe
NGO	Non-Government Organisation
P	Page
PIANC	The World Association for Waterborne Transport Infrastructure
PLATINA	Platform for the Implementation of the EU NAIADES Programme
PSC	Project Steering Committee
RBMP	River Basin Management Plan
SAC	Special Areas of Conservation (see FFHD)
SCI	Sites of Community Interest (see FFHD)
SEA	Strategic Environmental Assessment Directive (2001/42/EC)
SPA	Special Protection Areas for Birds (see BD)
TEN-T	Trans-European Network for Transport
TPT	Technical Planning Team
UN	United Nations
UNECE	United Nations Economic Commission for Europe
WFD	EU Water Framework Directive (2000/60/EC)
WWF	World Wide Fund for Nature

EXECUTIVE SUMMARY

Public discussions on the protection versus economic development of European rivers in recent years have led to a growing understanding that there is a strong need to guide future actions with an eye to reconciling what might be conflicting interests. Some innovative processes and measures have shown that it is indeed possible to create win-win solutions for **environment, transport and other river uses**.

The World Association for Waterborne Transport Infrastructure (PIANC) has recently published **guidance documents**, such as the guideline for sustainable inland waterways and navigation (2003) or **'Working with Nature'** (2008), which call for an integrated planning process to identify and exploit solutions acceptable to both project proponents and environmental stakeholders.

In the Danube region the **Joint Statement on Guiding Principles for the Development of Inland Navigation and Environmental Protection in the Danube River Basin**, endorsed in 2007 by the ICPDR (International Commission for the Protection of the Danube River), Danube Commission and the International Sava River Basin Commission (ISRBC), is a key tool providing guidance for the planning and implementation of waterway projects.

To provide further guidance, the EU **PLATINA** project provided the means to help prepare this Manual on Good Practices in Sustainable Waterway Planning, which is designed for use in the Danube River Basin and can also benefit other European river basins.

This **Manual** offers **general advice** on organising and implementing a balanced and integrated planning process. Thereby, project developers must also consider national, regional and local aspects and requirements when developing an inland waterway transport (IWT) project. The early integration of stakeholders (including those representing environmental interests) and of environmental objectives and wide communication are essential for successful planning process.

To develop a **sustainable waterway infrastructure project** that does not cause the river system to deteriorate and may even have a positive impact on the current state of environment, IWT planners need to understand and incorporate the wider environmental aspects and **fully respect the legal environmental requirements**.

Therefore, general **planning objectives and principles** should clearly prevent any deterioration of ecology (Natura 2000 and water status) and contribute to the legal needs (nature and water management objectives) to maintain and improve or restore ecological quality. The **River Engineering Criteria** elaborated in the Joint Statement should be taken into consideration as a general guide.

Preparing and executing an integrated planning process requires a more substantial investment into planning than was needed in the past, but it results in a number of **measurable benefits**: greater certainty for the IWT project planning will successfully pass the hurdle of environmental permits (EIA); development of innovative technical solutions; better financial feasibility; reduced environmental damage costs; and better use of the river ecosystem services as well as an improved public image of the project and the institutions responsible for planning and operating IWT infrastructure.

The **four essential features for integrated planning** are:

- Identify **integrated project objectives** incorporating IWT aims, environmental needs and the objectives of other uses of the river reach such as water management, recreation and fisheries.
- **Integrate relevant stakeholders** from the initial scoping phase of a project.
- Carry out an **integrated planning process** to translate the IWT and environment objectives into concrete project measures creating, where possible, win-win results.
- **Conduct comprehensive environmental monitoring** before, during and after the project works, enabling an adaptive planning and implementation approach as well as evaluating the project's success.

This Manual suggests **five general stages** for preparing, executing and sustaining the integrated approach to be applied and interpreted in each IWT project:
scoping; organising the planning process; executing the integrated planning; monitoring and project implementation.
For each stage, several activities are specified, and in particular, the second and third stages require a much more comprehensive approach than was often taken for infrastructure projects in the past.

The **integrated planning process** itself covers four main planning steps as a general guide.

Step 1
Define joint planning objectives and principles

Step 2
Carry out the detailed planning of measures
- technical and ecological options
- plan alternatives
- variants of chosen alternatives
- local examination and/or testing of measures
- priority ranking

Step 3
Conclude the integrated planning process (communicate and adopt results)

Step 4
Execute the EIA process and apply for environmental permits

Project developers can use these steps to create a dedicated Road Map for the entire planning process of their IWT project. However, there is no strict timeline, and the order of the steps may depend on the specific requirements and progress of a concrete IWT project.
Before beginning the concrete planning work, several organisational activities are recommended to facilitate efficient work and concrete results. The Manual recommends setting up **several types of planning bodies**. The following figure presents the role, suggested members and functions of such actors within the integrated planning process.

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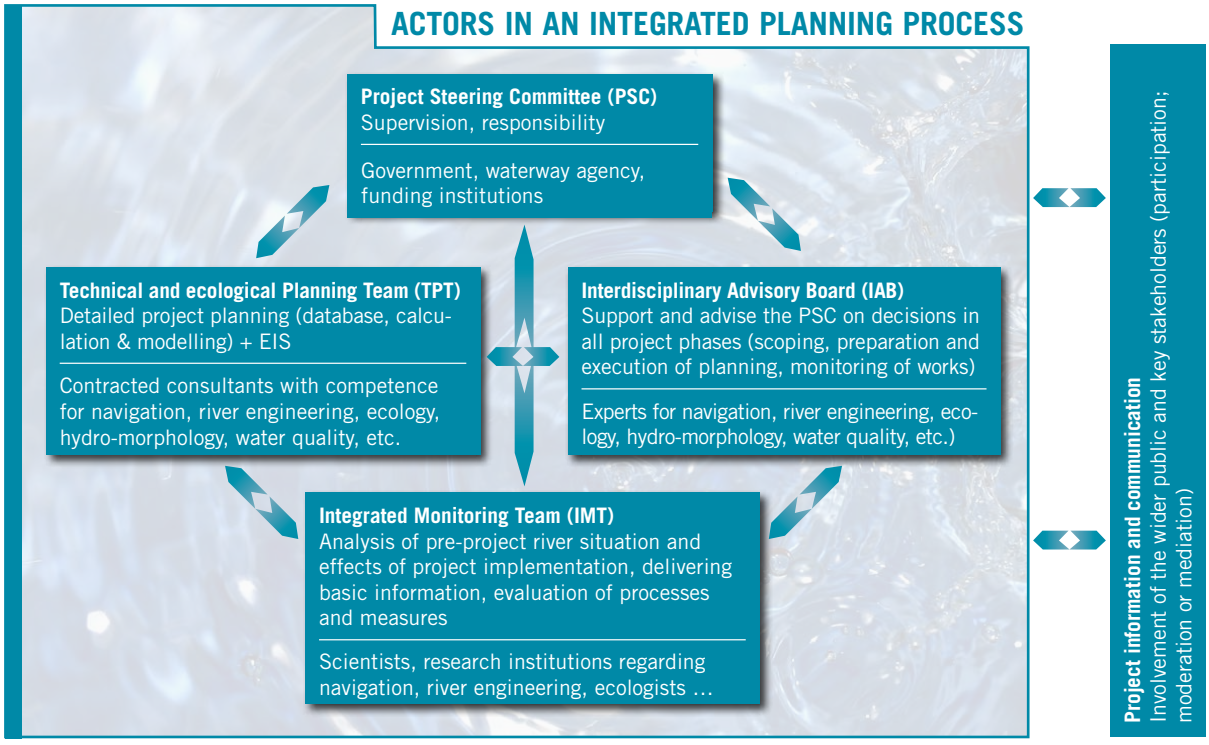


While detailed planning has to be carried out by the Technical and ecological Planning Team (**TPT**), the Integrated Advisory Board (**IAB**) should be closely involved in this process to **jointly assess and optimise the proposed solutions**. The joint planning results should be presented publicly and commented on by other stakeholders before they are finalised and endorsed. The completed set of integrated measures must be submitted to the responsible environmental authorities with all the required information (technical design, environmental aspects) in the Environmental Impact Study (EIS) to receive environmental and other permits.

The Project Steering Committee (**PSC**) executes **overall supervision** and assures that the planning results are implemented accordingly during further project phases. This may include the need to specify or amend certain details later following conditions set by the permitting authorities.

The **environmental monitoring** should be executed by a competent Integrated Monitoring Team (**IMT**). The monitoring should also be connected to the adaptive planning and implementation of measures to allow for a feedback process. Any new findings have to be assessed by all planning bodies.

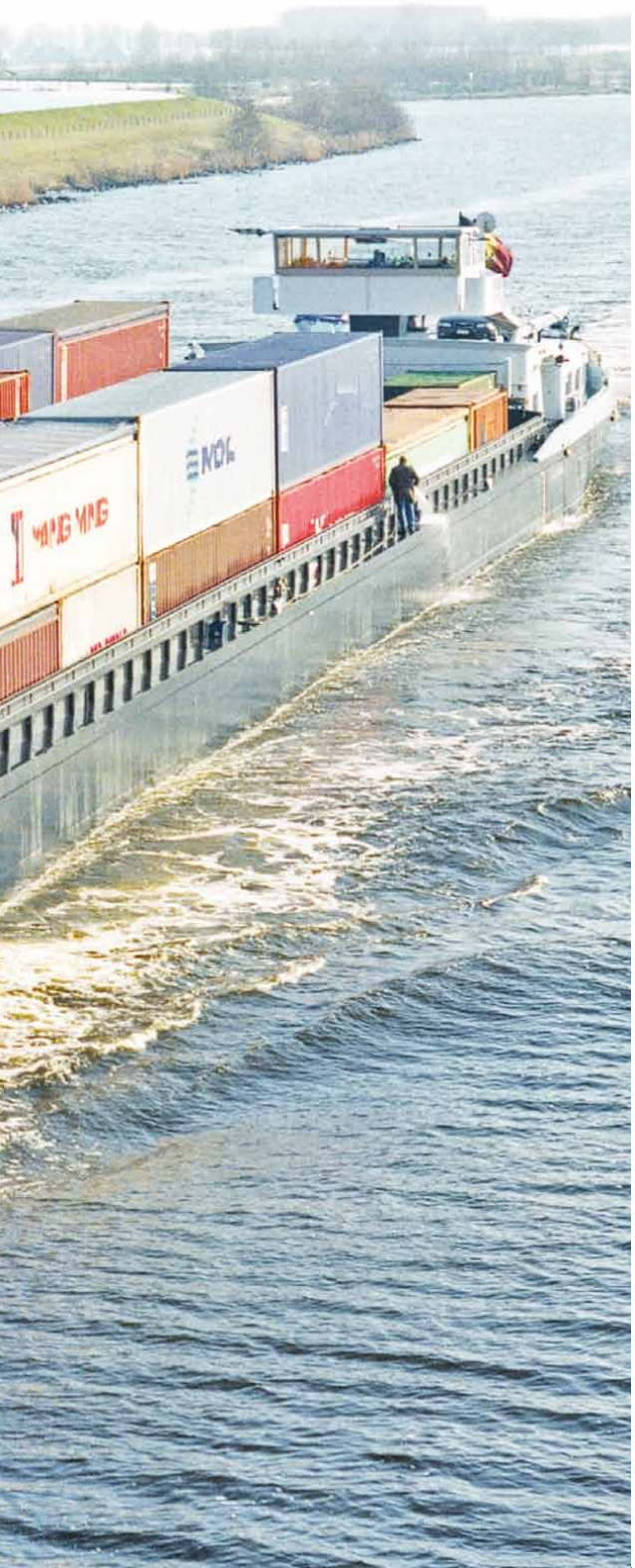
If the planning is carried out properly, the results are fully **coordinated and compatible with other development plans** within the transport sector and with other activities affecting the river area (e.g. WFD, Natura 2000, flood control, agricultural and recreation development).

Though integrated planning and its implementation are rather new methods, there is a wide range of experience and practical **examples in Europe demonstrating** '**good practice**', some of which are presented in Part C of the Manual. This section also gives a comprehensive overview of relevant policies and the legal framework to be observed, of modern waterway management concepts and of the new management tasks of waterway administrations in line with EU environmental directives.

Success overall depends on how well these planning tools are applied and interpreted in individual river infrastructure projects by all parties, i.e. governments, waterway agencies and relevant stakeholders.

part A

INTRODUCTION AND BACKGROUND



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Discussions about Europe's rivers, and particularly the Danube, have intensified in recent years. Riverine ecosystems and natural landscapes need protection and in many cases improvement to the environmental conditions. Rivers, however, are multi-use resource areas – providing waterways, energy and drinking water sources, recreation and tourism areas and flood and sewerage discharge channels – all of which need sustainable development. Historically, coordination between the transport sector and environmental authorities was insufficient or has functioned poorly. Increasingly, however, there is a greater understanding of the need to guide future actions with an eye to reconciling sometimes conflicting interests. There is also encouraging evidence that it is indeed possible to create solutions that serve the various interests and needs of the many different interested parties involved.

The Danube River offers an example of this sort of reconciliation. In 2007, the International Commission for the Protection of the Danube River (ICPDR, Vienna), together with the Danube Commission (DC, Budapest) and the International Sava River Basin Commission (ISRBC, Zagreb), initiated an international dialogue to create a basis for improving navigation while at the same time protecting and improving the natural landscape and water quality of the Danube. An intensive one-year discussion process resulted in an agreement called the *Joint Statement on Guiding Principles for the Development of Inland Navigation and Environmental Protection in the Danube River Basin*. The Joint Statement was endorsed by the ICPDR, DC and ISRBC in 2008 and provides **guiding principles and criteria for the planning and implementation of waterway projects** that bring together the sometimes conflicting interests of navigation and the environment. The countries of the Danube Basin are committed to utilising these principles in future project planning thus creating a new basis for the sustainable use of the Danube River.

To facilitate and ensure the application of the Joint Statement, there was an obvious need to prepare this **good practice manual on sustainable waterway planning to be applied as a reference and practical tool in the Danube and other European river basins by inland waterway planning authorities and interested stakeholders**.

The EU PLATINA project provided the means to help prepare this, which will hopefully be widely used and endorsed by river and navigation commissions. The Manual's drafting process in 2009 already emphasised the early involvement of key waterway and environment stakeholders via dedicated workshops (▶ PLATINA Task 5.3.3) and official meetings. 1

2 Model

The Manual's general advice

The PLATINA Manual 2 is intended to be an easy-to-use guide for governmental IWT project developers to achieve balanced development. In addition, this manual serves waterway planners and any other interested stakeholders (environment and river managers, local authorities, NGOs) who are or should potentially become involved in an integrated IWT planning process. The Manual gives general advice on organising and implementing a balanced and integrated planning process. However, the Manual is not a detailed blueprint for IWT projects; project developers should also consider national, regional and local aspects and requirements when developing an IWT project. Nevertheless, consulting stakeholders and integrating environmental objectives as early as possible is essential for successful IWT project planning.

The following chapters provide information about the positive aspects and benefits of integrated planning (part A), a detailed guide to successful integrated planning (part B) as well as various detailed explanations, illustrations and examples (part C).

A.1 INTEGRATED PLANNING – SUSTAINABLE WATERWAY PLANNING

Developing a sustainable waterway infrastructure project which aims to minimise negative impacts, or even to have a positive effect on the already degraded environment, requires IWT planners to first understand the wider environmental context. This is especially true for the complexities of riverine ecosystems and their new legal protection needs (► ***ch. C.1***). Discussions during the Joint Statement (JS) process and at PLATINA workshops showed that waterway project developers often have little interaction with experts from the environment sector and other river users, and consequently environmental and other non-transport stakeholders usually have little insight into the needs of inland navigation and the options for design and management of inland waterways.

Integrated planning is a tool to develop environmentally sound inland waterways that can lead to win-win situations for navigation and ecology as well as to ensure and improve cross-sector communication. These important discussions – as suggested here also for concrete planning steps (► ***ch. B.3***) – include all possibilities to simultaneously improve the situation of inland navigation and of the environment (such as River Information Services, temporary and local traffic restrictions in ecological sensitive sections and so on).

Preparing and executing an integrated planning process requires a more substantial investment into such a process than was needed in the past. Today's much changed legal framework (► ***ch. A.2.2 and C.1.2***) requires a more comprehensive assessment of environmental aspects and objectives; on the other hand there are a number of **measurable benefits when carrying out integrated planning**: 3

- Integrated planning can provide responsible institutions with **greater certainty of the success of their planning** because it helps ensure that the IWT project will pass environmental permit hurdles. In the past, infrastructure projects often faced enormous feasibility problems when required to incorporate environmental improvements into an already completed design. This is technically very difficult, expensive and time consuming, and ultimately could lead to the failure of an IWT project.
- Integrated planning leads to the development of new, creative and **innovative solutions**. This is a positive challenge from an engineering and technical point of view and has already led to better solutions.
- Integrated planning can ease the application and acquisition of additional funding sources, thus improving the **financial feasibility** of a project.
- Integrated planning is likely to avoid or at least **reduce environmental damage costs**, which – if not accounted for in the IWT project – must eventually be paid by public budgets. Preventing potential environmental damage is always cheaper than rehabilitation after unexpected damage.
- Integrated planning can also maintain and restore the river ecosystem's free economic services (such as timber, fish, game and drinking water supply, retention of soil, contaminants and nutrients, recreation and tourism, flood control etc.) (► ***ch. C.1.1.1***). There is a direct and indirect monetary value to be accounted for during the planning.
- Integrated planning can contribute to an **improved public image** of the project and institutions responsible for planning and operating IWT infrastructure. With proper planning, IWT projects can restore the ecological quality of a water body demonstrated by monitoring results and visible effects such as restored river banks, improved fish migration and increased numbers of rare species. When infrastructure planners and operators can report such success stories it can significantly improve public support for this transport mode.

These arguments illustrate that an integrated planning process is the way to achieve IWT objectives in an environmentally and financially sustainable manner.

Managing environmental needs successfully is achieved more easily when **waterway authorities include biologists and ecologists among their staff**. Such personnel can provide the technical in-house expertise needed for ecological planning, execution of works and monitoring of waterway projects. Since the 1980s, some waterway authorities in European countries, such as Austria, Belgium, Germany and The Netherlands, have become more committed to ecological waterway management and have carried out environmental projects in addition to pure fairway management tasks (► ***ch. C.2.2.3, C.2.2.4 and C.3***).

Model 3
Added values of integrated planning

A.2 PRINCIPLE FRAMEWORK FOR IWT PROJECTS

The wider framework for navigation and environment issues in the Danube River Basin includes international conventions between countries as well as relevant EU law, policies and action plans. Some of these are relevant for the integrated planning process, particularly because the assessment of environmental prerequisites is rather complex and still developing.

A.2.1 POLICY FRAMEWORK

The starting points for waterway development projects are national and international ambitions to provide and upgrade transport infrastructure.

There are policy commitments to be taken into account, including:

- national transport master plans;
- EU transport policy (White Paper 2001, TEN-T, NAIADES);
- national and EU environmental policy (on water, biodiversity, climate change, flood risk etc.).

A.2.2 LEGAL AGREEMENTS

There are several national and international transport and environment-related legal requirements that must be observed by waterway infrastructure projects, such as:

- the EU Trans-European Network for Transport (TEN-T) guidelines;
- the European Agreement on Main Inland Waterways of International Importance (AGN);
- the Mannheim Convention on the navigation on the Rhine;
- the Rhine Protection Convention;
- the (Belgrade) Convention on the navigation regime on the Danube;
- the (Sofia) Danube Protection Convention;
- the Framework Agreement on the Sava River Basin;
- the Espoo Convention;
- the (Rio) Convention on Biological Diversity;
- the Bern Convention (Emerald Network);
- the Ramsar Convention.

For details: ► ***ch. C.1.2***.

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A.2.3 NEW EU ENVIRONMENTAL DIRECTIVES

The **EU Water Framework Directive** (WFD, 2000/60/EC) is the core policy element for integrated water management, but many other environmental directives, policies and conventions need to be considered for comprehensive policy integration related to IWT development, in particular the EU **Habitats and Birds Directives** (Natura 2000 ecological network) ► ***ch. C.1.3.2***.

The **Strategic Environmental Assessment Directive** (SEA, 2001/42/EC) requires a formal environmental assessment of plans and programmes which are likely to have significant effects on the environment. The **Environmental Impact Assessment Directive** (EIA, 85/337/EEC) ensures that environmental consequences of projects are identified and assessed before authorisation is given for the project to proceed.

Details on these complex EU directives and guidance on their application are given in ►***ch. C.1.2 and C.1.3***.

Recent experience with the overlapping of these directives has resulted in a combined and coordinated application.

A.3 MODERN APPROACHES IN RIVER ENGINEERING – GOOD PRACTICES

Ecology-oriented river engineering is a rather new type of river management that was developed in various small-scale projects in the 1980s. Today, this is common practice on many rivers, notably in Austria, Belgium, Denmark, Germany, The Netherlands and Switzerland where broad experience and numerous examples exist.

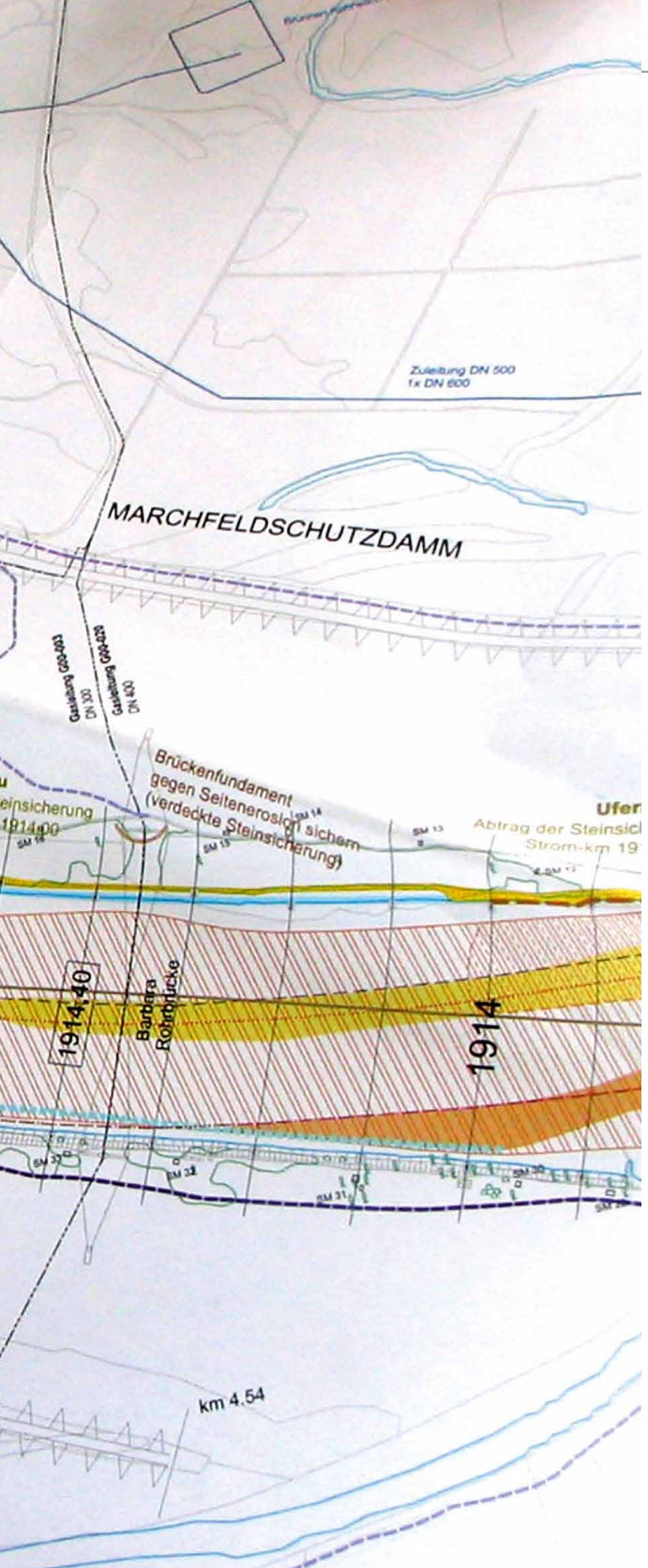
Concrete results are regularly shared in publications, conferences, workshops, study trips and expert cooperation. A leading source of expertise in this technical field is the **European Centre for River Restoration:** ► ***www.ecrr.org***, whose mission is to enhance and promote river restoration and sustainable river management throughout Europe.

Good practices in river engineering have been recognised at the EU level during the ongoing implementation of the WFD, notably in the EC (2006) 'Technical Paper – Good practice in managing the ecological impacts of hydropower schemes; flood protection works; and works designed to facilitate navigation under the Water Framework Directive', which lists a number of engineering examples (for those related to navigation ► ***ch. C.3.2***). Another important document is the PIANC Position Paper 'Working with Nature' (2008): ► ***ch. C.2.2.2***.

This Manual presents several **examples of good practices** in river engineering in ► ***ch. C.3***. New field experience is continuously gained through projects (many funded through the EU Life and Life+ programmes), but each new river engineering project is unique and will go through its own local development process.

part B

MODEL FOR AN INTEGRATED PLANNING PROCESS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Recently the advantages of and the needs for an integrated planning process have been expressed in various ways, notably through the Joint Statement process in the Danube area and the PIANC publication 'Working with Nature' (► ***C.2.2.2***), and in concrete projects such as the Integrated River Engineering Project on the Danube East of Vienna (► ***C.2.2.3***). IWT project developers and stakeholders expressed interest in a concrete guide on achieving an integrated planning, in the form of a checklist and manual on how to better meet environmental conditions (such as Articles 4 – 7 of the WFD) ► ***C.1.3.1***.

This chapter provides basic advice on how to prepare and organise an integrated planning process, and the necessary steps to follow and sustain it.

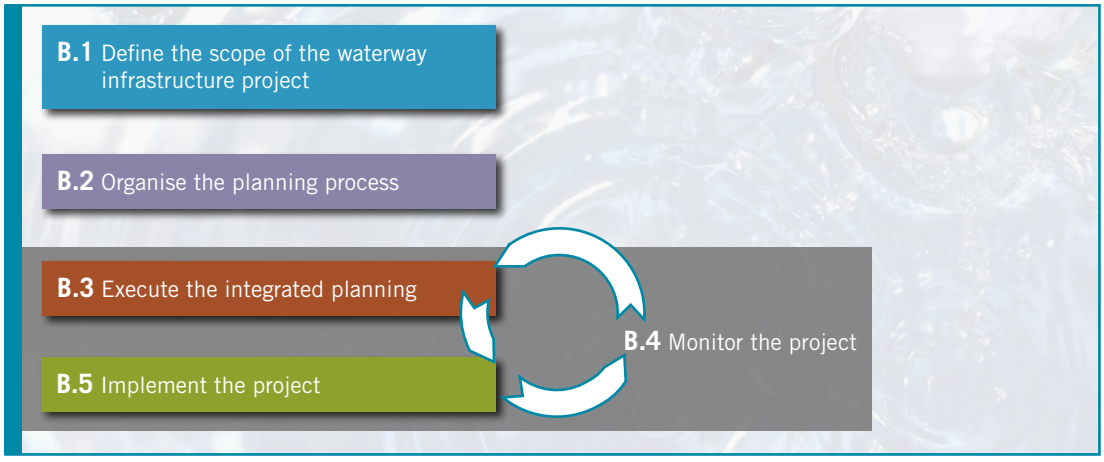
The basic philosophy is to integrate environmental objectives into the project design, thus preventing legal environmental barriers and significantly reducing the amount of potential compensation measures, and potentially improving the ecological conditions of the river. Although the proposed planning steps in this manual may vary from project to project, these are the **essential features of integrated planning**: 1

1 Model

Essential features of the integrated planning process

- **Identify integrated project objectives** incorporating IWT aims, environmental needs and the objectives of other uses of the river reach such as nature protection, flood management and fisheries.
- **Integrate relevant stakeholders from the initial phase** of a project.
- Carry out an **integrated planning process** to translate the IWT and environment objectives into concrete project measures securing win-win results.
- **Conduct comprehensive environmental monitoring** before, during and after the project works, enabling an adaptive implementation approach if necessary.

The guidance given in this manual distinguishes the following **five general stages** of an integrated approach:



B.1 DEFINITION OF THE SCOPE OF A SUSTAINABLE WATERWAY INFRASTRUCTURE PROJECT

Before starting concrete planning works, it is important to recognise the wider scope of important issues, and to identify and involve all relevant key stakeholders. This initial scoping phase ensures that relevant aspects, information, valid interests and useful expertise are not overlooked before the concrete planning phase starts. This will minimise potential negative impacts at a later stage of the planning process. A comprehensive scoping phase can significantly reduce the financial and political risks for a successful project realisation.

The scoping process can be facilitated by an **early public presentation and consultation** of the basic project objectives, such as through a workshop involving a broad list of stakeholders (government agencies, private sector, NGOs, public, etc.). This ensures that all stakeholders are informed and possibly incorporated early on and that relevant issues are brought into the planning of an IWT project. ► *ch. B.5.*

B.1.1 IDENTIFICATION OF TRANSPORT NEEDS

The starting point of an inland waterway infrastructure project is what is usually described as a bottleneck at a navigable river. If such bottlenecks do not meet the defined minimum fairway parameters of a certain waterway stretch (e.g. width, depth, curve radius, bridge clearance), they limit the navigability and competitiveness of IWT in comparison with road and rail transport. These inland waterway bottlenecks are defined at the international level in the Blue Book of the UN/ECE 2 as well as in the EU TEN-T network. The current TEN-T addresses the following two European IWT priority projects:

Project 18: Rhine/Meuse–Main–Danube inland waterway axis (improvement of navigability on the Rhine-Meuse stretch as well as on the Danube in Germany, Austria, Slovakia, Hungary, Romania and Bulgaria);

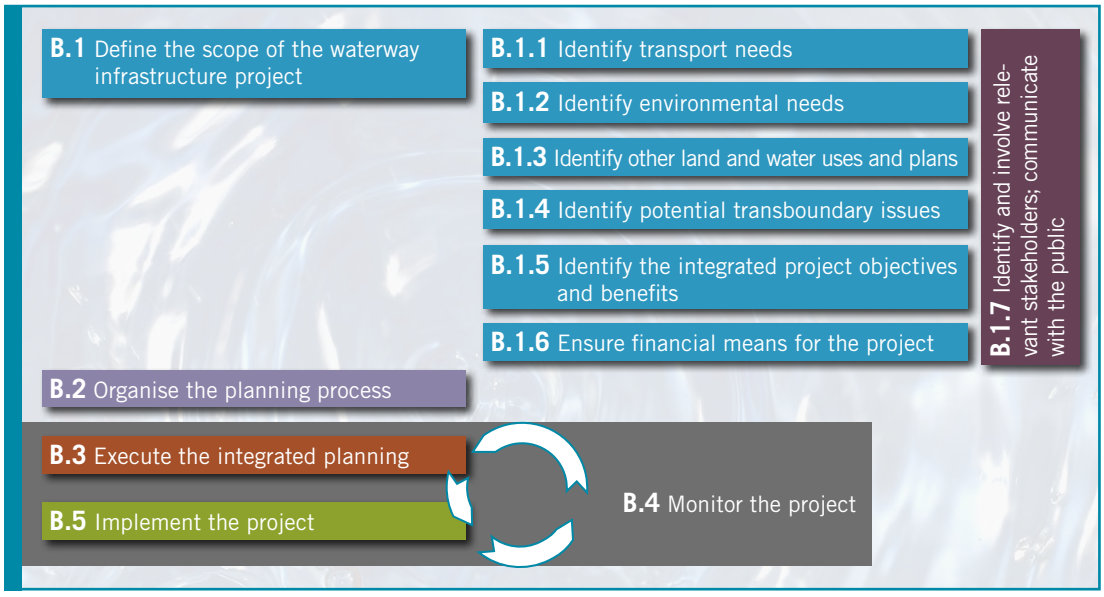
Project 30: Inland waterway Seine–Scheldt (construction of an inland waterway canal connecting both rivers in France and Belgium).

These TEN-T projects must be carried out by the respective Member States and are usually co-funded by the European Union. In most cases, eliminating these bottlenecks is also part of national transport policy (e.g. in transport or infrastructure master plans). In addition, IWT policy addresses national and local bottlenecks.

This phase includes a review of the existing national and international or European visions, policies and strategies to develop the transport network and infrastructure. The main focus, however, is the concrete project planning that should aim to both achieve the IWT objectives (including economic and cost-benefit aspects) and fulfil environment protection and improvement requirements.

2
www
Inventory of Main Standards and Parameters of the E Waterway Network, UN/ECE, First revised version 2006

www.unece.org/trans/doc/finaldocs/sc3/ECE-TRANS-SC3-144r1e.pdf



B.1.2 IDENTIFICATION OF ENVIRONMENTAL NEEDS

The IWT project developer is advised to identify early on the basic environmental needs of the particular river stretch. These include protected areas, valuable habitats and species, as well as nature management needs (according to national, international and EU law), which usually demand **no deterioration of the current status or restoration towards a better status**.

In this early phase it is also important to assess the required scope for an SEA/EIA (also in relation to WFD Article 4(7) and FFH Article 6(2) which may make it useful to combine several **environmental impact assessments:** ► ***ch. C.1.3.4***). This scope also includes the potential wider impacts of the planned infrastructure project beyond the actual IWT project area, i.e. up- and downstream the river as well as laterally into the floodplain (e.g. in terms of hydromorphology, fish migration).

According to the European nature conservation law (Birds Directive, Habitats Directive), the presence of certain species and habitats in a specific area requires that a government secure their effective protection. The resulting European Natura 2000 network must be maintained by – often new – management plans that sustain their natural character.

Under the WFD, various water body improvements, such as restoration measures, are listed in the new national and international river basin management plans (RBMP; 2009). Therefore, an early consideration of these plans in the IWT project planning is essential for an overview of the ecological needs and locations of sensitive river sections. Here the project must prevent any ecological deterioration and should assess whether the required nature management can be combined with the IWT improvement measures (including mitigation and/or restoration measures to achieve all environmental requirements) ► ***ch. C.1.3.1 and C.1.3.2***.

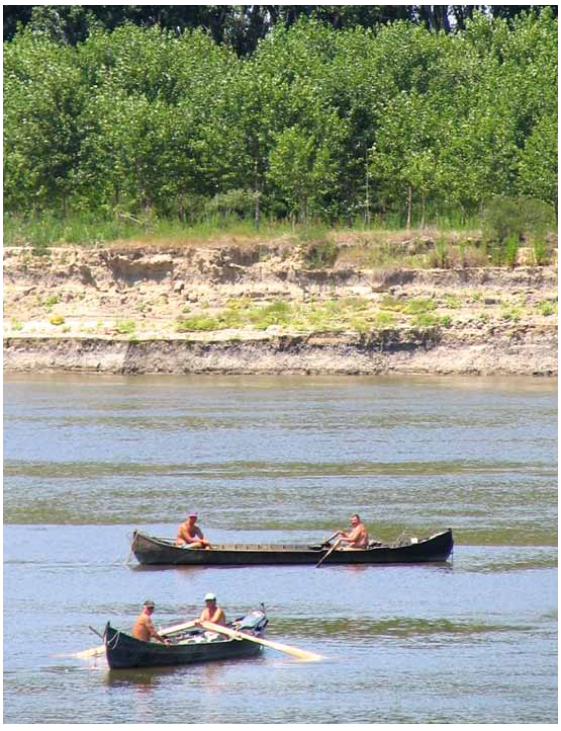
The early identification of environmental needs facilitates finding of 'win-win' solutions, improving both the waterway infrastructure of a river stretch as well as its ecological integrity.

B.1.3 IDENTIFICATION OF OTHER LAND AND WATER USES AND PLANS

In addition to environmental needs within the IWT project area, it is strongly recommended to consider other land and water uses and plans at the early project stage. Uses such as flood control, fisheries, agriculture, irrigation, forestry, industrial water supply, power production and tourism need to be taken into account or even integrated into the project plan to facilitate the planning success. Therefore, it may be useful to compile a database of various uses and their locations. Integrating economic activities such as IWT and environmental protection is also the aim of the new EU Strategy for the Danube Region.

B.1.4 IDENTIFICATION OF POTENTIAL TRANSBOUNDARY ISSUES

European regions such as the Rhine or the Danube Basin and some of its sub-basins (notably Tisza, Sava and Danube delta) require intensive cross-border thinking to develop any water-related activity.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Most inland waterway projects have transboundary aspects and impacts and therefore need early communication and coordination with neighbouring countries or their smaller administrative units.
Cross-border issues can be directly related to the transport sector (e.g. shared maintenance responsibility for common river stretches, accident prevention) but can also be linked to important aspects such as water quality, flood and sediment management and biodiversity. Infrastructure projects with transboundary impacts on the water status have to be included in the national and international RBMP (to meet WFD Article 4(7): ► ***ch. C.1.3.1***). While the Espoo Convention provides a useful framework for preventing and solving conflicts, pro-active and early assessment of potential transboundary issues with the neighbouring country and local stakeholders is the easiest and most efficient solution.

B.1.5 IDENTIFICATION OF THE INTEGRATED PROJECT OBJECTIVES AND BENEFITS

While the initial reason for an IWT project is often a bottleneck limiting navigability and competitiveness, a comprehensive design also aims to integrate the objectives of environment as well as of other water uses. Incorporating needs beyond transport objectives leads to a holistic development of a particular river stretch. Waterway infrastructure projects should assess whether river engineering measures can be made compatible with or even supportive of other water uses. This maintains and improves several river functions, thus strengthening the justification and public image of the IWT project.
Therefore, sustainable IWT projects integrate environmental conditions and objectives to ensure no deterioration of the water body and Natura 2000 site (which can be several km up- or downstream). Improving and restoring river ecology must be part of the IWT project objectives.
Identifying the general project objectives should also be complemented by a definition of the expected project benefits for IWT, the environment and other uses. These benefits are also an important element for the justification of the project, and its funding, as well as for communication (► ***ch. B.1.7***).

B.1.6 ENSURING FINANCIAL MEANS FOR THE PROJECT

The feasibility of the project very much depends on secured funding. While integrated planning requires more time and funds for the actual planning work, it may prove to save time and be more cost-efficient during impact assessment, authority permitting and implementation, as various planning risks will have already been addressed from the beginning.
An integrated planning approach requires financial means and some flexibility of funding conditions, such as extended stakeholder involvement, adaptive implementation of measures and a comprehensive monitoring programme. Therefore it is recommended to have a funding concept for the project before the planning starts that is adaptable to unforeseen aspects during the planning or implementation process. The responsible national, EU and international funding institutions should adopt this funding concept to sustain their financial commitment for the project.

B.1.7 COMMUNICATION AND INVOLVEMENT OF STAKEHOLDERS AND THE PUBLIC

The dialogue with the public about large projects that may affect the environment usually happens at three levels: **information, consultation and active involvement**:

Provide information to the general public

During the entire planning process, information about the IWT project should be provided to the public regularly. This could be achieved through updated communication (e.g. newsletters or media articles to be issued at local, national and international levels), a special website with basic information (in at least the national language and English), and by providing access to all relevant planning documents. Public events can also be used to communicate the goals of the project and the planning process.

Consult the interested public

The goal of this consultation is to listen carefully to the concerns of the public and integrate them into the planning process if possible. Public consultation is generally a legal prerequisite of any public infrastructure project, as laid down in the respective national and European legislation (notably the Public Participation Directive 2003/35/EC and WFD). The project owners could, for example, organise several round-table discussions with relevant organisations (such as NGOs, academic bodies, interest groups or local communes) on sensitive project topics such as navigation, other uses and the integrated planning process. This should happen throughout the entire planning process.

Actively involve stakeholder groups

Active involvement of stakeholders means their full participation throughout the entire planning process – and therefore their direct input into the final outcomes and plans. This is encouraged by national and European legislation (notably the SEA, EIA, WFD) and other international legal instruments (such as the Aarhus Convention). IWT projects are listed in the WFD RBM Plan 2009, and the relevant **international commissions** for navigation and environment (e.g. DC, ICPDR, IKSR, ZKR/CCNR, ISRBC) should be informed about projects with possible transboundary effects. Information about the project should be provided prior to the start of planning and should be updated regularly. These commissions ensure balanced and harmonised information exchange and sustained cooperation, and new projects and plans should always be presented and discussed in these platforms.

Aside from fulfilling legal requirements, however, it is recommended to invest resources into the integration of the '**key stakeholders**', also called 'concerned public' or 'interested parties'. These key stakeholders represent public bodies such as international river commissions or the private sector such as industry, expert institutions and NGOs, and often hold valuable information and knowledge. Their involvement can ensure that additional important data and experience are included in the project planning to find a balanced and widely accepted solution.

Helpful guidelines on public participation exist, such as the WFD Common Implementation Strategy (CIS) Guidance document no. 8 'Public Participation'. This key document, published in 2003, is the outcome of an international working group dedicated to the issues of public participation under the WFD. It covers general principles and tools in public participation and gives numerous examples from water management projects. Another good source of information is the HarmoniCOP Handbook 'Learning together to manage together – improving participation in water management'. This handbook presents case studies and innovative support for social learning in participatory processes of water management. 1

General objectives of communication and active involvement are to:

- ensure a transparent planning and decision-making process of the IWT project;
- 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 IWT project.

For the practical execution of stakeholder involvement, it is recommended that a dedicated **communication and stakeholder involvement strategy**:

- carries out an early analysis of all relevant and interested international, national and local stakeholders, resulting in a shortlist (being as inclusive as possible) of key stakeholders to

1 WWW

Common Implementation Strategy for the WFD Guidance document no. 8. Public Participation: circa.europa.eu/Public/irc/env/wfd/library?l=/framework_directive/guidance_documents/guidancesnos8spublicspar/_EN_1.0_&a=d

HarmonicCOP Handbook: www.harmonicop.uos.de/handbook.php

be involved in the planning process;
- identifies rules and provisions for continuous and regular project information through websites and forums for the wider public and stakeholders, ensuring that regular, easily accessible information, including on the possibility of being involved in the planning process;
- delivers regular and timely information about the preparatory and progressing planning steps, including transparency of the key decisions of the planning and supervisory bodies (► ***ch. B.2***);
- makes a public presentation and discusses the basic project idea during the scoping phase and after completing the draft project plan, explaining the result of the integrated planning process with solutions, the implementation phases and monitoring details.

The results of this scoping process (B.1) form the basis for the integrated planning process (► ***ch. B.2 and B.3***) and constitute a key input for the subsequent **tendering and contracting procedure for the technical planning** (► ***ch. B.2.4***). The tendering documents should ensure that the Technical and ecological Planning Team is prepared and competent to plan the IWT project under the defined scope, and to cooperate and serve both the Project Steering Committee and the Interdisciplinary Advisory Board (► ***ch. B.3***).

B.2 ORGANISATION OF THE PLANNING PROCESS

Before beginning integrated planning, several organisational activities are recommended to facilitate efficient work and concrete results:

1 Model

Recommended bodies for integrated planning

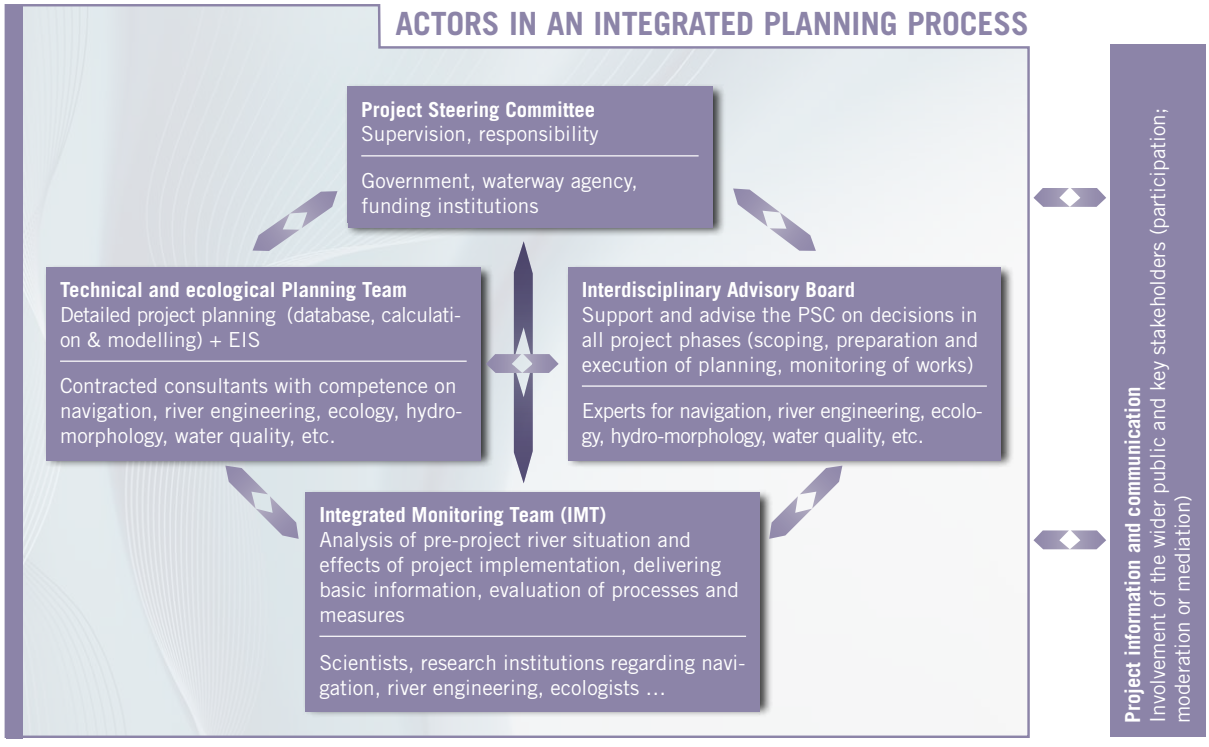
The planning of the project needs to follow certain national and international rules that – for legal, policy and informal reasons – involve a number of responsible and competent stakeholders in several types of planning bodies: 1

- a **Project Steering Committee (PSC)** formed by a governmental supervisory body oversees coordination;
- a **Technical and ecological Planning Team (TPT)** of contracted consultants providing the required competencies to undertake the concrete planning.

According to the basic concept of this manual, integrated planning can be facilitated by setting up two additional bodies:

- an **Interdisciplinary Advisory Board (IAB)** that assists and advises the Project Steering Committee in the development of project objectives, possibly from the B.1 scoping process, of the planning principles, the TPT planning methods and results, the adaptive implementation, public participation and the scientific knowledge transfer as well as in the communication of project results, as elements of the integrated planning process (► ***ch. B.3***);
- A **Integrated Monitoring Team (IMT)** that monitors progress (pre- and post monitoring) by analysing the pre-project technical and ecological conditions and the effects of implemented measures (impact evaluation), delivering basic environmental process information and process understanding.

The following figure shows how an integrated planning process might be set up:



B.2.1 ASSESSMENT OF THE ROLES OF GOVERNMENT, COMPETENT AUTHORITIES AND RELEVANT STAKEHOLDERS

While an IWT project is usually initiated by the Ministry of Transport or the waterway authority, other government bodies that should be involved (at least to a certain extent) in IWT projects are:

- the Ministry of Environment, Ministry of Water Management;
- specialised authorities and agencies, such as environment protection agencies and regional environmental inspectorates;
- affected regional governments and local municipalities;
- Ministries of Regional Development, Economy, Energy, Foreign Relations/European Integration and Finance;
- National, international or private (co-) financing institutions such as the European Commission, World Bank, European Bank for Regional Development (EBRD).

Although the project developer (usually the Ministry of Transport) has the overall political and financial responsibility, the institutions listed above share a certain amount of responsibility for a given IWT project and their involvement is defined by governmental and legal rules.

Relevant stakeholders are interested parties who have a particular competence or expressed interest that may be relevant for a balanced and successful project. These stakeholders are not responsible for the project, but they may have a vested interest in the project derived from geographical links (a river section, river basin), thematic issues (such as agricultural irrigation, environment protection) or water uses (such as angler associations or a group of ports). Their involvement is often required by government rules and should be based on an identification process (► ***ch. B.1.7***). In the case of transboundary aspects, foreign government bodies or organisations are additional stakeholders.

B.2.2 ESTABLISHMENT OF THE PROJECT STEERING COMMITTEE (PSC)

The Project Steering Committee has the overall responsibility for the project. The project initiator should set up the PSC and involve further relevant governmental and international bodies or institutions. In some cases the project initiator can also be an international institution, such as the ISRBC.

The PSC assesses the tasks of the Technical and ecological Planning Team (TPT) and organises a structured exchange of information between the contracted TPT and the IAB.

The PSC needs to define the role and proper functioning of the IAB, indicating:

- its general tasks and timeline, including the objectives, subjects and information to be assessed, as well as the results to be provided;
- its members, including the possibility of involving some experts later or at certain stages of the project;
- its internal responsibilities, cooperation and decision-making, dispute resolution and reporting, involvement of outside experts or subgroups;
- its budget securing the desired quality of results, which may include:
    - operational costs (working time of its members, travel costs to meet and visit certain sites or institutions etc.);
    - mandate-related costs, such as contracting studies or expert opinions, modelling and calculation of scenarios and variants;
    - reporting costs (such as compilation and publication of results);
    - involvement of a moderator or mediator to facilitate group discussions and agreements.

This IAB budget should be seen as part of the overall IWT project budget and be secured by the project developer (Ministry of Transport, waterway authority). This budget can be managed by this institution or the TPT.

B.2.3 SETTING UP THE INTERDISCIPLINARY ADVISORY BOARD (IAB)

The Interdisciplinary Advisory Board is an informal group to advise the Project Steering Committee and the Technical and ecological Planning Team on developing the project. It is created by the PSC (either via a tender or by invitation of the best available persons) and includes a wide range of competent and

independent experts with a scientific background. Ideally these experts are able to communicate in multi-disciplinary groups in a mutually open-minded and respectful atmosphere and can contribute **local knowledge and international expertise in the following disciplines**:

- river engineering (modelling, hydromorphology);
- water management (including flood protection);
- river ecology (terrestrial, aquatic, fish);
- waterway transport (navigation requirements);
- key land and resource uses (forestry, agriculture, power production, recreation and tourism).

If set up at the beginning, the IAB can assist the PSC in the scoping process of the project (► ***ch. B.1***), thus contributing to harmonised project visions and objectives. The IAB helps the TPT to find the best options for achieving the IWT and environmental objectives right from the beginning of the project.
In its main function of advising the PSC and TPT in the concrete planning of the project, the IAB supports the identification and development of balanced and ecology-compatible solutions. Furthermore, the IAB advises the PSC on various technical and ecological aspects, securing the use of international and scientific experience in integrated planning and ecological engineering. Preferably, members of the IAB should also be familiar with the legal requirements of impact assessments (SEA for qualifying plans, programmes and policies; EIA for projects).
The IAB tasks should be to develop the project's vision (leitbild) and goals in harmony with other planning processes and provide local competence to assess the best options for addressing navigation constraints and ecology needs, i.e. the IAB planning input should support and facilitate the identification and selection of concrete measures.
The IAB provides a wide range of technical and environmental knowledge independent from the project proponent, and like a think tank its group work focuses on cross-sector and ecology-supporting solutions. This assists the TPT in assessing the specific feasibility of complex planning proposals. Therefore the work of the IAB can indirectly support and ease the necessary legal steps of the project such as the EIA prepared by the TPT. During the project implementation the IAB should advise the PSC in the monitoring and execution of the planned works (e.g. adaptation of certain measures): ► ***ch. B.4 and B.5***.
In summary, the IAB acts as a facilitator that contributes to finding optimised solutions. These should be endorsed by all its members, who represent a wide range of expertise and interests. This will also ease the public communication of the planning result.

B.2.4 CONTRACTING THE TECHNICAL AND ECOLOGICAL PLANNING TEAM (TPT)

The Technical and ecological Planning Team is responsible for carrying out the detailed project planning, including:

- pressure analysis at a fundamental level including field data inventories;
- formulation of a leitbild/vision (together with IAB);
- technical calculations and modelling;
- specification and quantitative comparison of alternatives and variants (also reflecting the SEA results);
- preparation of the EIS.

The TPT is usually made up of a consortium of various consultants with the necessary knowledge in all required fields. The Project Steering Committee contracts the TPT through a legal tendering process following national and EU rules. The IAB can advise the PSC on drafting tendering documents and contract specifications of the TPT. During integrated planning, the TPT works closely with the IAB, and

both are supervised by the PSC. The TPT prepares all technical plans and EIA-related documents, including a project database, and makes them available to the IAB and PSC during the integrated planning process.

B.2.5 SETTING UP THE INTEGRATED MONITORING TEAM (IMT)

The Integrated Monitoring Team is created by the PSC, in consultation with the IAB, and undertakes the environmental monitoring of the project. Installing an IMT should lead to a better understanding of ecological processes, as it will provide the required data to evaluate specific measure types and assess the effects of certain measures in the field.

It is essential to use monitoring results for step by step implementation or adaptive realisation. The IMT implements the project monitoring concept and strategy developed by the IAB (possibly with external assistance) ► ***ch. B.4***.

The main tasks of the IMT are to:

- survey current conditions before implementation of the planned measures (pre-monitoring);
- evaluate the planned measures after implementation (post-monitoring);
- analyse their results and provide interpretation, giving a basis for a decision on whether measures need to be adapted in a certain way.

It may be useful that all monitoring work is done by a primary contractor who coordinates the various monitoring activities and compiles the **synthesis of monitoring results**, which will then be verified and used at certain intervals by the PSC in collaboration with the IAB and TPT.

B.2.6 COMMUNICATION WITH THE CONCERNED AND WIDER PUBLIC

As addressed in chapter B.1.7, continuous communication and the involvement of stakeholders are essential for the success of the project. The public should be informed regularly and consulted during the integrated planning process. Communicating and explaining the planning work secures transparency and, possibly, the early indication of obstacles or issues to be addressed. Implementing the 'Communication and Stakeholder Involvement Strategy' (► ***ch. B.1.7***) can help achieve this.

This requires all planning bodies (PSC, TPT, IAB) to communicate with the various groups of the public at certain intervals via the project webpage, regular publications and events such as moderated or even mediated workshops. The PSC has overall responsibility for the project and thus for all external communication activities, and all project related communication from the TPT and the IAB should be coordinated through the PSC.

Experience gained during the planning of the Integrated River Engineering Project East of Vienna has indicated that incorporating facilitation and mediation processes can help the team make efficient progress and achieve joint conclusions of discussions and planning steps ► ***ch. C.2.2.3***.

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B.3 EXECUTION OF THE INTEGRATED PLANNING PROCESS

The integrated planning process is a sequence of necessary steps for the development of the detailed project. The planning process begins with the scoping phase of the project (► B.1) and the necessary organisational works (► B.2) for the detailed integrated planning. At the end of the planning process the competent authorities receive and evaluate the proposed project in the course of an EIA.

An integrated planning process includes specific planning steps, described in this chapter. However these steps could have varying significance for different projects; the amount of integrated planning depends on the general nature of the project, its framework conditions, its objectives and its identified measures. Therefore **the following steps serve as a general guide to be applied and interpreted according to each IWT project. Furthermore the proposed steps do not necessarily represent a strict order**, i.e. some steps may also be carried out in parallel or iterative forms, depending on the specific requirements and progress of a concrete IWT project:

Model
Recipe for integrated planning

Step 1
Define joint planning objectives and principles

Step 2
Carry out the detailed planning of measures:
- technical and ecological options;
- plan alternatives;
- variants of chosen alternatives;
- local examination and/or testing;
- priority ranking.

Step 3
Conclude the integrated planning process (communicate and adopt results)

Step 4
Execute the EIA process and apply for environmental permits

Project developers should use these steps to create a dedicated **Road Map** for the planning process of their IWT project.

STEP 1

DEFINE JOINT PLANNING OBJECTIVES AND PRINCIPLES

Successful planning depends on agreement on various framework conditions, the first being the overall objectives of the project. Common planning principles help to streamline and accelerate the planning work within an agreed framework.

The project objectives identified in the initial scoping phase (► ***ch. B.1 to B.1.5***) are the basis for the definition of joint planning objectives and principles. The project developer (PSC) should have already involved the IAB for the identification and assessment of common planning principles (for an example ► ***ch. C.2.2.3***).

For an integrated project this means considering objectives of transport, environment and – possibly – other functions and uses (also with reference to the SEA results), as well as the character of the result to be achieved (such as a comprehensive plan including EIA study).

The **assessment of the ecological status** is a general environmental planning principle, and the relevant River Basin Management Plan 2009 should be used as a guiding document. Its related Programme of Measures regarding water status improvement and the respective sub-basin and national river basin management plans and programmes of measures offers one foundation for integrated planning and implementation of IWT infrastructure projects.

Project developers need to make sure that the general planning objectives and principles are in line with the WFD (Art. 4(7)) and the FFH-D (Art. 6(2) to 6(4)), as specified in ► ***ch. C.2***. Furthermore, they should also take account of national and local environmental legal requirements:

- Under the WFD, various improvements, such as site restorations, have to be achieved in various water bodies; these are listed in the new national and basin RBMP from 2009.
- Similarly, Natura 2000 sites and species are subject to new management plans that secure their future existence. According to EU law, the presence of certain species and habitats already requires a government to secure their effective protection. All relevant and required

data (including from the field) must be available to assess the potential effect of certain fairway structures (on bed morphology and its dynamics over time). The TPT and IAB have to be aware early on which river sections are more sensitive and which type of intervention may be beneficial.

The **general planning objectives and principles should clearly prevent any deterioration of ecology** (Natura 2000 and water status) and contribute to the legal need (nature and water management objectives) to maintain and improve or restore the ecological quality of affected stretches. Impact minimisation and compensation measures, such as the removal of obsolete structures, can be important planning objectives to achieve the EIA and receive environmental permits. Planning which supports ecology ideally leads to a situation where no compensation measures are necessary ► ***ch. C.2***.

The planning principles should also **take into consideration good practice examples** in the field of navigation and infrastructure development. As stressed in the Joint Statement and in EU guidance papers on WFD & Hydromorphology (Technical and Case Studies documents: EC 2006 a, b), there are examples of 'Good practice in managing the ecological impacts of hydropower schemes, flood protection works and works designed to facilitate navigation under the EU WFD'; such as the 'Integrated River Engineering Project on the Danube to the East of Vienna' ► ***ch. C.2.2.3***. Further examples are provided in ► ***ch. C.3***.

The issue of **climate change** should be considered as an additional planning principle. Climate change could have a number of potential implications for the future of IWT (such as the positive and negative effects on navigability during the year due to changed flow regime) and consequently IWT needs to dispose of more precise fairway information and adaptation measures related to the maintenance of fairways and to vessel types. Future IWT projects should prepare for potential climate change through:

- a holistic and coherent approach (taking account of actions from other relevant sectors);
- the definition of flexible management tools.

To correctly identify and address all the above issues, the IAB should draft various sectoral expert papers covering all relevant topics of the project (at least navigation, the environment, river engineering, economic issues). These sectoral expert papers should serve the PSC and the TPT in further development of the project. The IAB should discuss and agree on how to best combine the results of these sectoral papers to achieve an integrated project.

Following this philosophy waterway infrastructure projects should assess and design necessary river engineering measures in such a way that several river functions are maintained and improved at the same time.

The following general planning principles related to **River Engineering Criteria** (elaborated in the Joint Statement 2007) should be taken into consideration:

JOINT STATEMENT CRITERIA FOR RIVER ENGINEERING

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

- Use a **case-by-case approach** considering both the ecological requirements for river sections and the basin-wide scale as well as the strategic requirements of IWT at the basin-wide scale when deciding on adequate fairway width and depth.
- **'Work with nature'** wherever possible through implementation of measures according to given natural river-morphological processes following the principle of minimum or temporary engineering intervention.
- **Integrate design** of regulation structures, regarding hydraulic, morphological and ecological criteria.
- Implement measures in an **adaptive form** (e.g. river bed stabilisation by granulometric bed improvement, low water regulation by groynes).
- Make optimal use of the **potential for river restoration** (such as river banks restoration) and side-arm reconnection.
- Ensure that **flood water levels** are not exacerbated and, ideally, are reduced.

On the basis of the planning objectives, it is very helpful to jointly assess and agree on the scope, scale and/or framework of **planning parameters**, such as:

- the minimum dimension of the fairway;
- ecological necessities and criteria (e.g. for habitats, species, resilience to climate change);
- engineering requirements (e.g. bed stabilisation, flood protection).

STEP 2

CARRY OUT THE DETAILED PLANNING OF MEASURES

Detailed planning is carried out by the TPT, which should be guided and advised by the IAB. This usually includes the development of various alternatives and variants which consider the effectiveness of the proposed measures to achieve the defined objectives, the technical feasibility, the ecological aims and the costs of the plan. Developing alternatives begins with a description of the status quo ('zero state') and also considers non-structural measures (e.g. River Information Services) as well as environmental and resource costs. **While this planning part is primarily a task of the TPT, the IAB should be closely involved in this process in order to critically examine and optimise the proposed solutions.**

The following steps explain in detail how to **ensure comparability of alternatives and assess the feasibility of a plan or project** (including the costs and benefits).

Identify and examine basic technical and ecological options

The project objectives (such as the achievement of certain fairway dimensions and ecological requirements) can generally be achieved through various non-structural measures (capital and maintenance dredging) and structural measures (groynes, guiding walls, chevrons, river bank restoration, side-arm reconnection etc.) in various forms (concrete, rocks, stones or fixed deadwood).

In addition, non-structural measures (such as RIS, buoys, sonar or temporary limited one-way sections) need to be assessed for their individual and combined suitability and feasibility in the alternatives and variants.

Develop alternatives of the plan

The integrated improvement of navigability and ecology can be achieved to a certain extent by various technical alternatives. The types of possible alternatives should be proposed and developed by the IAB and technically assessed by the Technical and ecological Planning Team (via model calculations and plans). This comparative process improves the overall quality of the planning results and is also needed both from a technical and an environmental perspective (e.g. EIA study).

Such alternatives can be developed for different fairway dimensions, intervention types and ecological effects/restoration measures which allow for an initial cost and benefit assessment. In the end the best alternative is chosen based on the IAB and TPT recommendations to the PSC.

Compare variants of chosen alternatives

For the most promising alternative, variants need to be developed by the Technical and ecological Planning Team – with guidance from the IAB – to make detail assessments on a small scale. Furthermore the identified variants must be compared in relation to the effects of the foreseen interventions (such as size of structures, location and height compared to water level) on navigability and ecology.

Use further planning tools for local examination and/or testing of certain aspects

In addition to the above planning tools (calculation of mathematical models) the effects of some foreseen measures may have to be assessed through concrete activities such as pilot measures at specific river sites and testing of various sizes of technical structures via physical-hydraulic models.

Carry out a priority ranking of possible variants to ensure the best possible navigation and environmental development effect and use of financial resources

Integrated planning should include a quality check of possible variants, preferably presented in rank (from

best to worst) and indicating how each of the developed variants meets the navigation and ecology needs as well as the related costs. It may well be that different measures are preferred for various river sections but the overall assessment of achievable effects will be essential; this must consider both the combined local effects and the far-reaching up- and downstream effects.

A priority ranking leads to identification of the best overall variant (considering navigation and environmental needs as well as costs) and will justify the preferred solution.

STEP 3

CONCLUDE THE INTEGRATED PLANNING PROCESS (COMMUNICATE AND ADOPT RESULTS)

After the PSC, TPT and IAB agree on a result, it is important for the successful completion of the integrated planning process that the joint result is presented publicly and commented on before it is finally approved or formally adopted. This should start with a publication (in at least the local language and English) on the Internet and at an event to present – with all experts and institutions involved in the planning – the draft results to all interested parties locally, nationally and at the international level and to receive their final comments.

These stakeholder comments should be taken into account before finalising the integrated plan and ending this planning work. More IAB input is needed during the plan implementation (► ***ch. B.4***), and this will be formally connected to the response of the PSC which has to accept and adopt the planning result.

The PSC assures that the planning results are implemented during further project phases. This may include the need to further specify or amend certain details upon conditions set by the permitting authorities. However this should not lead to a change of the planning principles, or to a postponement or cancellation of certain project elements. Such changes risk undermining the overall planning success and credibility of the process.

Road Map for Integrated Planning
The steps indicated are not necessarily consecutive, i.e. some steps may have to be iterative, and all should be assessed in their suitability in each single water infrastructure project.

If the planning is properly done, the results are also fully coordinated and compatible with other development plans, both in the transport sector (national master plan, Corridor VII and TEN-T plans) as well as with the national and international management plans under WFD, Natura 2000 and other environmental legislation. Planning results may also be relevant for flood management, agricultural and recreational development.

STEP 4

EXECUTE THE EIA PROCESS AND APPLY FOR ENVIRONMENTAL PERMITS

The EIA process is regulated by national law and the EU directives. This includes a public information process (usually including a public hearing) where all stakeholders, not just those affected by the project, have the opportunity to read all relevant project documents and express comments to the permitting authority. The authority has to address all comments and consider them in its concluding statement. Details of the process can be learned from the national environmental authority.

The result of this process is a decision by the permitting environmental authority on whether and under what specific conditions they grant environmental permits for the proposed project.

Projects that are (co-)funded by the European Union will involve the European Commission (at least DG Environment) and require their positive comment on the EIA process, before EU funds can be paid out. The EC may also impose additional conditions to a project.

Guidance on the interrelation and application of these procedures is given in ► ***ch. C.1.2***.

Prepare and complete the required documents for the EIA process

The innovative character of the integrated planning of IWT projects reduces the environmental impact potential from the beginning of planning but not at its end. Therefore, the result of planning should be a set of measures that ensures the legal environmental requirements and transport objectives are met. This aspect needs to be reported with all the required details (technical design, environmental aspects) in the Environmental Impact Study (EIS) which must be submitted to the responsible environmental authorities in order to receive the environmental permits for all planned works.

It is therefore recommended to start **preparing EIA-required documents at the beginning of the planning process**. EIA studies usually require reports on the ecological status prior to the project and evaluations of the potential short and long term impacts. This implies presenting detailed and long-term field data (such as habitat and biological communities) about all sites and key aspects that are directly and indirectly affected by planned measures, such as:

- river bed;
- river banks;
- floodplain;
- lateral and longitudinal connectivity;
- hydrological impact by flow diversion upstream and downstream;
- sites suitable for compensation measures.

Collecting and assessing field data is time-consuming and can affect the planning process. In most cases, the legally required information about species, habitats and water ecology (including morphology, such as bed and fairway dynamics, and location and quality of fish spawning sites) can only be collected during certain periods of a year. Certain design questions (e.g. where to locate a groyne, for which fish to design a bypass) may depend on the availability and quality of field data. Producing such data at a later planning stage may delay or even complicate the entire planning process.

As explained in ► ***ch. C.1.3.4***, the EIA has to address – separately or in a combined process (► ***ch. C.1.3.5***) – possible impacts in relation to:

- the SEA and EIA Directives;
- the Water Framework Directive;
- the Birds Directive;
- the Fauna-Flora-Habitat Directive;
- the Flood Risk Directive;
- the Bern Convention.

B.4 MONITORING THE PROJECT

B.4.1 DEFINITION OF THE MONITORING PROGRAMME

The monitoring programme is not only a legal requirement but also provides the best opportunity to evaluate the achievement of project objectives. It generally consists of a short-term and a mid- to long-term component with interim assessments.

Overall project monitoring (financial, contractual aspects) is undertaken by the PSC. **Monitoring construction works** is not the subject of this manual, although there should be feedback and coordination with the environmental monitoring and integrated planning (adaptive implementation).

Monitoring plan implementation is a task where the PSC should involve both the TPT and IAB.

Environmental monitoring before, during and after construction works supports the successful implementation of the project. The IAB provides guidance on the definition of the monitoring programme, to be contracted by the PSC usually via a corresponding tendering procedure. The environmental monitoring programme should also be connected to the adaptive implementation steps relating to monitoring results and allow for a feedback process with the planning.

To achieve a desired effect of new measures it may be necessary to apply new engineering techniques where the effect must be carefully monitored and assessed over years to decide if further works are needed.

In light of hydrological dynamics and increasing climatic uncertainties, monitoring new river modifications technically and ecologically is much more important than in the past.

Therefore an interim assessment of the monitored results is recommended to assess the appropriate implementation of the measures. This may be trivial for the technical aspects but is important for ecological reasons.

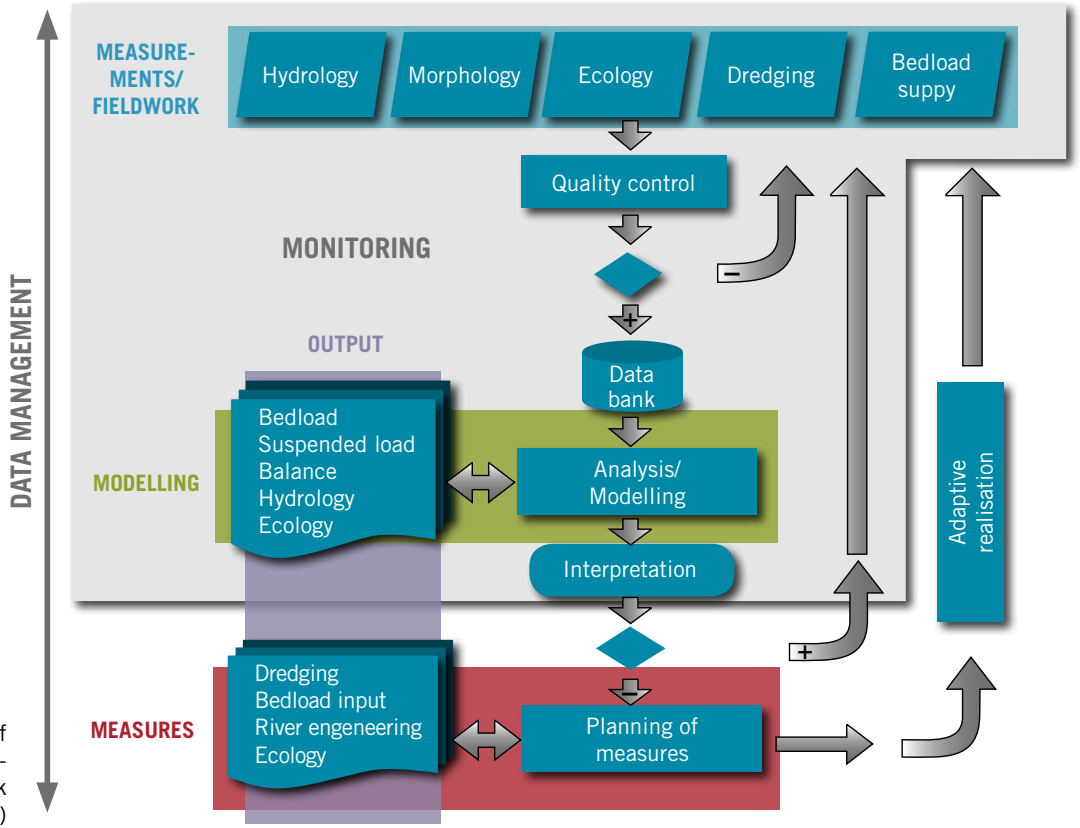
Planning should ensure that monitoring begins before the start of any works or measures.

The effectiveness of measures can only be judged by a long-term monitoring and verification of goals and objectives. Therefore the achievement of – at best quantified – project objectives (such as increased navigability, restored and maintained habitats) also needs to be monitored and verified over a period of five years or more. This accounts especially for morphodynamic changes, which depend on hydrology, sediment regime etc. Their timing, degree and focus depend on the type and complexity of works, and should be defined in the planning process and then re-assessed at agreed intervals.

Such assessment may lead to the subsequent decision on whether certain adaptive or corrective actions are still needed. The monitoring programme should anticipate this flexibility to adapt to unplanned and undesired effects such as in river morphology or species development to allow for corrective measures to be undertaken in the project area in relation to the qualitative and quantitative objectives.

Experience has shown that the various monitoring activities should be coordinated and presented in one synthesis report by one primary contractor.

The possible interaction between planning, adaptive implementation and monitoring is shown in the following figure:



Schematic flow chart of the integrated monitoring concept (Habersack et al. 2004)

B.4.2 CONTRACT AND EXECUTE PROJECT MONITORING (BEFORE, DURING AND AFTER EXECUTION OF WORKS)

Environmental monitoring is an essential element of the EIA process. All planned measures need accompanying monitoring of certain parameters. The specific monitoring requirements depend on the type of intervention and usually include monitoring components before, during and after the implementation of works. The monitoring programme should also fully consider existing international and EU legal requirements. The monitoring parameters and intensity are decided by the national environmental authority that receives and assesses the monitoring reports. If the monitoring assessment indicates that the required environmental status has not been achieved, the relevant authority may need to review the technical project conditions.

When executing an adaptive project, the monitoring results have a key function for the continuation of project works. Within a feedback process the monitoring results should lead to optimisation of the measures from one construction phase to the next. This procedure can be applied for works executed over a longer period of time or to works executed at particular intervals ► ***ch. B.5.2***.

The monitoring programme should also plan for the IAB to visit the construction sites several times during the execution of (engineering) works and intervene if necessary to ensure best in situ implementation. **Experience has shown that the implementation works can produce new facts or aspects that may deviate from the original plans. In this case, the new findings have to be assessed by the IAB and PSC** with respective measures defined by the TPT and agreed upon by the IAB and PSC (also with the permitting authorities). Such complex planning and execution may not only be more ecology-oriented but even the less expensive project alternative ► ***ch. B.5.2***.

B.5 IMPLEMENTING PLANNED WORKS

Implementation of the project can begin after successfully completing the EIA and receiving all necessary permits, which can vary from country to country and from project to project.
Generally project implementation consists of two main components:

- execution of the monitoring (before, during and after the execution of works) ► ***ch. B.4***;
- execution of project works according to the planning results and work permits.

B.5.1 CONTRACT THE CONSTRUCTION COMPANY

Usually as a result of a public tender procedure, a contracted company is entrusted to execute the designed measures.

B.5.2 EXECUTE AND REFINE PROJECT WORKS

It is evident that all planned and permitted works must lead to the concluded planning results and permitted works. Furthermore, any kind of possible damage triggered from the works should have been assessed prior to the construction and an agreement on compensation reached with the affected party (such as the environment authority or local land owner).
Usually, environmental and construction permits specify the conditions for the execution of works. In an integrated planning process the specific execution of works will have already been considered through the early involvement of environmental experts in the IAB and TPT who ideally developed types of measures and works that prevent or at least minimise negative environmental impact.
An adaptive and step by step realisation of measures is recommended, using monitoring results to improve the detailed planning and execution of the following steps. The implementation of works should be flexible to allow potential corrections of certain works, measures or designs based on monitoring results to achieve an improved or optimum result. Such an **optimisation during implementation of projected measures** should include dedicated models, test and pilot measures.

The public should be regularly informed on the execution of works. This can be done through a regularly updated webpage, information boards and brochures (in the local language and English), viewing platforms, guided tours, regular media information and mailings to local stakeholders that are directly and indirectly affected by the works (such as to warn of inevitable but temporary noise, dust, deteriorated water quality). The special environmental measures related to certain habitats, species and living conditions should be explained to the interested public prior to the works, and then monitored and reported via published monitoring reports.

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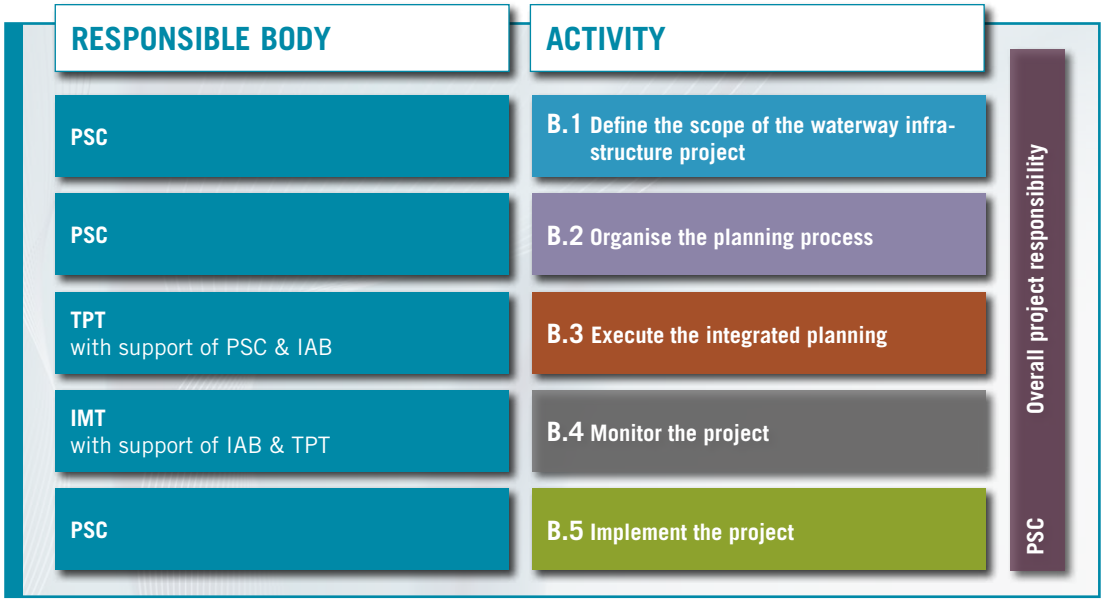
B.6 RESPONSIBILITIES

The integrated planning steps are the result of regular cooperation. Each stage should be executed by one or several bodies as follows:



PSC: Project Steering Committee
IAB: Interdisciplinary Advisory Board
TPT: Technical and ecological Planning Team
IMT: Interdisciplinary Monitoring Team

B.7 OUTLOOK

The planning process and allocation of tasks and responsibilities presented makes IWT project planning much more complex than it was in the past. As modern environmental legislation requires halting and reversing exploitation, degradation and the destruction of natural resources, sustainable development must be based on more cooperation and coordination between various sectors and their responsible authorities, and on comprehensive information and the involvement of affected stakeholders and the wider public.

In recent years, innovative efforts to integrate environmental objectives into infrastructure development have resulted in valuable experiences, some of which are considered 'good practice' and presented in Part C (notably chapters ***C.2 and C.3***).

The Joint Statement has created a new foundation for combining the needs of transport with those of environmental protection. This manual provides practical guidance on how to achieve this, but the overall success depends on how well these tools are applied and interpreted in individual river infrastructure cases by all parties: governments, waterway agencies and relevant stakeholders.

New experiences will soon be available that can also serve to review the latest IWT planning processes and to update this manual.

part C

FRAMEWORKS FOR PRACTICAL APPLICATION

This section of the Manual provides information on specific topics connected with the planning steps and offers more insights that may be useful for the practical application of integrated planning.

C.1 BASICS ON RIVER ECOLOGY AND THE LEGAL FRAMEWORK

Recently, several new waterway extension and maintenance projects have been proposed along the Danube and were discussed in their potential conflict with the EU Water Framework Directive (WFD) and other environmental laws. This situation prompted an international dialogue in 2007 on how to improve navigation and protect or improve the riverine environment in new infrastructure projects (Joint Statement process, ► ***ch. C.2.1***). This integrated approach was successfully applied before in the planning of the Integrated River Engineering Project (IREP resp. Flußbauliches Gesamtprojekt FGP) east of Vienna (► ***ch. C.2.2.3***). The guiding principles and criteria defined in the Joint Statement 2007 support the development and the implementation of the Programme of Measures required by the WFD (► ***ch. C.1.3.1***).

C.1.1 MAIN CHARACTERISTICS OF INTACT LARGE RIVERS AND CURRENT DEVELOPMENT POLICIES

Creating a transport development project that has a minimal (or perhaps positive) impact on the current environment requires an understanding of the complexities of riverine ecosystems and their legal protection needs – with impact prevention having priority over impact mitigation and restoration. Project planners with such awareness will find feasible solutions more easily.

C.1.1.1 Ecology and economics 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, inter-annual) changes – result in frequently changing connectivity conditions and an especially diverse habitat complex. Human pressures like pollution, river straightening for flood control or navigation purposes, and especially hydroelectric power plants create serious problems for ecological status, especially if they have an impact on the original hydromorphological situation (e.g. hydropeaking, reservoir flushing, cross-catchment water diversion, bed-load retention, water abstraction, longitudinal river continuum disruption by dams, bank stabilisation for navigation and flood protection) or the natural composition of ecological communities such as through barriers for migratory fish species or disconnection of adjacent riparian wetlands. The conservation, protection and sustainable development of ecologically intact river-floodplain systems – as required by the WFD – must be based on multi-disciplinary planning and decision processes for multi-use riverine landscapes (after Jungwirth 2007).

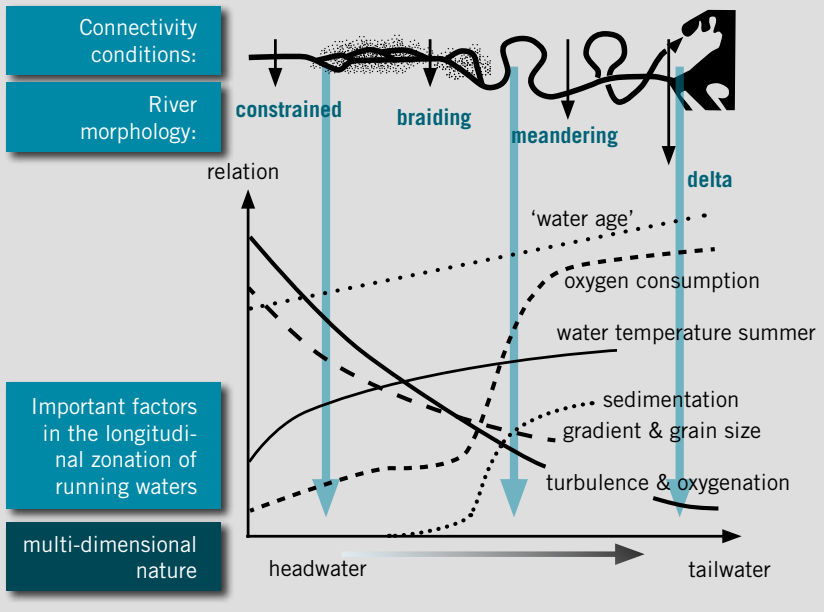
Large river systems such as the Danube are highly complex, multi-dimensional, dynamic riverine landscapes and thus are much more than just longitudinal channel networks. Understanding their high level of ecological complexity requires comprehensive observations and management at the catchment scale – a holistic approach that is required by the WFD.

Rivers can usually be divided into three main sections – the upper, middle and lower stretches. Each part is characterised by different abiotic (i.e. non-living) features (such as hydromorphology) and biological communities (► ***figure on p. 41***).

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 and the WFD (good status). They comprise the living organisms from both aquatic and semi-aquatic habitats in the main river and adjacent riparian zones and floodplains, such as microbial communities, plankton, aquatic and terrestrial vegetation, benthic algae and macro-invertebrates, fish, amphibians, reptiles, birds, mammals, etc. 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, floodplains) and

SCHEME OF LONGITUDINAL ZONATION



Source: Jungwirth 2007

its longitudinal continuity as well as habitat configuration. Anthropogenic structural measures can modify a river system's natural background conditions and therefore influence its ecological status and even its biogeochemical behaviour. Numerous other factors add to the complexity and highly dynamic nature of large river systems, such as natural disturbances (floods, 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.

Unlike many other European rivers, certain sections of the Danube and its tributaries are still home to very typical, natural and dynamic habitat complexes, which are essential for many species. For example, they include habitats for many important and almost extinct species such as the Danube sturgeon and Danube salmon. The EU Habitats Directive enables Member States to designate such areas as protected, to effectively protect, restore and prevent the deterioration of these remaining features.

In terms of **economic importance**, riverine floodplains have gained increased attention as a key global resource. Wetlands have a significant influence on the water supply for people and their many uses, including irrigation and food supply (fish, game, etc.). Wetlands also affect climate regulation, biodiversity maintenance, nutrient removal, groundwater recharge, tourism and recreation. This is provided by nature at no cost and the estimated economic value of these **free ecosystem services** delivered by wetlands is US$ 3,300 per ha/year or a total of US$ 200 billion (De Groot et al. 2006) (► ***also the table on page 42***).

However, the hydrologically dynamic character of natural floodplain systems has been largely destroyed by intense agriculture as well as urban and other infrastructure development worldwide, and the most impacted riparian corridors occur in Europe. Upstream deforestation may exacerbate downstream problems of flooding, soil erosion and sediment transport. Further threatening pressures result from increased water withdrawals for irrigation and nutrient and pesticide leakage from cultivated lands. As a result, important ecosystem services performed by floodplains free of charge are at considerable risk of being severely decreased or lost. Climate change and increasing nutrient pollution loading, combined with a rising demand of freshwater, are expected to exacerbate constraints.

The targeted use of existing wetlands to purify water, as well as the functional restoration of degraded floodplains by reconnecting them to the main river, are essential steps to meet the strict demands of the WFD and to improve living conditions for people dependent on ecosystem services in proximity to riverine wetland areas (Hein & Schabhuettl 2010).

ECOSYSTEM SERVICE BENEFITS PROVIDED FOR HUMANS BY WETLANDS

SERVICES	COMMENTS AND EXAMPLES
PROVISIONING	
Food	production of fish, wild game, fruits and grains
Fresh water*	storage and retention of water for domestic, industrial and agricultural use
Fibre and fuel	production of logs, fuelwood, peat, fodder
Biochemical	extraction of medicines and other materials from biota
Genetic materials	genes for resistance to plant pathogens, ornamental species and so on
REGULATING	
Climate regulation	source of and sink for greenhouse gases; influence local and regional temperature, precipitation and other climatic processes
Water regulation (hydrological flows)	groundwater recharge/discharge
Water purification and waste treatment	retention, recovery and removal of excess nutrients and other pollutants
Erosion regulation	retention of soils and sediments
Natural hazard regulation	flood control, storm protection
Pollination	habitat for pollinators
CULTURAL	
Spiritual and inspirational	source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
Recreational	opportunities for recreational activities
Aesthetic	many people find beauty or aesthetic value in aspects of wetland ecosystems
Educational	opportunities for formal and informal education and training
SUPPORTING	
Soil formation	sediment retention and accumulation of organic matter
Nutrient cycling	storage, recycling, processing and acquisition of nutrients

* While fresh water was treated as a provisioning service within the MA, it is also regarded as a regulating servibe by various sectors.

Source: Millennium Ecosystem Assessment (2005) Ecosystems and Human Well-Being: Wetlands and Water. Synthesis. World Resources Institute, Washington, DC

River Basin Management Plans, such as the one for the Danube Basin (ICPDR 2009), recognise the effects and benefits that reconnecting former floodplains to river main channels will have on biodiversity and ecosystem services such as nutrient retention.

Overall, **investing in the ecological infrastructure** 1 – or in nature's capacity to provide freshwater, climate regulation, soil formation, erosion control and natural risk management, among other services – supports a wide range of economic sectors and maintains and expands options for economic growth and sustainable development. The TEEB 2009 study launched by Germany and the European Commission found that maintaining nature's capacity to fulfil these functions is often cheaper than having to replace lost functions by investing in alternative heavy infrastructure and technological solutions.

1 WWW
www.teebweb.org

C.1.1.2 Effects of navigation on the riverine system

Human activities and uses affect the ecological and chemical status of large river systems in various ways. From an ecological point of view navigation is not the only pressure; activities such as hydroelectric power production and river straightening for flood control are also significant. River engineering measures can much impair the original hydro-morphological situation and the natural composition of ecological communities. Navigation requirements can result in a stabilised, single thread, ecologically uniform river channel (i.e. a waterway or canal), lacking both natural in-stream structures with their gentle gradients and connectivity with the adjacent floodplains, which leads in the long run to ecosystem degradation (such as for the main river channel and the floodplain) and a loss of species.

Alternative options to reduce hydromorphological impacts (from maintaining or expanding the fairway) include the use of other types of ships via modification or modernisation of fleet or the ship design (► *ch. C.2.2.3*). The EU-funded PLATINA project set up an **Innovation Database for Inland Waterway Transport** 2 to encourage the sharing of innovations throughout Europe. The database intends to bring innovation owners and innovation users closer together, and consequently speed up developments in inland navigation. The online data-

2 WWW
www.naiades.info/innovations

base is based on a wiki-approach and enables users to easily look for existing innovations and to create their own entries with minimal effort.
In addition to hydromorphological impacts, navigation has other negative impacts on the aquatic environment, such as pollution, which will be addressed in the WFD river basin management plans and in specific projects (such as waste and sewage collection). This can lead to a decrease in fishery resources (mostly due to habitat degradation and waves induced by ships; see Wolter & Arlinghaus 2003) and in a spread of invasive species.
A new assessment of the hydromorphological condition of the Danube has been conducted within the **PLATINA SWP 5.3** in the 'Integrative study on hydromorphological alterations on the Danube' (Habersack et al. 2010). Some results are presented in the box and map below.

RESULTS FROM PLATINA SWP 5.3 **'INTEGRATIVE STUDY ON HYDROMORPHOLOGICAL ALTERATIONS ON THE DANUBE'** (HABERSACK ET AL. 2010)

As one of the key PLATINA activities of the sub-work package 5.3.3, the University of Natural Resources and Life Sciences, Vienna (BOKU), undertook a status assessment of hydromorphology of the Danube. On the basis of a comprehensive literature review, the research team concluded in summer 2009 that the main ecological pressure from navigation, in addition to pollution from shipping, is hydromorphological alterations.

The study shows that **sections of the Danube River feature totally disturbed systems (e.g. sediment balance) due to the combined impacts of flood protection, navigation and hydropower**. The sediment continuum does not exist any more (torrent control, hydropower etc.), leading to a lack of bed load and suspended load in free flowing sections. For the purpose of navigation, flood protection, sediment extraction and hydropower generation, large sections of the Danube River have been narrowed, channelised, disconnected from floodplains and morphologically degraded. This has led to increased shear stresses, sediment transport capacities, lack of lateral sediment transport and reduced morphodynamics in unimpounded sections. As a consequence of limited sediment supply and channelisation, the free flowing sections show river bed degradation. Such degradation leads to a loss of instream structures, especially a disappearance of gravel bars and changes to sand bars. With a lack of morphodynamics such as the disappearance of spawning places, the ecological status is worsening (► the map on pages 44-45).

The study recommends that future navigation projects follow an integrated planning process to simultaneously improve the current situation of IWT as well as that of ecology (as the WFD does not allow deterioration of ecological status).

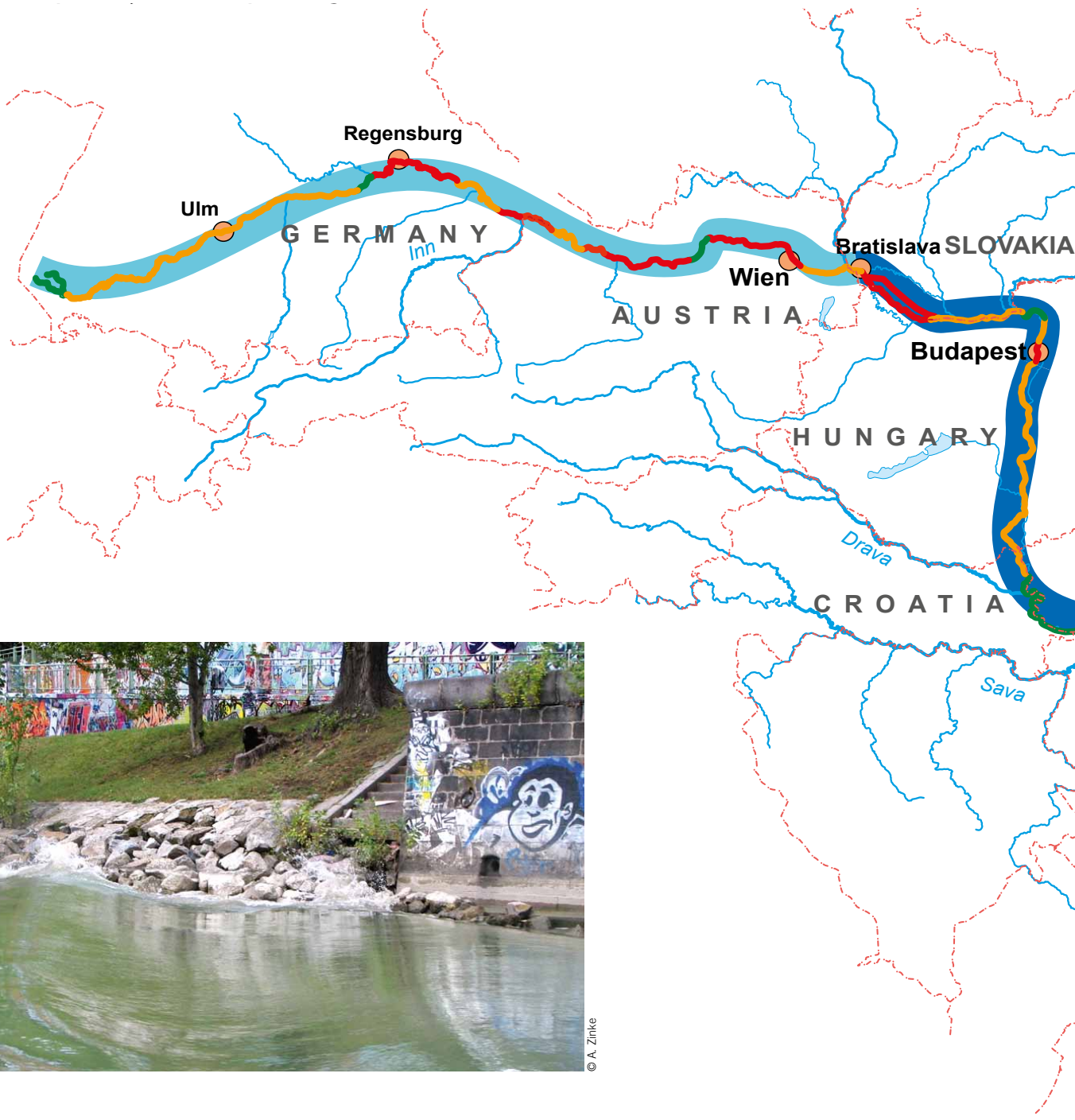
River restoration and improved navigation should be the aim in the upper and middle reaches of the Danube. Preservation of morphodynamics and restoration of floodplains in combination with the improvement of navigation should be a central goal in the lower reaches of the Danube. The improvement of the sediment continuum along the Danube River sections and halting further river bed degradation by a sustainable stabilisation of the mean bed level is of great importance for ecology and navigation. The sediment continuum along the Danube tributaries should be preserved and improved in areas where hydropower plants and torrent control (re-)structures affect it.
An integrated design of IWT infrastructure measures (using hydraulic, morphological, ecological criteria) is of central importance. Ecologically compatible measures should be developed, adapted to their locations to improve navigation (such as the modification of existing groynes). Restoration measures should be implemented according to given river morphological processes such as side erosion, bed and side-arm development and heterogeneity in river morphology and habitat diversity.
The ship pathway should be shifted to deeper sections to reduce navigation problems. Furthermore, the aim should be a longitudinal and lateral river continuum to support sustainable improvement of ecological status especially at shorelines and side-arms, a reconnection of the former side-arm system or at least connection during higher discharge, river bank restoration and the improvement of aquatic and semi-aquatic habitat quantity and quality.

Dredged material downstream should be refilled (such as in case of yearly ford dredging) and dredging activities (particularly concerning discharges and seasons) should be harmonised with ecological needs.

An adapted land use should prevent the input of fine sediment and fertiliser emissions into the river and should avoid agricultural activities along adjacent areas of the river. Buffer zones are needed between agricultural areas and floodplains (nature reserves). Furthermore, floodplains need to be conserved and restored; self-forming processes (morphodynamics) need to be allowed and initiated; river bed incision should be stopped by adding gravel; and longitudinal, lateral and vertical connectivity should be restored.

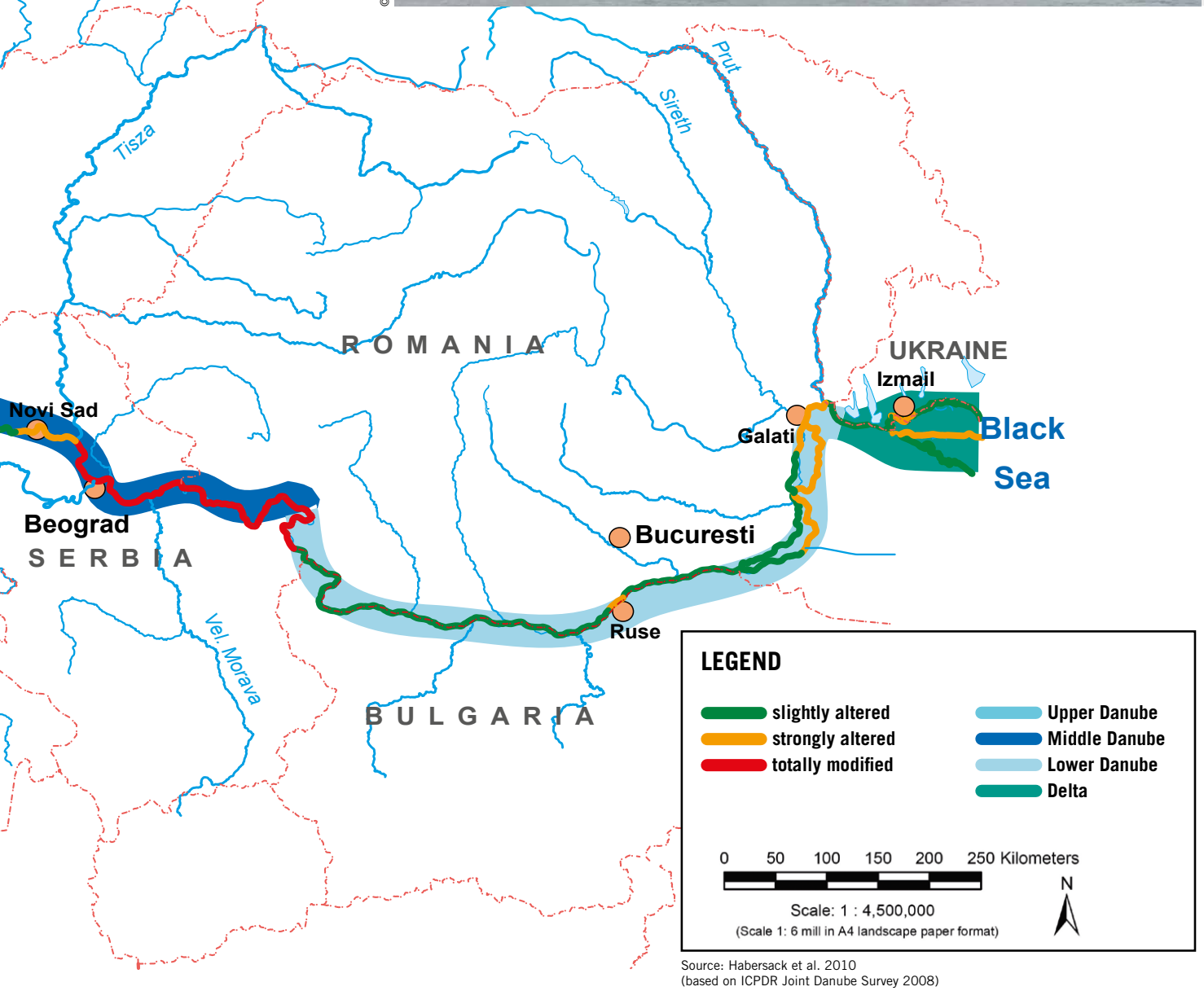
In general, measures to improve navigation should also repair or restore hydromorphology.

HYDROMORPHOLOGICAL ALTERATIONS OF THE DANUBE



© A. Zinke

© C. Baumgartner



Source: Habersack et al. 2010
(based on ICPDR Joint Danube Survey 2008)

C.1.2 POLICY AND LEGAL FRAMEWORK

C.1.2.1 Relevant policies

EU environment policy

The EU's environmental policy covers many areas, including nature, water and climate change. 1

The EU is committed to the protection of biodiversity, and halting biodiversity loss within the EU by 2010. Over the last 25 years a vast network has been built of nearly 26,000 protected areas covering all the Member States and a total area of more than 850,000 km², representing approximately 18% of total EU terrestrial area. This **Natura 2000 network** is the largest coherent network of protected areas in the world.

The legal basis for the Natura 2000 network comes from the Birds Directive (1979) and the Habitats Directive (1992), as the backbone of the EU's internal policy on biodiversity protection. But this also requires ensuring that agriculture as well as regional, energy and **transport policies** are sustainable and that Europe's natural capital – its biodiversity – is conserved and protected. 2

The protection of **water resources**, fresh and salt water ecosystems and the water we use for drinking and bathing, are other cornerstones of environmental protection in Europe. The issues transcend national boundaries and concerted action at the EU level is necessary to ensure effective protection. According to the EU Water Framework Directive (WFD), all waters in the EU should reach good status, in principle by 2015. The related **River Basin Management Plans** were to be completed in December 2009 following extensive consultation.

The WFD establishes a legal framework to protect and restore clean water across Europe and ensure its long-term, sustainable use. The directive establishes an innovative approach for water management based on river basins and the natural geographical and hydrological units, and sets specific deadlines for Member States to protect aquatic ecosystems. The directive addresses inland surface waters, transitional waters, coastal waters and groundwater. It establishes several innovative principles for water management, including public participation in planning and the integration of economic approaches, including the recovery of the cost of water services. In its Article 3, the directive calls for the creation of international districts for river basins that cover the territory of more than one Member State and for coordination of work in these districts. Examples are the Rhine and Danube River Basin Districts. 3

In April 2009 the European Commission presented a policy paper (White Paper) introducing the framework for adaptation measures and policies to reduce the European Union's vulnerability to the impacts of **climate change**.

Decisions on how best to adapt to climate change must be based on solid scientific and economic analysis. The White Paper outlines the need to create a clearing house mechanism by 2011 where information on climate change risks, impacts and best practices would be exchanged between governments, agencies and organisations working on adaptation policies.

Since the impacts of climate change will vary by region, many of the adaptation measures will need to be carried out nationally or regionally. The European Union will support and complement these efforts through an integrated and coordinated approach, particularly in cross-border issues and policies. Adapting to climate change will be integrated into all EU policies. For "increasing the resilience of biodiversity, ecosystems and water", one of the White Paper Actions refers to transport infrastructure:

> Develop methodologies for climate-proofing infrastructure projects and consider how these could be incorporated into the TEN-T and TEN-E guidelines and guidance on investments under cohesion policy in the current period.

On 30 November 2009, Water Directors of EU Member States issued a **guidance document on adaptation to climate change in water management**. The document is the first result of numerous White Paper actions and includes guidance on how to take climate change into account in the implementation of the WFD, the Floods Directive and the Strategy on Water Scarcity and Droughts. 4

With respect to EU **transport policy**, the guidance states that a "well-balanced approach is also needed to meet both climate mitigation and adaptation

1 WWW
ec.europa.eu/environment/policy_en.htm

2 WWW
ec.europa.eu/environment/nature/index_en.htm

3 WWW
ec.europa.eu/environment/water/water-framework/index_en.html

4 WWW
circa.europa.eu/Public/irc/env/wfd/library?l=/framework_directive/guidance_documents/management_finalpdf/_EN_1.0_&a=d

and water protection objectives. With emissions of greenhouse gases from transport still on the increase, a shift from high-carbon road transportation to low-carbon maritime and inland shipping is encouraged by EU transport policy as both modalities contribute relatively positively to reducing overall climate change impacts from transport. On the other hand, navigation on rain water-fed rivers will become increasingly vulnerable to climate change impacts such as more varied precipitation patterns. A balanced approach should therefore ensure that both climate mitigation and adaptation and environment protection aspects are checked and reported for transportation projects with environmental implications as well as for environment projects with transport implications in environmental impact assessments (EIAs) and strategic environmental assessments (SEAs). Such a multi-disciplinary policy should guarantee actions that provide an optimum between mitigation and adaptation."

Environmental integration – or the full consideration of environmental concerns in the decisions and activities of other sectors – has been a requirement under the EC Treaty since 1997. Article 6 of the Treaty states that "environmental protection requirements must be integrated into the definition and implementation of the Community policies in particular with a view to promoting sustainable development".

The Sixth Environment Action Programme stipulates that "integration of environmental concerns into other policies must be deepened" to move towards sustainable development.

Integration areas include – among others – **transport**. 5

EU transport policy

National transport policy is usually explained and specified in **master plans** (for all transport modes or particularly for IWT) that were prepared for most countries offering and operating waterways. These plans are usually coordinated at transboundary and international levels, and therefore they implement international policies and laws.

While this manual cannot present these national plans, it is important to note that they are based on government decisions and thus constitute the policy justification for a given IWT project.

The European Commission's Communication **NAIADES** (Navigation and Inland Waterway Action and Development in Europe) is the EC action programme on the promotion of inland waterway transport (2006). The programme includes recommendations for action to be taken between 2006 and 2013 by the European Community, its Member States and other parties concerned. The implementation of the programme should be carried out in close cooperation with national and regional authorities, river commissions, as well as the European inland waterway transport sector.

The Action Programme focuses on five strategic and equally important areas: the creation of favourable conditions for services and new markets; modernisation of the fleet, in particular its environmental performance; jobs and skills; and the promotion of IWT as a successful business partner.

The fifth area of the Action Programme relates to waterway infrastructure, and proposes initiation of a European Development Plan for improvement and maintenance of waterway infrastructures and transhipment facilities to make trans-European waterway transport more efficient while respecting environmental requirements. The Communication underlines that the development of waterway infrastructure should happen in a coordinated and integrated way, by fostering the mutual understanding of multi-purpose use of waterways and reconciling environmental protection and sustainable mobility.

Bringing together 22 partners from 9 European countries, the **EU PLATINA project** 6 supports the implementation of the NAIADES action programme. From 2008 to 2012, PLATINA provides technical and organisational assistance by ensuring active participation of key industrial stakeholders, associations and Member State administrations to develop a European inland waterway transport policy. Organised along the lines of NAIADES, PLATINA comprises five work packages covering the above mentioned strategic areas of the NAIADES Action Programme: Markets, Fleet, Jobs & Skills, Image and Infrastructure.

As PLATINA is a multi-disciplinary knowledge network with an open communication strategy, all project actions, results and events can be monitored through its online information services.

5
www
ec.europa.eu/environment/integration/integration.htm

6
www
www.naiades.info

1 www
ec.europa.eu/transport/infrastructure/index_en.htm

The Trans-European Transport Network (**TEN-T**) 1 is an EU policy with the objective of establishing a single, multimodal infrastructure network to enable safe and efficient traffic. Its principal legal basis is laid down in Chapter XV (Articles 154, 155 and 156) of the treaty establishing the European Union, which aims to promote the development of trans-European networks as a key element for the creation of the internal market and for reinforcing economic and social cohesion. The concrete **legal basis for the TEN-T network** is laid down in the Decision 1692/96/EC on Community guidelines for the development of the trans-European transport network. It shall be established gradually by integrating land, sea and air transport infrastructure components, and by including the necessary technical installations, information and telecommunication systems to ensure smooth operation of the network and efficient traffic management. The transport infrastructure components are road, rail and inland waterway networks, motorways of the sea, seaports and inland waterway ports, airports and other interconnection points between modal networks.

Section 4 of the Decision sets out the minimum technical characteristics for waterways forming part of the network and the technical specifications for modernisation and construction. Article 8 on environmental protection lays down the **obligation that environmental impact assessments must be carried out** for projects of common interest.

C.1.2.2 Relevant international legal conventions

Sofia Convention on the Protection of the River Danube (1994)

The Convention on Cooperation for the Protection and Sustainable Use of the River Danube (Danube River Protection Convention DRPC) forms the overall legal instrument for cooperation and transboundary water management in the Danube River Basin.

Signed on 29 June 1994, in Sofia, Bulgaria, by eleven of the Danube Riparian States (Austria, Bulgaria, Croatia, the Czech Republic, Germany, Hungary, Moldova, Romania, Slovakia, Slovenia and Ukraine) and the European Community, the DRPC came into force in October 1998.

Its main objective is to ensure that all waters within the Danube River Basin are managed and used sustainably and equitably. This involves:

- the conservation, improvement and rational use of surface waters and groundwater;
- preventive measures to control hazards originating from accidents involving floods, ice or hazardous substances;
- measures to reduce the pollution loads entering the Black Sea from sources in the Danube Basin.

The signatories to the DRPC have agreed to cooperate on fundamental water management issues by taking "all appropriate legal, administrative and technical measures to at least maintain and where possible improve the current water quality and environmental conditions of the Danube River and of the waters in its catchment area, and to prevent and reduce as far as possible adverse impacts and changes occurring or likely to be caused".

The International Commission for the Protection of the Danube River (ICPDR) was established as an international body, promoting policy agreements and setting joint priorities and strategies for improving the state of the Danube and its tributaries. The ICPDR formally comprises the delegations of all contracting parties, but has also established a framework for other organisations to join.

Seven Technical Expert Groups formed by national experts from the contracting parties and representatives of the observer organisations form the backbone of the operation and the success of the ICPDR. They deal with a variety of issues – from policy measures for the reduction of water pollution to the implementation of the WFD.

Today the ICPDR is the platform for coordinating the WFD implementation on the basin-wide scale in the Danube River Basin District between 14 Danube Basin countries and the European Commission (see the Danube Declaration 2004). The work of the ICPDR is supported by a Secretariat located in Vienna, Austria. 2

2 www
www.icpdr.org

Rhine Protection Convention (1999)

The Convention on the Protection of the Rhine is the basis for international cooperation for the

protection of the Rhine. It was signed on 12 April 1999 by representatives of the governments of the five Rhine bordering countries: France, Germany, Luxembourg, The Netherlands and Switzerland, and by the European Community. They formally confirm to protect the valuable character of the Rhine, its banks and floodplains through increased cooperation.

Among other objectives, the preservation, improvement and sustainable development of the Rhine ecosystem are central elements of the convention. This target was fixed against the background that the Rhine is an important European navigation lane and should continue to serve different uses.

Considering the preservation and improvement of the North Sea, the restoration of the Rhine has an additional international dimension.

The Convention signed in 1999 replaces the Treaty of Bern signed in 1963 as well as the Chemical Convention of 1976, and is governed by the financial regulations and rules of procedure of the International Commission for the Protection of the Rhine (ICPR). 3

For the benefit of the Rhine and of all waters running into the Rhine, the members of the ICPR successfully cooperate with Austria, Liechtenstein and the Belgian region of Wallonia, as well as Italy. Nine states and regions in the Rhine watershed closely cooperate in order to harmonise the many interests of use and protection in the Rhine area. Focal points of work are sustainable development of the Rhine, its alluvial areas and the good state of all waters in the watershed.

Expert and working groups with clearly defined mandates work on all relevant technical issues arising from the implementation of the Convention and from European law. Decisions are taken in the annual plenary assembly. The Conference of Rhine Ministers makes decisions in matters of political importance.

The ICPR-activities have been a model for many other river basins, and cooperation along the Rhine was also integral to the development of the WFD and the Flood Risk Directive.

The international secretariat of the ICPR in Koblenz, Germany, is the international office for the implementation of the Convention.

Espoo Convention (1997)

The Convention on Environmental Impact Assessment in a Transboundary Context is a UNECE convention signed in Espoo, Finland, in 1991 that sets out the obligations of Parties to assess the environmental impact of certain activities at an early stage of planning. It also lays down the general obligation of states to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across boundaries.

The Protocol on Strategic Environmental Assessment (Kiev, 2003) augments the Espoo Convention by ensuring that individual parties integrate environmental assessment into their plans and programmes at the earliest stages – helping to lay the groundwork for sustainable development. The Protocol also provides for extensive public participation in the governmental decision-making process. 4

(Rio) Convention on Biological Diversity (1992)

The Convention on Biological Diversity has been ratified by nearly 200 countries world-wide, including the European Union as well as all contracting parties to the ICPDR. It aims to conserve biological diversity, and secure the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the use of genetic resources.

In April 2002, the Parties to the Convention committed themselves to achieving a significant reduction by 2010 of the current rate of biodiversity loss at global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth, known as the 2010 Biodiversity Target. This target was subsequently endorsed by the World Summit on Sustainable Development and the United Nations General Assembly and was incorporated as a new target under the Millennium Development Goals. 5

Ramsar Convention (1971)

This convention was adopted in 1971 in the Iranian city of Ramsar and is a framework for national action and international cooperation for the conser-

3 www www.iksr.org

4 www www.unece.org/env/eia/eia.htm

5 www www.cbd.int

vation of internationally significant wetlands which host animal or plant species that are rare or threatened by extinction. Each of the signatory states (currently 159) is obliged to declare at least one Ramsar area and give it special protection. At the centre of the Ramsar philosophy is the principle that sites should be managed according to 'wise use'.

The Convention uses a broad definition of the types of wetlands covered in its mission, including lakes and rivers, swamps and marshes, wet grasslands and peatlands, oases, estuaries, deltas and tidal flats, near-shore marine areas, mangroves and coral reefs, and human-made sites such as fish ponds, rice paddies, reservoirs and salt pans.

The wise use of wetlands is defined as "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development". Wise use therefore has at its heart the conservation and sustainable use of wetlands and their resources, for the benefit of humankind.

There are presently 156 contracting parties to the Convention, with 1,883 wetland sites, totalling over 185 million hectares, designated for inclusion in the Ramsar List of Wetlands of International Importance. This list, commonly called the list of Ramsar sites, not only recognises the world's most important wetlands, but is also an effective tool to help countries meet their goals of sustainability.

About 80 wetlands of the Danube River Basin have been declared Ramsar sites, several of them along the Danube, such as the Danube wetlands in Bavaria, the trilateral site of the Morava-Dyje wetlands in Austria, the Czech Republic and Slovakia, the Gemenc floodplain forest in Hungary and the Danube Delta in Romania. Several Ramsar sites are located along navigable routes in the Danube Basin and will possibly be affected by new IWT projects. 1

World Heritage Convention (1972)

The Convention Concerning the Protection of World Cultural and Natural Heritage was adopted by UNESCO in 1972 and has been ratified so far by 186 Parties. A UNESCO World Heritage Site is a specific site (such as a forest, mountain, lake, desert, monument, building, complex or city) that has been nominated and confirmed for inclusion on the list maintained by the international World Heritage Programme administered by the UNESCO World Heritage Committee.

As of 2009, a total of 890 cultural, natural and mixed property sites are listed in 142 states. Each World Heritage Site is the property of the country on whose territory the site is located, but the protection and conservation of these sites is a concern of all the World Heritage countries. Three of the World Heritage Sites in the Danube Basin are the Wachau Valley (Austria), Srebarna Lake at the Bulgarian Danube and the Danube Delta (Romania). 2

Bern Convention (1979)

The Convention on the conservation of European wildlife and natural habitats (adopted in 1979, in force since 1982) promotes cooperation between the signatory states to conserve wild flora and fauna and their natural habitats and to protect endangered migratory species. The Convention led to the creation of the **Emerald Network of Areas of Special Conservation Interest** (ASCIs in 1998), which operates alongside the EU Natura 2000 programme, and represents its de facto extension to non-EU countries. 3

The **Sturgeon Action Plan** (SAP) in the framework of the Bern Convention on the Conservation of European Wildlife and Natural Habitats (Council of Europe, Bern, 1979) aims to conserve the unique and endangered Danube sturgeons (SAP 2006). 4

Five out of six sturgeon species native to the basin are critically threatened by extinction, one species (*Acipenser sturio*) is already extirpated in the Danube River Basin. Sturgeon protection involves securing viable (self-reproducing) populations of all endangered species by sustainable management and by restoration of their natural habitats and migratory movements.

The key threats to Danube sturgeons include: overexploitation (over-fishing linked with poaching and illegal trade), habitat loss and degradation including the disruption of spawning migrations and pollution, and potential alteration of the genetic and ecological status by the introduction of exotic species and genotypes.

Apart from the disruption of sturgeon migration by dams and siltation in the reservoirs, loss of habi-

1 WWW
www.ramsar.org/

See the table Important Ecological / Landscape Areas on the Danube in ch. C.1.3.3

2 WWW
whc.unesco.org

3 WWW
www.coe.int/t/dg4/culture-heritage/nature/Bern/default_en.asp

4 WWW
www.iad.gs/docs/reports/SAP.pdf

tats is caused mainly by channelisation and bank constructions, the disconnection of rivers from their floodplains, and sand and gravel exploitation. For example, gravel extraction for construction purposes destroyed sturgeon spawning sites near Calarasi (river km 373). The plans of the Danube Commission in the frame of the TEN-T to remove navigation bottlenecks along the Danube Green Corridor, and to dredge shipping canals in the delta are threats to other potential sturgeon spawning habitats (WWF 2002). The Action Plan stipulates as priority action the re-opening of sturgeon migration routes which requires that the Iron Gate hydropower dams are passable.

The Action Plan ratified by 10 riparian countries, signed by 1 and with 4 countries in accession, is based around 12 objectives, containing 72 actions and grouped under 4 general headings:

- basin-wide coordination of sturgeon policy and best-practice management;
- legislation and enforcement controls for sturgeon fisheries and trade;
- conservation of sturgeon species and populations, including their genetic integrity;
- protection, management and restoration of sturgeon habitats, including reopening of migration routes.

Lower Danube Green Corridor Agreement (2000)

The LDGC Agreement 5 was signed in June 2000 in Bucharest, Romania, by the Ministers of Environment of Bulgaria, Moldova, Romania and Ukraine. In the Agreement, the ministers recognised the need and responsibility to protect and manage the Lower Danube in a sustainable way, as it is one of the most outstanding biodiversity regions in the world. The new corridor shall comprise a minimum of some 900,000 hectares of protected areas and restored floodplain habitats along the river in the 4 countries. Additional projects work to restore the biologically rich Danube Delta at the Black Sea, re-introduce lost species, and facilitate governmental cooperation to protect threatened trans-border areas.

Between the Iron Gate and the delta, the LDGC comprises a minimum of 773,166 ha of existing protected areas, 160,626 ha of newly proposed protected areas and 223,608 ha of areas proposed to be restored to natural floodplain.

The World Bank/GEF Wetland Restoration Project (Belene and Kalimok areas), for instance, is presented as a Bulgarian contribution to the LDGC restoration activities.

Framework Agreement on the Sava River Basin (2002)

The Framework Agreement on the Sava River Basin (FASRB) was signed by the riparian countries (Republic of Slovenia, Republic of Croatia, Bosnia and Herzegovina and the Federal Republic of Yugoslavia) in Kranjska Gora, Slovenia, on 3 December 2002 after successful negotiations under the umbrella of the Stability Pact for South-eastern Europe.

The Agreement came into force on 29 December 2004, and the International Sava River Basin Commission (ISRBC, Sava Commission) was established in June 2005 in Zagreb, Croatia. The goals of the ISRBC are to **establish an international regime of navigation** on the Sava River and its navigable tributaries, which includes provision of conditions for safe navigation by adopting a waterway development plan, and to **establish sustainable water management**, which includes cooperation on management of the Sava River Basin water resources. In addition, the ISRBC undertakes measures for the prevention or restriction of danger, as well as the elimination of hazardous impacts of floods, ice, draught and accidents involving substances having negative impacts on waters.

The Agreement also defined general principles on the actions of the parties, which would cooperate in accordance with the WFD. The parties will prepare a joint plan for water resources management (Sava RBMP).

The Agreement stipulates that the parties should cooperate and exchange data relating to the water regime of the Sava River, the navigation regime, regulations, organisational structures and administrative and technical practices. The ISRBC also collaborates with international organisations such as the ICPDR, Danube Commission, UN/ECE and EU institutions.

5 WWW

www.panda.org/what_we_do/where_we_work/black_sea_basin/danube_carpathian/our_solutions/freshwater/floodplains/lower_danube_and_danube_delta/

Navigation on the Sava River is free for trade vessels of all states, which is identical to the regulation for the Danube Navigation Convention. The parties will undertake measures for the maintenance of the waterways in their territory, as well as to undertake measures to improve the navigation conditions, and will not prevent or cause any obstacles to navigation. 1

1 www
www.savacommission.org

European Agreement on Main Inland Waterways of International Importance (AGN, 1996)

This agreement (adopted in 1996 in Geneva and in force since 1999) aims to determine unified technical and operational parameters for the construction, modernisation, reconstruction and operation of waterways destined for international river transport. The AGN establishes an internationally agreed European network of inland waterways and ports as well as uniform infrastructure and operational parameters.

The geographical scope of the European waterways network, consisting of navigable rivers, canals and coastal routes, extends from the Atlantic to the Ural, connecting 37 countries and reaching beyond the European region. By acceding to the AGN, governments commit themselves to the development and construction of their inland waterways and ports of international importance in accordance with the uniform conditions agreed upon and within their investment programmes.

The Agreement underlines the importance of IWT which, in comparison with other modes of inland transport, presents economic and environmental advantages and may, therefore, contribute to reducing congestion, traffic accidents and negative environmental impacts in the pan-European transport system. 2

2 www
www.unece.org/trans/conventn/agn.pdf

Belgrade Convention on the navigation regime on the Danube (1948)

The Danube Commission is an international intergovernmental organisation set up by the Convention on the navigation regime on the Danube, signed in Belgrade on 18 August 1948. The primary tasks of the Danube Commission are the provision and development of navigation on the Danube for commercial vessels in accordance with interests and sovereign rights of its member states.

According to the Convention, the 11 Member States (Austria, Bulgaria, Croatia, Germany, Hungary, Moldova, Romania, Russia, Serbia, Slovakia and Ukraine) undertake to maintain their sections of the Danube in a navigable condition for river-going and, where appropriate, for sea-going vessels, and to carry out the works necessary for the maintenance and improvement of navigation conditions and not to obstruct or hinder navigation on the navigable channels of the Danube.

Since 1954 the Commission has had its seat in Budapest. It consists of Member State representatives who supervise the implementation of the Convention, preparing a general plan of the main works in the interest of navigation on the basis of proposals and projects from the Member States and the special river administrations. It consults with and makes recommendations to Member States regarding the execution of these works. With respect to the waterway infrastructure, the Danube Commission has defined minimum parameters for the different Danube stretches which have recommendation character.

The Danube Commission actively works to fulfil the Declaration on European Inland Waterways and Transport (Budapest, 11 September 1991), as well as the Declaration of the Rotterdam Conference on Accelerating Pan-European Cooperation Towards a Free and Strong Inland Waterway Transport of 5-6 September 2001.

Another relevant issue in this context is the harmonisation of technical prescriptions, rules and standards, as well as of legal provisions in force on the Danube, on the Rhine, within the European Union, and those adopted by the UNECE, with the aim of creating a uniform pan-European system of inland navigation that can meet present conditions. 3

3 www
www.danubecommission.org

Mannheim Convention on the navigation on the Rhine (1963)

In 1815, the Final Act of the Congress of Vienna established the principle of freedom of navigation on international waterways. One of its provisions concerned the creation of a Central Commission on the Rhine River to control the enforcement of common rules as well as to provide an author-

ity for communication between riparian states on all aspects of navigation. The Convention of Mannheim (1868) brings about an update of the main regulations, taking into account the evolution of the Rhine navigation in the fields of technique, economy and politics. In 1963, the Convention was again amended and integrated into the Revised Convention for Rhine Navigation. In 1920, the Central Commission for the Navigation of the Rhine (CCNR) was transferred from Mannheim to Strasbourg (France) where its permanent secretariat was established. This service and management body for CCNR meetings is also the seat of the Rhine navigation tribunal and a central administration office for the social security of crew members on the Rhine. 4

European Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN, 2000)

The ADN was established to ensure a high level of safety for the international carriage of dangerous goods by inland waterways; to contribute to environmental protection by preventing any pollution resulting from accidents or incidents during such carriage; and to facilitate international transport and trade.

Regulations annexed to the Agreement contain technical requirements for the international carriage of dangerous substances and articles in packages and in bulk on board inland navigation vessels and tank vessels, as well as uniform provisions concerning the construction and operation of such vessels. They also establish international requirements and procedures for inspections, issuance of certificates of approval, recognition of classification societies, monitoring and training and examination of experts.

The ADN was adopted on 25 May 2000 in Geneva at a Diplomatic Conference organised jointly by the UNECE and the CCNR. It entered into force on 29 February 2008.

Contracting states thus far are Austria, Bulgaria, Croatia, France, Germany, Hungary, Luxembourg, Moldova, The Netherlands, Romania, Russian Federation, Slovakia and Ukraine.

Before the entry into force of the Agreement, updates of the annexed Regulations have been carried out regularly by a Joint Meeting of Experts of the UNECE and CCNR. ADN 2009 is a consolidated version which takes account of these updates and is applicable as from 28 February 2009. 5

4
www
www.ccr-zkr.org/

5
www
www.unece.org/trans/danger/publi/adn/adn_e.html

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C.1.3 EU DIRECTIVES AND THEIR APPLICATION

Over the last 30 years, EU legislation has developed much in terms of environmental protection and improvement. However, as more Directives have been adopted the regulatory requirements have become more complex, and as the Directives have become more holistic (addressing spatial, social and economic development) their implementation has become more complicated. Therefore, a coordinated and harmonised implementation is needed. The figure below shows the links between the WFD, the EIA and SEA Directives, the Public Participation Directive and the Birds and Habitats Directives BH-D). Their objectives to integrate the environment into decision-making, the forms of required assessments and public involvement in decision-making are often very similar.

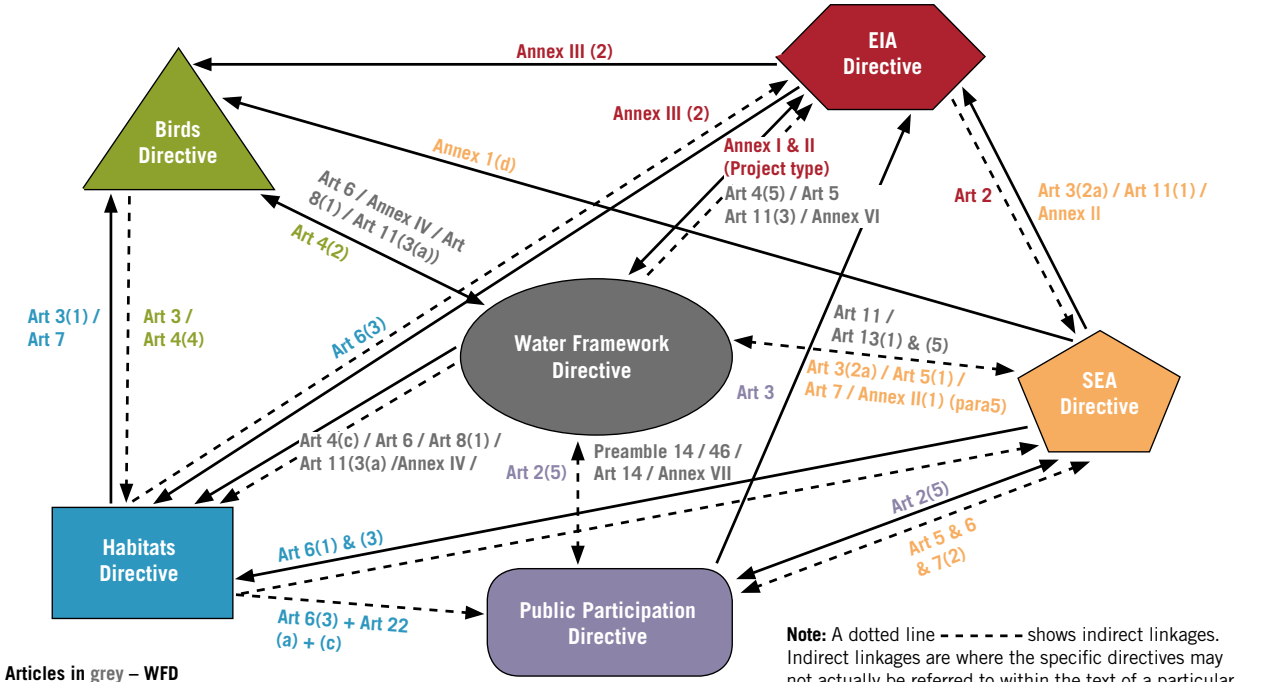
The effectiveness of all directives requires understanding of the application of their complementary and potentially synergistic functions, particularly when they are transposed and implemented in individual Member States.

Some Member States use the transposition of EU directives into national legislation as an opportunity to overcome apparent inconsistencies in definitions between directives. Arrangements for coordination are not in place in many Member States to resolve overlaps and inconsistencies between requirements in different directives. The lack of consistency in methods for measurement, monitoring, calculation, presentation of monitoring results and reporting adds to the administrative burden to all affected: Member States, competent authorities and installations and industry. Efforts to assure national coordination between WFD, BH-D and the implementation of other directives (such as on flood risks) are therefore reasonable.

There are also inconsistencies in the legislative background for the directives' implementation between countries; therefore transboundary assessments have to be well coordinated and harmonised to prevent problems and delays for project approval and implementation.

Some frequently asked questions raised by implementing authorities and stakeholders about the **links between the Water Framework Directive and Nature Directives** (Birds Directive and Habitats Directive) are answered in a new paper prepared by DG Environment expected to be endorsed by the EU Water Directors in 2010 and then developed into a new guidance document.

RELATIONSHIP BETWEEN EU DIRECTIVES THAT ADDRESS THE ENVIRONMENT



Articles in grey – WFD
Articles in blue – Hab. Dir.
Articles in green – Birds. Dir.
Articles in red – EIA Dir.
Articles in orange – SEA Dir.
Articles in violet – Pub. Part. Dir.

Note: A dotted line - - - - - - shows indirect linkages. Indirect linkages are where the specific directives may not actually be referred to within the text of a particular directive, but there are indirect connections in relation to subject matter and/or where the text implies that a particular directive could be considered.
A solid line ——— indicates that a specific directive has been mentioned within the text of a particular directive.

Articles from the **Water Framework Directive**	Articles from the **EIA Directive** (as amended)	Articles from the **SEA Directive**	Articles from the **Public Participation Directive**	Articles from the **Habitats Directive**	Articles from the **Birds Directive**
To **EIA Directive:** • Art. 4(5) – Environmental Objectives • Art. 5 – RBD Characterisation • Art. 11(3) – Programme of measures (POMs) • Annex VI – Measures to be included in POMs To **SEA Directive:** • Art. 11 – POMs • Art. 13(1) & (5) – RBMPs To **Public Participation Directive:** • Art. 14 – Public information & consultation • Annex VII – Contents of RBMPs To **Habitats Directive:** • Art. 4(c) – Environmental objectives • Art. 6 – Register of protected areas • Art. 8(1) – Monitoring • Art 11(3)(a) – POMs • Annex IV – Protected areas: contents of register of protected areas (PAs) To **Birds Directive:** • Art. 6 – Register of protected areas • Art. 8(1) – Monitoring • Art. 11(3)(a) – POMs • Annex IV – Content of register of PAs	To **WFD:** • Annex I – Projects subject to mandatory EIA • Annex II – Projects which may require EIA To **SEA Directive:** • Art. 2 – Application of EIA and `another form of assessment´ To **Habitats Directive:** • Annex III(2) – Screening: case by case examination selection criteria: location of projects To **Birds Directive:** • Annex III(2) – Screening: case by case examination selection criteria: location of projects	To **WFD:** • Art. 3(2)(a) – Scoping: plans & programmes subject to mandatory SEA • Art. 5(1) – Environmental report • Art. 7 – Transboundary consultation • Annex II(1) – Criteria to determine significance of effects To **EIA Directive:** • Art. 3(2)(a) – Scoping: plans & programmes which set the framework for future development consent of projects • Art. 11(1) – Relationship with other Community legislation • Annex II – Criteria to determine significance of effects To **Public Participation Directive:** • Art. 5 – Environmental report • Art. 6 – Consultations • Art. 7(2) – Transboundary consultations To **Habitats Directive:** • Art. 3(2)(b) – Scoping: effects of plan & programmes on sites • Annex 1(d) – Content of environmental report To **Birds Directive:** • Annex I(d) – As above	To **WFD:** • Art. 2(5) – Public participation concerning plans & programmes To **EIA Directive:** • Art. 3 – Amendments to EIA Directive (85/337/EEC) To **SEA Directive:** • Art. 2(5) – Public participation concerning plans & programmes	To **EIA Directive:** • Art. 6(3) – Plans or projects subject to appropriate assessment To **SEA Directive:** • Art. 6(1) – Establishing conservation measures and appropriate management plans • Art. 6(3) – Plans or projects subject to appropriate assessment To **Public Participation Directive:** • Art. 6(3) – Plans or projects subject to appropriate assessment: if appropriate obtain opinion of general public before agreeing to plan or project • Art. 22(a) & (c) – Supplementary provisions: re-introduction of species and re-establishment of favourable conservation status after proper consultation with public & promotion of education an general information To **Birds Directive:** • Art. 3(1) – Conservation of natural habitats and habitats of species: inclusion of special protection areas in natura 2000 Network • Art: 7 – Amendments to Birds Directive: in relation to special conservation areas	To **WFD:** • Art. 4(2) – Protection of wetlands and wetlands of international importance To **Habitats Directive:** • Art. 3 – The preservation, maintenance and re-establishment of a sufficient diversity and area of habitats for all species of bird • Art. 4(4) – Avoidance of pollution or deterioration of habitats or any disturbances

(Source: Collingwood Environmental Planning (CEP), London, UK. The Water Framework Directive, Assessment, Participation and Protected Areas: What are the Relationships? Prepared for the Environmental Protection Agency, Eire.)

C.1.3.1 EU Water Framework Directive

Several EU policies make up the legal framework for water and river basin management in Europe, with the EU Water Framework Directive 2000/60/EC (WFD) the most significant for the protection of surface waters and groundwater. The WFD requires the development of the first river basin management plan for the entire basin by December 2009. For international river basin districts the WFD requires the coordination of international river basin management plans involving non-EU Member States when possible ► WFD Art. 3(4) and 3(5).

In principle, the main environmental objectives of the Directive have to be achieved by 2015 with the implementation of the programmes of measures which inter alia address hydromorphological alterations caused by navigation and other human pressures.

The objective of the WFD is to coordinate all water-related measures at European level, to protect all waters in a holistic way and to achieve 'good ecological and chemical status' 'good ecological potential' in the case of heavily modified water body designation and artificial water bodies) for all surface water bodies by 2015. For groundwater bodies Good Chemical and Quantitative Status has to be achieved. Surface water bodies include streams and rivers, lakes, transition waters (estuaries) and coastal waters which are all part of one river basin as a natural hydrographic unit. For the WFD, 'ecology' refers to both the structure and functioning of aquatic ecosystems. Good Status is derived from the so-called reference condition which reflects a water body status that is near natural and fully functional as an ecosystem.

Setting objectives and necessary measures requires taking into account economic aspects and an intense participation of the public (► ***ch. B.1.7***). The Directive precisely defines how the Good Status of each water body must be achieved in its physical and biological characteristics (i.e. in ecology including structure) as well as in its chemistry.

For each river basin district, a **River Basin Management Plan** (RBMP) 1 had to be prepared by 22 December 2009, and will be updated in six-year planning cycles. The RBMP must include:

- the objectives set for the river basin (ecological status, chemical status and protected area objectives; quantitative status for groundwater bodies) to be reached within the timescale required;
- the results of the analysed river basin characteristics, the impact of human activity on the status of waters in the basin, an estimation of the current status and of the remaining 'gaps' to meeting the environmental objectives (WFD Report from 2005);
- a Programme of Measures designed to fill the gap;
- an economic analysis of water use within the river basin to enable a rational discussion on the cost-effectiveness of the various possible measures;
- the involvement of all interested parties in the preparation of the RBMP.

The WFD's approach for dealing with hydromorphological pressures on the water environment is as follows ► WFD Art. 4(3) – 4(7):

- For **new developments,** there is a need first to prevent deterioration of 'status' in a water body. Where this is not possible, mitigation measures should be applied (WFD Article 4(7) allows failure to achieve no deterioration when specific criteria and conditions are met). Details are provided by the European Commission in the box below.
- For **past developments** where a physical modification has already taken place, actions should first be considered to restore the water body with the aim of achieving 'good ecological status' (restoration). Where restoration is not possible, mitigation measures should be investigated with the aim of meeting 'Good Ecological Potential' (GEP). For more information. 2

1 www

Danube RBMP: www.icpdr.org/icpdr-pages/danube_rbm_plan_ready.htm

Rhine RBMP: www.iksr.org/index.php?id=171&L=3&cHash=455fdab52c

2 www

ec.europa.eu/environment/water/water-framework/index_en.html

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CONDITIONS ESTABLISHED BY WFD ARTICLE 4(7)

Improving the navigability of rivers may cause modifications of the physical characteristics of the surface water bodies concerned. The key clause in the Water Framework Directive (WFD) in relation to such modifications is Article 4(7), which exceptionally allows the deterioration of water status or failure to achieve good water status, provided that certain strict conditions are satisfied. This provision lies at the heart of new sustainable developments in river basins and ensures that water impacts are properly taken into account.

Development of IWT is compatible with the WFD as long as it complies with the provisions therein. It is possible that such projects will be evaluated based in particular on the conditions established in Article 4(7). The EU Member States and the European Commission have agreed on guidance on how to best fulfil the requirements of the WFD when developing IWT [3]. A specific explanation for IWT development and WFD Article 4(7), based on existing guidance, is given here.

WHAT DOES 'ASSESSING THE WATER IMPACTS' MEAN?

In case such modifications are expected, an assessment according to the WFD definition of water status (that comprises a number of quality elements, ▶ WFD Annex V.1.1) should be carried out of the available options. This includes:

- an **assessment of the impacts** of the modification on the quality elements for the classification of ecological status including fish, benthic invertebrate fauna and aquatic flora (plants and algae);
- an **assessment of impacts on other water bodies** than the one in which the project is situated (▶ WFD Article 4(8)) e.g. tributaries;
- in case of several projects in the same river basin, an **assessment of cumulative effects** of the various projects. For example, one hindrance may allow fish to migrate in sufficient quantity, but more blockages may lead to scarcity of fish to the extent that they become extinct in the basin.

An assessment of options could be made directly in the context of the development of the WFD river basin management plans, which would also provide the opportunity to benefit from a broad public consultation (e.g., public hearings in the affected region). If a specific plan for IWT development is made for other purposes, a separate assessment needs to be made and the results will need to be integrated in the river basin management plans. Such a specific plan should undergo a Strategic Environmental Assessment (SEA). In all cases of large infrastructure projects, SEAs and Environmental Impact Assessments (EIAs) are necessary.

WHICH 'STRICT CONDITIONS' HAVE TO BE FOLLOWED?

These WFD Article 4(7) conditions can be summarised as follows:

- All practicable mitigation measures are taken.
- The project is included in the river basin management plan (e.g. ▶ future infrastructure projects reported by countries in the Danube RBM Plan 2009, Annex 7).
- The project is of overriding public interest, i.e. the benefits of the project outweigh the benefits of achieving the WFD objectives.
- There are no significantly better environmental options.

WHAT DOES 'ALL PRACTICABLE STEPS' MEAN?

Practicable steps include steps that are technically feasible, do not lead to disproportionate costs and are compatible with the new modification or sustainable human development activity. In case of IWT, such practicable steps are usually mitigation measures such as the use of other materials (building with gravel instead of concrete), adjusted design of training works, fish by-passes, no cutting of side-arms, no works during the spawning/migration/rearing or the young stages of life of the aquatic communities (fish in particular), etc.

WHAT IF AN IWT DEVELOPMENT IS PLANNED IN THE MIDDLE OF A RIVER BASIN MANAGEMENT CYCLE?

The risk of status deterioration should be assessed at the time a new modification or alteration is being considered. The assessment should be based on the best information available for water bodies whose status is likely to be affected by the proposed project. This means that a modification should be included in the river basin management plan when it is still in the planning stage, and not only when a final consent is reached.
If a modification or alteration is planned in the middle of a river basin planning cycle, the reason for that modification or alteration must be set out in the subsequent (update of the) river basin management plan. In the project's impact assessment, the water status impacts and the coherence and compatibility of the project with the river basin management plan need to be addressed. The required SEA/EIA public consultation taking place in the middle of the river basin management cycle can serve the purpose of WFD Article 14 for this specific modification.

WHEN IS A PROJECT OF 'OVERRIDING PUBLIC INTEREST'?

The two elements of Art. 4(7c) (the reasons are of overriding public interest and/or the benefits to the environment are outweighed by the benefits of the new modifications) can be regarded and assessed together as a unit (no separate assessment requirements). In both cases, Member States should weigh the benefits of the project against the benefits of environmental protection.
Balancing the benefits of the new modifications to the

3

WWW

▶ particularly section 3.5 in circa.europa.eu/Public/irc/env/wfd/library?l=/framework_directive/guidance_documents/documentn20_mars09pdf/_EN_1.0_&a=d

and section 4.2 in circa.europa.eu/Public/irc/env/wfd/library?l=/framework_directive/thematic_documents/hydromorphology/hydromorphology/_EN_1.0_&a=d

foregone benefits of water protection or to the public interest should be done in the very early stages of the project's development. It needs to be taken into account that that the foreseen benefits of the project in the early stage may not be fully achieved when the project is planned in more detail. For example, certain depths or widths of navigation channels may not be feasible to develop because of water or nature legislation. Moreover, balancing the project's benefits with other benefits needs to be an iterative process as more comprehensive information, on the specific river stretch for example, may only become available when the project is planned in more detail.

The 'water costs' (negative benefits) have to be balanced with the potential benefits and other costs (increased use of other natural resources, including global impacts) of the new modifications and alterations to human health, to the maintenance of human safety or to sustainable development. These water costs include:

- those benefits and opportunities foregone as a result of any deterioration of status (loss of biodiversity, loss of ecosystem services such as food provision, water supply, etc);
- those benefits that would be provided if the achievement of good status or good ecological status were not prevented (such as drinking water or food shortages, etc.), in case of failure to reach good status or potential.

This should at least be done qualitatively.

It is the Member State that makes the judgement when balancing the benefits of the new modifications with the foregone benefits, or with the public interest. These judgements will be evaluated in the frame of the river basin management cycles according to the WFD.

WHAT ALTERNATIVES NEED TO BE CONSIDERED?

Alternatives, or better environmental options, should be assessed at an early stage when developing the project, when better alternatives are available. Those alternative solutions could involve alternative locations, different scales or designs of development, or alternative operation processes. Alternatives should be assessed at the appropriate geographical level (EU, national, river basin district) against a clear view of the beneficial objectives provided by the modification.

For navigation infrastructure improvements, it is important to look at the project at the river basin, or even European, scale: it is unreasonable to address one bottleneck on a large river when transport capacity will not increase. Along the same lines, several projects to improve inland waterway transport on the same river cannot be assessed as individual projects. In most cases, different projects on the same river will have cumulative effects, such as for sediment transport and fish migration.

Practical examples of better environmental options are:

- different operations in limited periods when the water level is low (summer);
- specific crossing rules for ships in narrow bends;
- disposal of dredged material back into the system;
- adjustment in the type of structural measure in the river (different type of groynes);
- alternative technical ship parameters (such as vessel shape and construction, radar, new engines with low emissions, no traffic with old vessels risking oil leakage).

Again, these options and their benefits have to be assessed on a case-by-case basis.

Navigation plans and programmes should consider alternatives that would not result in significant adverse impacts on the water environment (e.g. other forms of transport) but in better alternative locations of ship passage, and to practicable steps to mitigate the adverse impact on the water body.

If a number of projects are planned in a river basin, alternatives should be considered at a strategic planning level. Otherwise, better alternatives with no or fewer water impacts may be excluded and the provisions in WFD Article 4(7) may be undermined. In addition, only a strategic approach allows for the consideration of cumulative effects, also taking into account the importance of specific free flowing river stretches and the potential deterioration of their ecological status.

When sound strategic planning is carried out, considering all water impacts and delivering the adequate intensity of development for the river basin and the best choice of interventions, the assessment of better environmental options at project level only needs to refer to the strategic plan as regards those aspects.

Note that the obligation to assess alternatives under WFD Article 4(7d) is distinctly different from the obligation in Article 6(4) of the Habitats Directive. Whereas the latter only calls for the "absence of alternatives" in the development of a project, WFD Article 4(7) explicitly requires that the beneficial objectives served by the project "cannot be achieved by other means which are a significantly better environmental option", therefore requiring the implementation of the best environmental option which is technically feasible and does not entail disproportionate costs.

Source: DG Environment 2009

CASE STUDY: IMPLEMENTATION OF WFD ON GERMAN WATERWAYS

In the light of WFD implementation, transport and environment authorities in Germany have reviewed the existing legal framework for the management of waters along German federal waterways: a total of 4,600 km on all main rivers and some tributaries within the 10 German river basins, including approximately 340 impounding structures. Today, waterway authorities acknowledge their strategic co-responsibility to provide for an environment-friendly waterway management, as stipulated by WFD. The improvement of hydromorphological deficits, notably of structural elements impacted by inland waterway transport, is one of the main objectives of water management, and is the area in 2008 where federal and provincial authorities from both the environment and transport sectors agreed to cooperate.

The German waterway management bodies (7 regional directorates, 39 offices and 7 development offices) provide safe navigation and maintain all waterway infrastructure. According to the Federal Waterways Act, the **planning and execution of transport-related measures must respect nature, the quality of landscape, the self-purification capacity and the water management objectives according to WFD**. As early as December 2007, the Federal Ministry for Transport published an 'Ecology Decree', asking for ecologically oriented transport measures on waterways, as long as transport functionality and economy are not affected. **Since 2009, transport authorities have also accepted responsibility for a WFD-required maintenance of federal waterways.** However, this does not include any responsibility to protect against pollution and floods nor to implement strictly nature restoration measures, as these tasks are the responsibility of environment authorities. **In 2010 the German transport authorities will take over responsibility for preserving and restoring the longitudinal connectivity of federal waterways when required to reach WFD objectives**.

This innovative cooperation of bodies responsible for transport, water management, ecology and nature protection along federal waterways in Germany involves various authorities and stakeholders at several levels, and representatives participating in international river commissions and preparing WFD RBMPs and Programmes of Measures (such as regional agreements on catalogues of measure types suitable to improving the ecology without interfering with transport interests). Transport authorities contribute to the definition of management objectives and integrated management concepts.

As a result of this cooperation, waterway authorities will expand their scope of work, public image and technical competence by becoming responsible for certain WFD measures, such as the restoration of ecological connectivity over dams (fish bypasses), the design of ecological bank protection, the ecological optimisation of fairway structures (groynes) and of sediment management. Nature protection interests and compensation options are being integrated early on into planning, and model measures are being inventoried; long years of monitoring confirm the ecological benefits. For example projects ► ***ch. C.2.2.4***.

The planning and execution of integrated water management concepts by German waterway institutions in close cooperation with environment authorities has proved to be an innovative contribution to WFD implementation (► e.g. Herpertz & Esser 2009).

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C.1.3.2 Birds and Habitats Directives

The Birds Directive (79/409/EC) and the Habitats Directive (92/43/EC) are the two central pieces of EU legislation supporting biodiversity and nature conservation. Their implementation, through the Natura 2000 Network, is the EU's official contribution towards achieving the Countdown 2010 targets under the UN Convention on Biological Diversity. 1

1 www
ec.europa.eu/comm/environment/nature_biodiversity/index_en.htm

The **Birds Directive** (1979) covers all wild birds native to Europe and their conservation at a transnational level. Annex I of the Directive lists those birds whose conservation status is at risk at the European level (other annexes deal with the hunting, killing and capturing of birds). Member States are obliged to define and designate sites for the protection of the birds from Annex I as so-called Special Protection Areas for Birds (SPAs). This site identification may only be done on scientific grounds, i.e. any site which scientifically qualifies should be designated. The European Court of Justice (ECJ) has repeatedly handed down judgments that other considerations, such as not designating a site or part of a site because there were plans to build infrastructure there, were in breach of the Directive.

There was no deadline or time frame for the designation of SPAs. However several ECJ judgments made it clear that countries which failed to designate an adequate spread of SPAs within a reasonable time frame were in breach of their obligations under the Directive. New member states from later accessions (2004, 2007) were required to carry out their SPA designations as part of their accession homework.

Article 4(4) obliges Member States to protect their SPAs against deterioration, pollution and disturbance. Under Article 12 Member States must report to the European Commission every 3 years regarding their national implementation of the Directive, describing not just the state of the SPAs but also other aspects, such as hunting.

When it was adopted in 1979, the Birds Directive was a revolutionary piece of legislation, providing new tools for conservation bodies, especially NGOs, to ensure the protection of important bird habitats in EU Member States and prevent or halt the damage or destruction of these habitats by projects aiming to drain wetlands, intensify agriculture or build infrastructure.

In 1992, the Birds Directive was complemented by the **Fauna-Flora-Habitats Directive**, which covered non-bird species and habitats. This Directive went a step further than the Birds Directive. Its two annexes (I for habitats and II for species) provide the nature values whose conservation status was considered important in a European perspective, notably a number of so-called 'priority species and habitats'.

Member States had to propose sites for designation (proposed Sites of Community Interest, pSCI) covering an adequate proportion of the surface area of the Annex I habitat types and of the populations of the Annex II species in their territory. These MS proposals would be evaluated in scientific seminars per biogeographic region (there are nine across the EU, e.g. the Continental Region surrounds the Pannonian Region in the Danube Basin; the Alpine Region includes the Carpathian Mountains and the Balkan) and if the European Commission considered that certain habitat types or species were not adequately covered by the MS proposals, it could ask for improved designations. The final list of sites was adopted and published as Sites of Community Interest (SCIs).

Member States were then required to take the necessary measures (administrative, legal, technical planning) to ensure proper protection and functioning of these conservation areas as so-called Special Areas of Conservation (SACs) which must be completed within six years of the establishment of the SCI list. Should Member States fail to meet the original timetable, the EU may cut funding. As with the Birds Directive, infringement proceedings and ECJ judgements have given the Commission additional tools to press for the implementation of the Habitats Directive by Member States.

The SCIs of the Habitats Directive and the SPAs of the Birds Directive together make up the **Natura 2000 Network**.

The purpose of the sites in the Natura 2000 Network is "to maintain or, where appropriate, restore the Favourable Conservation Status (FCS) of habitats and species" (Art. 3(1) HD).

The objective for each site within the Network is to achieve and maintain FCS for the habitat types and species for which the site was designated and listed on the Standard Data Form (SDF) which, together with the site map, constitutes the official designation document vis-à-vis the EU.

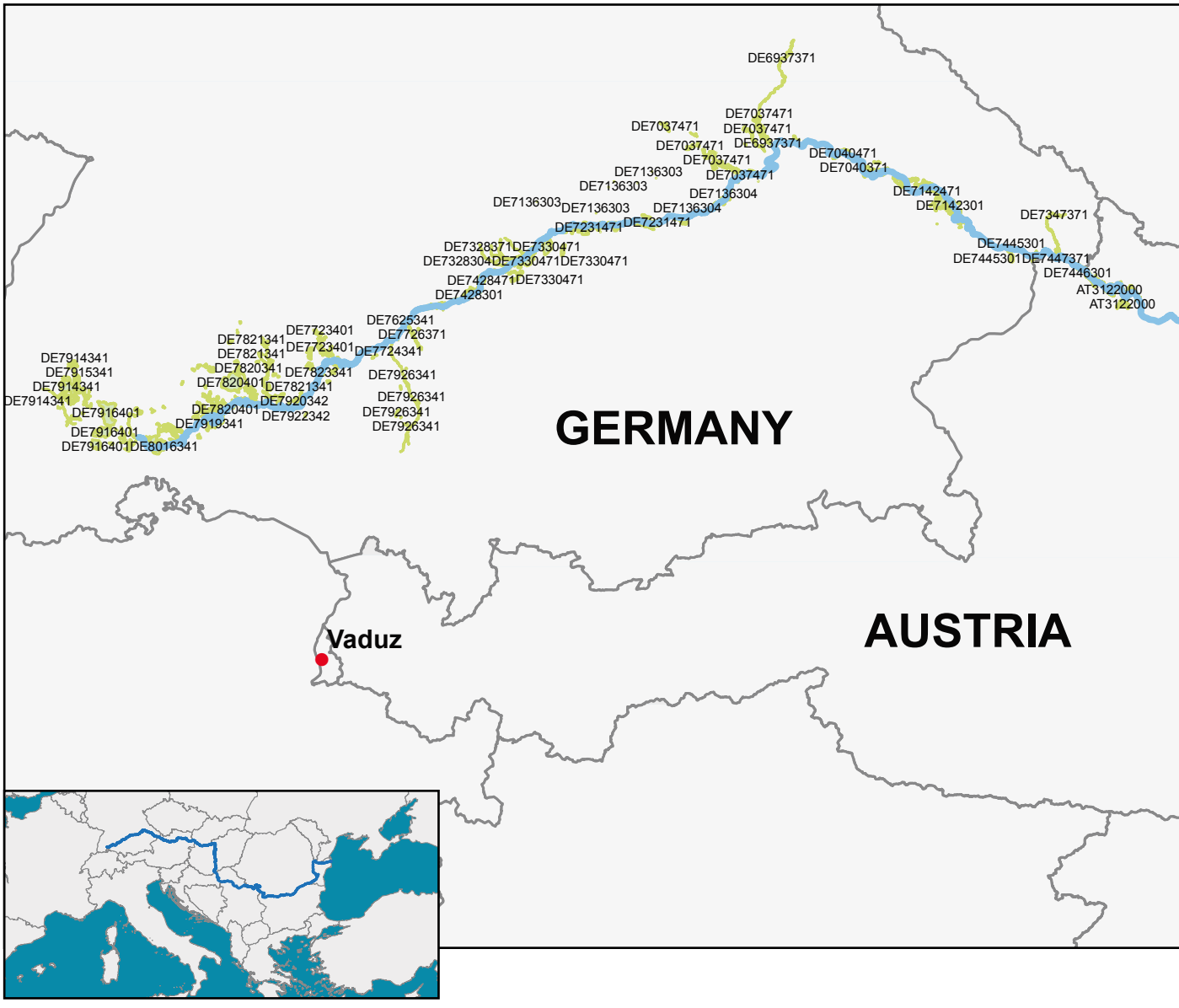
Favourable Conservation Status is defined in the HD for habitat types as "its natural range and the area it covers inside that range are stable or increasing, and the specific structure and functions necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and its typical species have a favourable conservation status" (Art. 1c).

For Annex II species: "Population dynamics data indicate it is maintaining itself on a long-term basis as a viable component of its natural habitat and its natural range is neither being reduced nor likely to be reduced in the foreseeable future and there is, and will likely continue to be, sufficiently large habitat to maintain the population long-term" (Art. 1i).

Under the Birds Directive: "Preserve or re-establish a sufficient diversity and area of habitats for all wild birds native to Europe … maintain their populations … this means the upkeep and maintenance of habitats in accordance with their ecological needs" (Art. 2 & 3).

Consequently, Member States must establish priorities for the maintenance or restoration of their SACs to FCS and for the coherence of Natura 2000, in the light of the threats of degradation and destruction to which the sites are exposed (Art. 4(4) HD). They have a choice of instruments to use (Art. 6(1)), such as management planning.

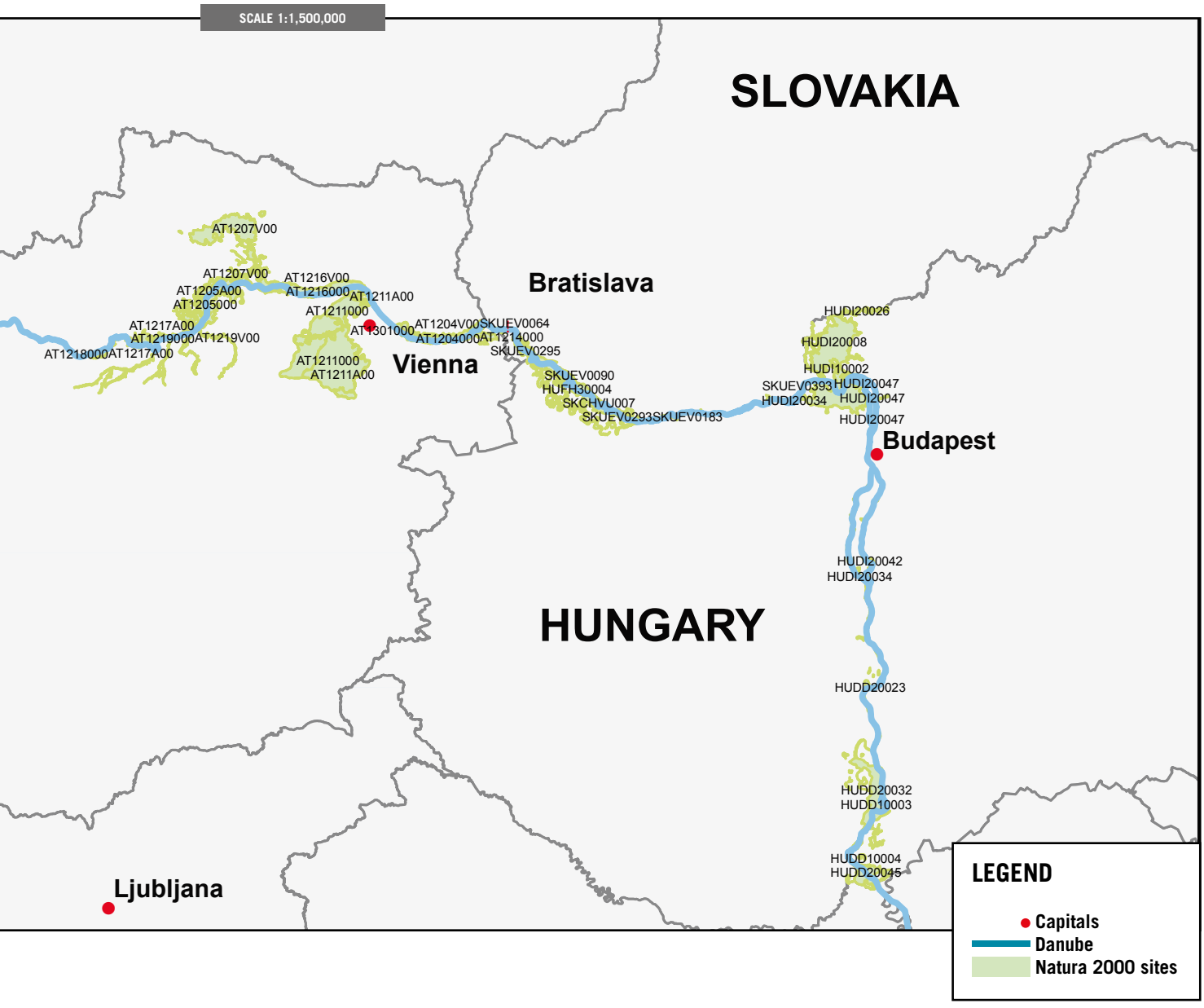
NATURA 2000 SITES ALONG THE DANUBE (STATUS AUGUST 2008)



GERMANY

DE6937371 Naab unterhalb Schwarzenfeld und Donau von Poikam bis Regensburg
DE6938301 Trockenhänge bei Regensburg
DE7040371 Donau und Altwässer zwischen Regensburg und Straubing
DE7136301 Weltenburger Enge' und 'Hirschberg und Altmühlleiten'
DE7136303 Mausohrkolonien in der südlichen Frankenalb
DE7136304 Donauauen zwischen Ingolstadt und Weltenburg
DE7142301 Donauauen zwischen Straubing und Vilshofen
DE7232301 Donau mit Jura-Hängen zwischen Leitheim und Neuburg
DE7233372 Donauauen mit Gerolfinger Eichenwald
DE7243302 Isarmündung
DE7328304 Egau
DE7328371 Nebel-, Kloster- und Brunnenbach
DE7329301 Donauauen Blindheim-Donaumünster
DE7347371 Erlau
DE7428301 Donau-Auen zwischen Thalfingen und Höchstädt
DE7445301 Laufenbachtal
DE7446301 Donauleiten von Passau bis Jochenstein
DE7447371 Donau von Kachlet bis Jochenstein mit Inn- und Ilzmündung

DE7625341 Donautal bei Ulm
DE7724341 Donau zwischen Munderkingen und Erbach
DE7726371 Untere Illerauen
DE7820341 Schmeietal
DE7821341 Gebiete um das Laucherttal
DE7823341 Donau zwischen Munderkingen und Riedlingen
DE7914341 Rohrhardsberg, Obere Elz und Wilde Gutach
DE7915341 Schönwalder Hochflächen
DE7919341 Donautal und Hochflächen von Tuttlingen bis Beuron
DE7920342 Oberes Donautal zwischen Beuron und Sigmaringen
DE7922342 Donau zwischen Riedlingen und Sigmaringen
DE7926341 Rot und Bellamonter Rottum
DE8016341 Baar
DE8017341 Nördliche Baaralb und Donau bei Immendingen
DE7037471 Felsen und Hangwälder im Altmühl-, Naab-, Laber- und Donautal
DE7040471 Donau zwischen Regensburg und Straubing
DE7142471 Donau zwischen Straubing und Vilshofen
DE7231471 Donauauen zwischen Lechmündung und Ingolstadt
DE7243402 Isarmündung
DE7330471 Wiesenbrüterlebensraum Schwäbisches Donauried
DE7428471 Donauauen
DE7723401 Große Lauter auf der Schwzbischen Alb
DE7820401 Südwestalb und Oberes Donautal
DE7916401 Mittlerer Ostschwarzwald
DE8017401 Donautal auf der Baar



AUSTRIA

AT1204V00 Donau-Auen östlich von Wien
AT1205000 Wachau - Jauerling
AT1211000 Wienerwald - Thermenregion
AT1216V00 Tullnerfelder Donau-Auen
AT1218V00 Machland Süd
AT1219V00 Pielachtal
AT3112000 Oberes Donautal
AT1204000 Donau-Auen östlich von Wien
AT1205A00 Wachau
AT1211A00 Wienerwald - Thermenregion
AT1214000 Hundsheimer Berge
AT1216000 Tullnerfelder Donau-Auen
AT1217A00 Strudengau - Nibelungengau
AT1218000 Machland Süd
AT1219000 Niederösterreichische Alpenvorlandflüsse
AT1301000 Nationalpark Donau-Auen (Wiener Teil)
AT3122000 Oberes Donau- und Aschachtal

SLOVAKIA

SKUEV0064 Bratislavské luhy
SKUEV0067 Cenkov
SKUEV0270 Hrušovská zdrž
SKUEV0293 Klúcovské rameno
SKUEV0090 Dunajské luhy
SKCHVU007 Dunajské luhy
SKUEV0393 Dunaj
SKUEV0295 Biskupické luhy
SKUEV0182 Biskupické luhy
SKUEV0183 Velkolélsky ostrov

HUNGARY

HUDI20047 Szigeti homokok
HUDD20023 Tolnai Duna
HUDD10003 Gemenc
HUDD20032 Gemenc
HUDI10002 Börzsöny és Visegrádi-hegység
HUDI20008 Börzsöny
HUDI20026 Ipoly völgye
HUFH30004 Szigetköz
HUDI20034 Duna és ártere
HUDI20042 Ráckevei Duna-ág
HUDD10004 Béda-Karapancsa
HUDD20045 Béda-Karapancsa

NATURA 2000 SITES ALONG THE DANUBE (STATUS AUGUST 2008)

Member States must monitor the evolution of habitats and species in their SACs (Art. 11 HD) and report to the Commission at intervals of six years regarding the level of FCS achieved (Art. 17 HD).

Finally, and this is a key aspect, Member States must avoid deterioration and disturbance of sites which have a significant impact on the achievement and maintenance of FCS (Art. 6(2) HD). This means that all **plans and projects which could have a negative impact on Favourable Conservation Status must be assessed**: if there is a negative impact, alternative solutions must be sought. If these are not possible, the plan or project may only be carried out for 'imperative reasons of over-riding public interest', but then compensatory measures must be taken to ensure the overall coherence of the Natura 2000 Network is maintained. Furthermore, if the negative impact affects a priority habitat or species, the conditions are even stricter: the plan or project can only go ahead for reasons of public health and safety; in all other cases the opinion of the European Commission must be sought (Art. 6(3) & 6(4) HD).

The key document for all biodiversity management aspects is 'Guidance document: Managing Natura 2000 sites (2000)'.

The main **guidance on how to assess plans and projects** is European Commission – Environment DG (2002): Assessment of plans and projects signif-

icantly affecting Natura 2000 sites Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC. 1

Art. 12 and 13 of the Habitats Directive require a **system of strict protection for the animal and plant species** of Annex IV in their (entire) natural range to be established by the Member States. These systems have to prohibit (inter alia):

- all forms of deliberate capture or killing of specimens of these (animal) species in the wild;
- deliberate disturbance of these species, particularly during the period of breeding, rearing, hibernation and migration;
- deliberate destruction or taking of eggs from the wild;
- deterioration or destruction of breeding sites or resting places;

and for the plant species listed in Annex IV:

- the deliberate picking, collecting, cutting, uprooting or destruction of such plants in their natural range in the wild.

These prohibitions are relevant for the planning and approval process for IWT projects and have to then be considered sensibly.

The assessment stages regarding a project's potential impact on a Natura 2000 site are described in the figure below.

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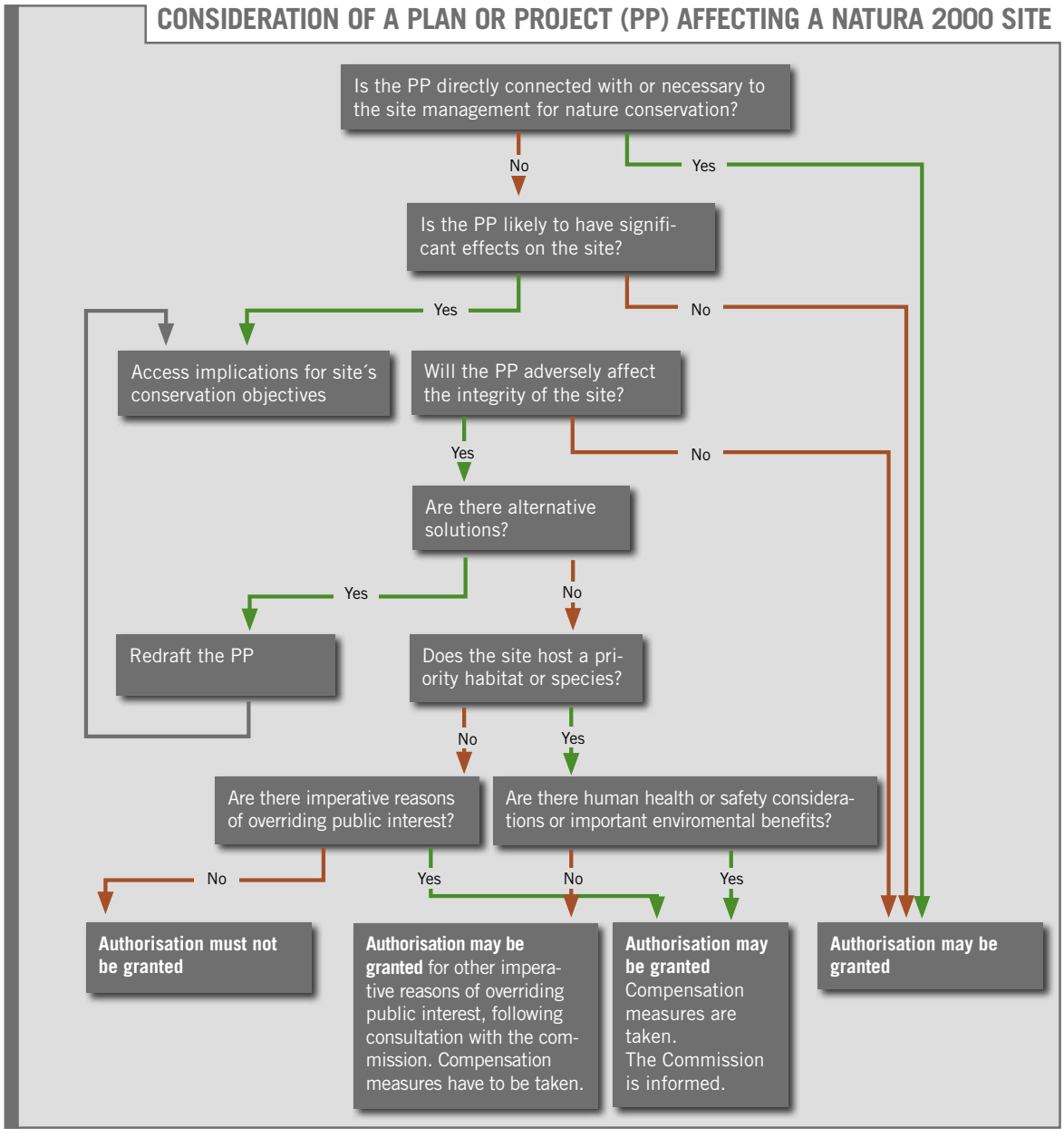
www

All relevant guidance documents are available at ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm#art6



Source: European Commission – Environment DG (2002): Assessment 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

C.1.3.3 Important Bird Areas (IBAs)

Important Bird Areas (IBAs) are those sites where a significant part of bird populations can regularly be found, and where a network of such protected sites effectively ensures the survival of these species across their biogeographical distribution area. The first European-wide IBA inventory with over 2,400 sites was completed in 1989, and in 2000 the revised IBA inventory listed 412 Important Bird Areas in the 10 EU Accession States. **These IBAs serve as a basis for the designation of Special Protection Areas (SPAs) as part of the future Natura 2000 network in the accession countries.** In 1995, BirdLife International and the World Conservation Monitoring Centre found that the EU had failed to assess the potential impact of the Trans-European Transport Networks (TEN-T) in EU countries on IBAs. An assessment of the potential impact of the Transport Infrastructure Needs Assessment (TINA) network on IBAs in the 10 Accession States (BIRDLIFE INTERNATIONAL 2001) found that out of 85 IBAs potentially affected

by TINA developments, as many as 34 IBAs are threatened by waterways (some with internationally important or even globally threatened species) and, more specifically, 19 IBAs potentially affected by the Danube corridor (TINA Corridor VII). This is by far the highest number of IBAs threatened by transport corridors. BirdLife stressed that the TINA network can potentially threaten a very significant part of bird diversity, on both a European and global scale (e.g. Dalmatian pelican). It should be noted that this study lacks complementary information of IBAs in EU Member States (Germany, Austria) and Non-Member States (especially Croatia, Serbia and Ukraine).

BirdLife therefore recommends carrying out a detailed strategic environmental assessment (SEA) of the likely impact of the planned TINA network with special emphasis on existing and future protected areas, especially for the Helsinki corridors no. I, IV, V and VII identified as potentially affecting the most IBAs. BirdLife recommends that international or EU funding for TINA projects leading to the deterioration or destruction of IBAs be halted. The TINA strategy for waterway corridor development should be revised extensively, involving ecologists and considering the requirements of the EU Water Framework Directive.

A recent study (BirdLife 2008: 1 TEN-T and Natura 2000: The Way Forward. An assessment of the potential impact of the TEN-T Priority Projects on Natura 2000) states that more than 1,000 Natura 2000 sites are endangered by the TEN-T network. Some sites are listed in the table below.

BirdLife states that for the TEN-T **Priority Project no. 18** (Rhine/Meuse-Main-Danube inland waterway axis) **a total of 62 SPAs or potential SPAs could be affected** (if potential impacts on Bulgarian and Romanian IBAs are taken into account as a surrogate for potential impacts on SPAs), and for **Priority Project no. 22** (railway axis Athens-Sofia-Budapest-Vienna-Prague-Nuremberg/Dresden) **43 SPAs or potential SPAs could be affected**.

It should be stressed that the BirdLife list is incomplete and focuses mostly on railways: The Green Corridor (ISPA 1 & 2) and the Danube Delta (Bystroe-Kylia channel), with the highest biodiversity, are not included.

BirdLife concludes that if these potential impacts are to be avoided it is essential that strategic and detailed project planning fully integrates Natura 2000 considerations, as is required by European environmental law.

The report refers to some positive examples that demonstrate that this is possible:

- the Article 6(3) **assessment of the German Federal Transport Infrastructure Plan**, which shows that consideration of Natura 2000 at the strategic level via plan level Article 6(3) assessment is feasible and can avoid conflicts, costs and delays at the project stage ► ***ch. C.2.2.4***;
- the integrated water management project on the **Flemish part of the River Scheldt**, which demonstrates that it is possible to plan integrated projects that reconcile transport development with nature and achieve a net gain for Natura 2000 ► ***ch. C.2.2.8***;
- the **Øresund fixed link**, which shows that it is possible to design projects that reconcile transport and environment and minimise impacts on Natura 2000; in this case an International Expert Panel was established which prioritised consideration of environmental impacts and resulted in major changes to the project as originally conceived in response to negative effects;
- the **feasibility study on Rail Baltica railways**, which demonstrates coordinated strategic planning and how environmental assessment can be incorporated.

In a similar preliminary assessment, as part of the process of developing the Joint Statement in 2007, three NGOs (Bund Naturschutz Bayern, IAD and WWF) compiled a list of 119 **'Important Ecological and Landscape Areas along the Danube'** between Bavaria and the delta that would require special care when developing an IWT project or programme. The list is provided in the table below. As the nomination of Natura 2000 and Ramsar sites as well as other protected areas is still under way, this list may have to be updated ► Annex 10, **'List of protected areas', in the Danube River Basin Management Plan** (December 2009).

1
www
www.birdlife.org/eu/pdfs/TEN_T_report2008_final.pdf

IMPORTANT ECOLOGICAL AND LANDSCAPE AREAS ON THE DANUBE

Within the process of developing the Joint Statement (2007), the NGOs Bund Naturschutz Bayern, IAD and WWF compiled the following list of important nature areas that would require special attention and care when developing an IWT project or programme. These sites for habitats and species were selected because they were:

- designated Natura 2000 sites;
- protected areas designated on the national level.

COUNTRIES:

AT – Austria, BG – Bulgaria, DE – Germany, HU – Hungary, HR – Croatia, MD – Moldova, RO – Romania, RS – Serbia, SK – Slovakia, UA – Ukraine

ABBREVIATIONS:

SCI – Site of Community Importance
SPA – Special Protection Area
IBA – Important Bird Area

COUNTRY	TYPE OF VALUABLE RIVER SECTION (IF POSSIBLE)	NAME OF AREA OR NAME OF VILLAGES	RIVER KM (FROM-TO)
UPPER DANUBE			
DE	SCI	Danube floodplains between Straubing and Vilshofen	2,331 – 2,242
DE	SPA	Danube between Straubing and Vilshofen	2,330 – 2,242
DE	Protected landscape ('Landschaftsschutzgebiet')	'Bayerischer Wald', Thurnhof – Reibersdorf	2,318 – 2,315
DE	Protected landscape ('Landschaftsschutzgebiet')	'Bayerischer Wald', Reibersdorf – Bogen	2,315 – 2,307
DE	Nature reserve ('Naturschutzgebiet')	'Vogelfreistätte' Grey Heron Colony near Kleinschwarzach	2,295 – 2,293
DE	Protected landscape ('Landschaftsschutzgebiet')	'Bayerischer Wald', Hundldorf – Metten	2,295 – 2,289
DE	Protected landscape ('Landschaftsschutzgebiet')	'Lower Isar', Fischerdorf (Deggendorf) – Thundorf	2,285 – 2,276
DE	SCI and SPA	Isar Mouth	2,284 – 2,278
DE	Nature reserve ('Naturschutzgebiet')	Isar Mouth	2,284 – 2,281
DE	Protected landscape ('Landschaftsschutzgebiet')	'Bayerischer Wald', 'Old Danube' near Niederalteich	2,279 – 2,278
DE	Nature reserve ('Naturschutzgebiet')	Donaualtwasser Staatshaufen	2,278 – 2,277
DE	Protected landscape ('Landschaftsschutzgebiet')	'Bayerischer Wald', Niederalteich – Winzer	2,276 – 2,264
DE	Protected landscape ('Landschaftsschutzgebiet')	'Bayerischer Wald', Winzer – Hofkirchen	2,263 – 2,258
DE	Nature reserve ('Naturschutzgebiet')	Donaualtwasser Winzerer Letten	2,266 – 2,264
AT	SCI, SPA	Upper Danube and Aschach Valley	2,223 – 2,162
AT	UNESCO	Wachau	2,037 – 2,000
AT	SCI, SPA	Tullnerfeld Danube Floodplains	2,000 – 1,940
AT	SCI, SPA, national park	Donauauen National Park	1,923 – 1,880
AT	UNESCO biosphere reserve	Lower Lobau	Part
AT	Ramsar site	Danube-Morava-Dyje Floodplains	Part
MIDDLE DANUBE			
SK	Ramsar site, nature reserve	Cícov old arm	
SK	Ramsar site, nature reserve	Súr	
SK	Ramsar site	Danube floodplains in Slovakia	
SK	Protected landscape area	The riverside forests in Slovakia	

COUNTRY	TYPE OF VALUABLE RIVER SECTION (IF POSSIBLE)	NAME OF AREA OR NAME OF VILLAGES	RIVER KM (FROM-TO)
HU	SCI, SPA, protected landscape area	Szigetköz	
HU	Protected landscape area	Erebe-szigetek in the Pannonhalmi area, at Gönyű	
HU	National park	Danube-Ipoly National Park, Danube from Esztergom to Budapest	
HU	National park	Szentendre island, part of Danube-Ipoly National Park	
HU	Nature conservation area	Wild Growing place of Rosa santci-andreae, in Szentendre	
HU	UNESCO World Heritage	The bank of the Danube in Budapest	
HU	Nature conservation area	Flood forests of the Háros-island, in Budapest	
HU	SCI	Duna és ártere (Danube and its floodplain)	
HU	SCI	Ráckevei Dunaág (Ráckeve Side-arm)	
HU	Nature conservation area	Islands of Rácalmás	
	SCI	Tolnai Duna (Danube Tolnai)	
HU	National park	Danube-Drava National Park, at Gemenc, Béda, Karapancsa	
HU	Ramsar site	Gemenc and Béda-Karapancsa (part of the Danube-Drava NP), at Baja, Mohács, southern border	
HU	SCI, SPA	Gemenc	
HU	SCI, SPA	Béda-Karapancsa	
HU	Nature conservation area	Loess-wall at Dunaszekcső	
HU	SCI	Szigeti homokok	
HR	Ramsar site	Kopacki Rit Nature Park	
HR	Scientific reserve	Special Zoological Reserve Kopacki Rit	
RS	IBA	Gornje Podunavlje	1,433 – 1,367
RS	Nature reserve	Special Nature Reserve Karadjordjevo	1,325
RS	Nature park	Tikvara	1,305 – 1,297
RS		Begecka Sama	1,282 – 1,277
RS	Nature park	Fruska Gora	
RS	Nature reserve	Special Nature Reserve Koviljsko-Petrovaradinski Rit	1,250 – 1,230
RS	IBA	Kovijlski Rit	
RS	IBA	Dunavski Lesni Odseci	
RS		Veliko Ratno Ostrovo	1,172 – 1,170
RS		Donje Podunavlje (Dubovac-Ram)	1,159 – 1,040
RS	Nature reserve	Special Nature Reserve Deliblatska Pescara	1,091 – 1,077
RS	IBA	Djerdap Gorge	
RO	Nature park	Iron Gates	1,073 – 943
RS		Radujevac	
LOWER DANUBE			
RO, BG, MD, UA	Lower Danube Green Corridor	From the Iron Gates on the border of RS and RO to the Danube Delta	943 – 0
RO	SPA	Gruia – Garla Mare	823
RO	SPA, SCI	Maglavit	810 – 805
BG	SPA, SCI, protected landscape (IUCN category V)	Kutovo Island	802 – 799

COUNTRY	TYPE OF VALUABLE RIVER SECTION (IF POSSIBLE)	NAME OF AREA OR NAME OF VILLAGES	RIVER KM (FROM-TO)
RO	SPA	Calafat – Ciuperceni – Dunare	795 – 743
RO	SCI	Ciuperceni Desa	795 – 743
BG	SCI	Bogdan Island	783
BG	SCI	Bliznaci Island	778
RO	SPA	Bistret Lake	743 – 703
BG	SPA, SCI, managed reserve (IUCN category IV), island with floodplain forest and large bird colony	Ibisha Island	722 – 708
RO	SCI	Danube Floodplain Bistret – Jiu – Corabia	720 – 630
RO	SPA	Jiu – Dunare confluence	700 – 690
BG	SCI	Kozloduy Island	699
RO	SPA	Dabuleni levees	690 – 630
BG	SCI	Ostrov	672 – 660
BG	SCI	Karaboaz	678 – 610
BG	Protected lansdscape (IUCN category V)	Malak Boril Island	645 – 640
RO	SCI	Corabia – Turnu Magurele	630 – 597
RO	SPA	Olt – Dunare confluence	607 – 603
BG	SPA, SCI, nature park (IUCN category V), Ramsar site, natural islands with floodplain forest ecosystem	Persina Nature Park, Belene Islands Complex	599 – 560
BG	Managed reserve (IUCN category IV), part of Persina Nature Park and Ramsar site Belene Islands Complex, vulnerable wetland on the island of Persina	Persina Marshes, Belene Islands Complex	599 – 560
BG	Protected landscape (IUCN category V), part of Persina Nature Park and Ramsar site Belene Islands Complex	Persin Iztok, Belene Islands Complex	599 – 560
BG	SPA	Lakat Island, Belene Islands Complex	589 – 586
RO	SPA	Suhaia Lake	576 – 560
BG	SPA	Svishtov – Belene Lowland	572 – 555
BG	Strict reserve (IUCN category I), part of Persina Nature Park and Ramsar site Belene Islands Complex	Milka Island, Belene Islands Complex	570 – 568
BG	Strict reserve (IUCN category I), part of Persina Nature Park and RAMSAR site Belene Islands Complex	Kitka Island, Belene Islands Complex	568 – 566
BG	SPA, SCI, managed reserve (IUCN category IV)	Vardim Island	547 – 540
RO	SPA, nature reserve	Gasca Islet	540 – 539
RO	SPA	Vedea-Dunare confluence	540 – 539
RO	SCI	Vedea mouth – Saica – Slobozia	540 – 495
BG	SPA, SCI	Batin Islands and Mechka Fishpond	532 – 516
BG	Protected landscape (IUCN category V), part of Batin Islands	Doichov Island, part of Batin Islands	528 – 527
RO	Nature reserve	Cama – Dinu Islands	511 – 505
BG	SCI, protected landscape (IUCN category V)	Aleko-Telikata Islands, near the town of Ruse	480 – 468
RO	SPA	Ostrovu Lung Gostinu	470 – 465
BG	SPA, SCI, protected landscape (IUCN category V), riparian wetlands and Danube islands. Dependent on the water level of the Danube	Kalimok-Brushlen, near the town of Tutrakan	461 – 434
RO	SPA	Dunare – Oltenita	430 – 425
RO	SPA	Oltenita – Ulmeni	430 – 420

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COUNTRY	TYPE OF VALUABLE RIVER SECTION (IF POSSIBLE)	NAME OF AREA OR NAME OF VILLAGES	RIVER KM (FROM-TO)
BG	SPA, SCI, protected landscape (IUCN category V)	Pozharevo Island	428 – 422
BG	UNESCO World Heritage Nature Site, managed reserve (IUCN category IV), Ramsar site, SPA, SCI; the lake is dependent on the water level of the Danube	Srebarna	395 – 389
RO	SPA	Dunare Ostroave	394 – 300
RO	SPA, nature reserve	Ciocanesti Dunare	394 – 390
BG	SCI	Chayka Islands	385 – 384
RO	SPA	Iezer – Calarasi	375 – 370
RO	SPA	Borcea Arm	370 – 239
RO	SPA	Bugeac Lake	360
RO	SPA	Oltina Lake	340
RO	SPA	Dunareni Lake	330
RO	SPA	Vederoasa Marsh	315
RO	SPA	Dunare canarale Harsova	260 – 255
RO	SPA, SCI	Dunarea veche Macin Arm	240 – 160
RO	Nature reserve, Ramsar site, biosphere reserve, SPA, SCI	Small Braila Island	235 – 205
RO	SPA	Macin – Niculitel	160 – 100
RO	SPA	Lower Siret Floodplain	
RO	SPA, nature park	Lower Prut Floodplain	
MD	Ramsar site	Manta Lakes	
DANUBE DELTA			
RO&UA	Biosphere reserve	Danube Delta Biosphere Reserve	
RO	UNESCO World Heritage Nature Site	Danube Delta in Romania	
UA	Ramsar site	Kugurluy liman	
UA	Nature reserve, Ramsar site	Izmail Islands	
UA	Ramsar site	Kartal Lake	

C.1.3.4 SEA and EIA procedures

The **Environmental Impact Assessment (EIA) Directive** (85/337/EEC) ensures that environmental consequences of projects are identified and assessed before authorisation is given. The EIA Directive outlines which project categories will be made subject to an EIA, which procedures will be followed and the content of the assessment.

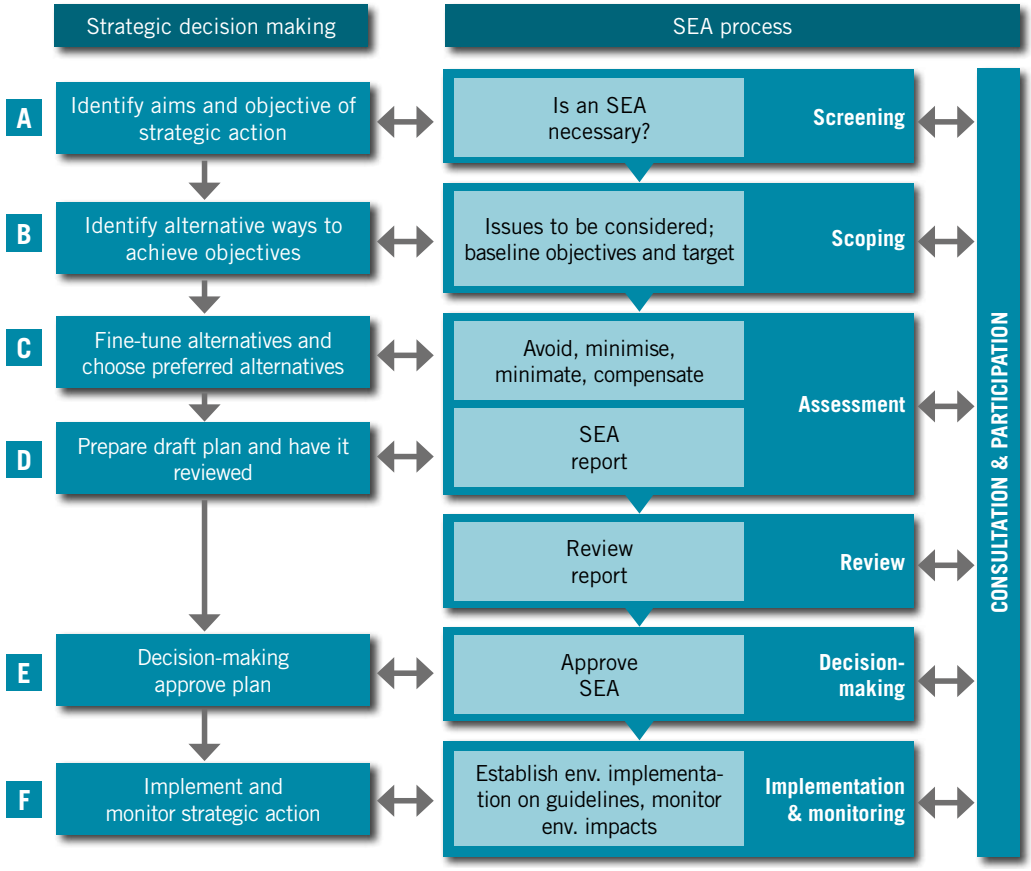
The **Strategic Environmental Assessment (SEA) Directive** (2001/42/EC of the European Parliament and of the Council of 27 June 2001) refers to the effects of certain plans and programmes on the environment. Its purpose is to ensure that environmental consequences of certain plans and programmes are identified and assessed during their preparation and before their adoption. The public and all authorities concerned can give their opinion and all results are integrated and taken into account in the course of the planning procedure. The SEA Directive contributes to more transparent planning by involving the public and integrating environmental considerations.

For the effective application of the SEA Directive, a **Transport SEA Manual** was prepared within the BEACON project. This SEA sourcebook on transport infrastructure plans and programmes elaborates on the procedural stages to be followed and impacts to be addressed, the tasks to be fulfilled in specific strategic situations and the use of suitable methods and techniques. The manual illustrates the overall structure of the SEA process, followed by the detailed description of each individual SEA task, and finally presents practical and operational information drawn from examples and previous experiences. The figure below presents a good practice model, reflecting SEA Directive requirements, in which strategic decision making stages are linked to an SEA process.

www

Further details on the directives, on the Commission's guidance on the implementation of Directive 2001/42/EC and on the EIA Directive are available on ec.europa.eu/comm/environment/eia/home.htm

KEY STRATEGIC DECISION MAKING STEPS AND PARALLEL SEA STAGES



The planning steps during an SEA process (from Beacon 2005: The SEA Manual – a sourcebook on strategic environmental assessment of transport infrastructure plans and programmes)

ELEMENTS ON APPLICABILITY OF SEA FOR NAVIGATION PLANS AND PROJECTS

As IWT plans and projects have environmental implications, there is a need to carry out environmental assessments before decisions are made. This is required by the Strategic Environmental (SEA) Directive (2001/42/EC) for qualifying plans, programmes and policies and required by the Environmental Impact Assessment (EIA) Directive (85/337/EEC) for qualifying projects. Under these procedures, the public can give its opinion and results are taken into account in the authorisation procedure for the projects (► ***Joint Statement 2007***).

Plans and programmes that will undergo SEAs are "plans and programmes, including those co-financed by the European Community, as well as any modifications to them:

- which are subject to preparation and/or adoption by an authority at national, regional or local level or which are prepared by an authority for adoption, through a legislative procedure by Parliament or Government, and
- which are required by legislative, regulatory or administrative provisions" (Article 2(a) of the SEA Directive).

According to Article 3(2), an SEA will be carried out for all plans and programmes (a) which are prepared for …transport, water management, tourism, town and country planning or land use and which set the framework for future development consent of projects listed in the annexes of the EIA Directive; and (b) which have been determined during the screening procedure by the competent nominated authorities to require an assessment pursuant to Article 6 or 7 of the Habitats Directive (92/43/EEC).

In addition, for other plans and programmes than those above-mentioned that set the framework for future development consent of projects (meaning projects for which the EIA Directive is applicable), a screening by the competent nominated authorities is needed to determine if they are likely to have significant environmental effects. If so, an SEA is needed.

The types of plans and programmes that may include IWT projects are, in principle, very diverse. They range from river basin management plans to specific IWT plans, general transport plans (or master plans), regional development plans, operational programmes co-financed by the EC, land use plans, etc. Some of them fulfil all characteristics of the Article 2(a) definition and are also included in the sectors listed under Article 3(2), which leads to a clear requirement for an SEA to be carried out. Others may not fully fit all the characteristics. For instance, the plan or programme may be a voluntary one, which is not required by any act and which is not approved through a legislative procedure.

For plans and programmes affecting the environmental objectives of the EU Water Framework Directive (WFD), the evaluation in accordance with Art. 4.7 could be incorporated into the SEA process (at the stage of the preparation of the 'environmental report' required under Art. 5 of the SEA Directive).

Even when a formal SEA is not required (some of the above-mentioned conditions are not fulfilled), the assessment of whether the criteria and conditions set out in WFD Article 4(7) are met, needs to be carried out in the planning stage, when better environmental options are still available (► ***CIS guidance on exemptions 2008***).

For plans and programmes for which an assessment is required under Article 4(7) WFD and/or under Article 6 of the Habitats Directive, it is advisable that an integrated SEA is carried out, including all the specific types of assessments required by the different legal provisions (WFD, Habitats and SEA Directives). This is particularly relevant since at the SEA stage an assessment of alternatives can be made comprehensively, and in an early planning stage (before wasting effort in project definition and preparation). Assessing alternatives is a strong requirement of the three directives (WFD, Habitats and SEA). A proper assessment of alternatives could serve further EIA procedures for the specific projects, and potentially lead to a smoother EIA process on the basis of the alternative selected during the SEA.

If a project-by-project approach is taken (for projects affecting environmental objectives or Natura 2000 sites and not decided on or incorporated at plan level), the EIA made at project level may not allow for the examination of all available alternatives (e.g. different operation schemes or different types of structural measures) and would disregard cumulative effects on the water environment in the same river basin or on protected Natura 2000 sites. This would most likely represent a breach of the EIA, WFD and, possibly, Habitats Directives. Therefore, if a plan or programme does not exist and an SEA was, therefore, not carried out, the EIA should include a broad examination of alternatives and an appropriate assessment of cumulative effects.

A practical difficulty that may be encountered in carrying out a proper assessment of alternatives and cumulative effects at project level is that the beneficiaries of the specific projects may be different; projects may be developed in different stages for reasons of public procurement or capacity; projects may be developed at the local level without a good overview of regional or river basin conditions. So, from both practical and environmental points of view, it is highly advisable to carry out an SEA first on a strategic level, followed by an EIA on a specific project level.

There may be an overlap between the SEA and EIA, and the procedures can be combined when:

- large projects are made up of sub-projects, or they are of such a scale to have more than local significance;
- the plans or programmes when adopted or modified set binding criteria for the subsequent consent for projects.

www

► report on relationship between SEA and EIA: ec.europa.eu/environment/eia/pdf/final_report_0508.pdf

Source: DG Environment 2009

C.1.3.5 Combined EIA process

As a result of the more complex legal requirements for environmental impact assessments of infrastructure projects, a combined EIA process (general EIA, the WFD's Art. 4(7) and the BH-D's Nature Impact Assessment) is suggested.

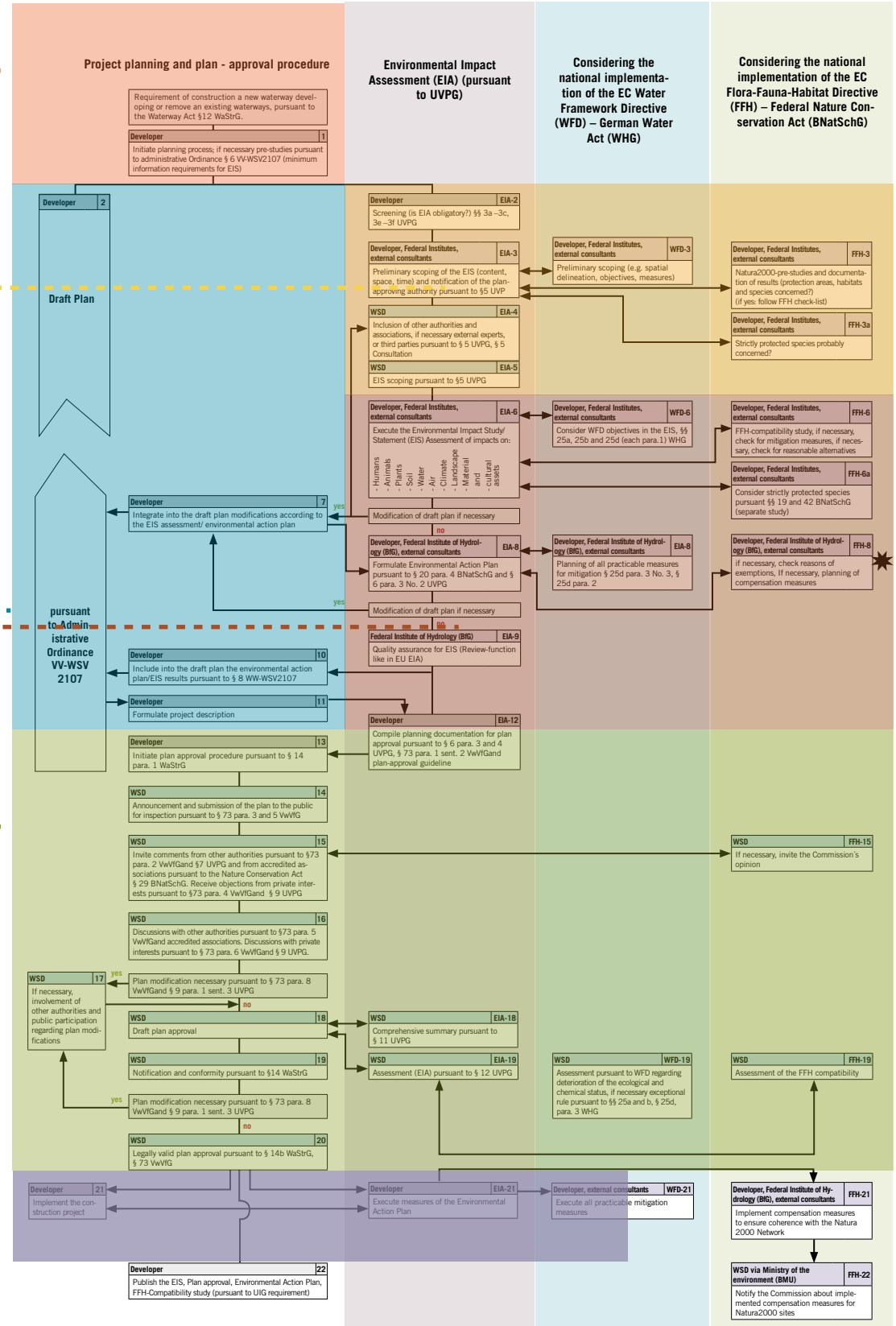
The German Federal Institute of Hydrology (BfG), a think tank of the German Federal Ministry of Transport, has prepared a 'Guideline for EIA on Federal Waterways' (BMVBS 2007: Leitfaden zur Umweltverträglichkeitsprüfung an Bundeswasserstraßen; in German).

German IWT development projects are based on the Federal Infrastructure Plan, which results from strategic planning at the federal level and is regularly amended. These projects are subject to cost-benefit analysis and environmental risk analysis.

The instruments detailing the plan approval procedure for IWT projects include the administrative ordinance Guidelines for Planning Procedures for the Development and New Construction of Federal Waterways. After their review, these guidelines reflect certain EU directives (EIA/SEA, Birds, Habitats and Water), with the result that projects modifying an existing navigation channel will be subject to a plan approval procedure, including an integrated EIA.

The following **EIA procedural flow charts** show the German plan approval procedure (Planfeststellungsverfahren) indicating the main steps and detailed activities. It presents the responsibilities of various waterway and shipping authorities for IWT projects, including necessary assessments regarding the EU Birds, Habitats and Water Framework Directives.

FLOWCHART OF MAIN STEPS IN THE EIA PROCESS IN GERMAN IWT PROJECTS *(BfG 2009)*



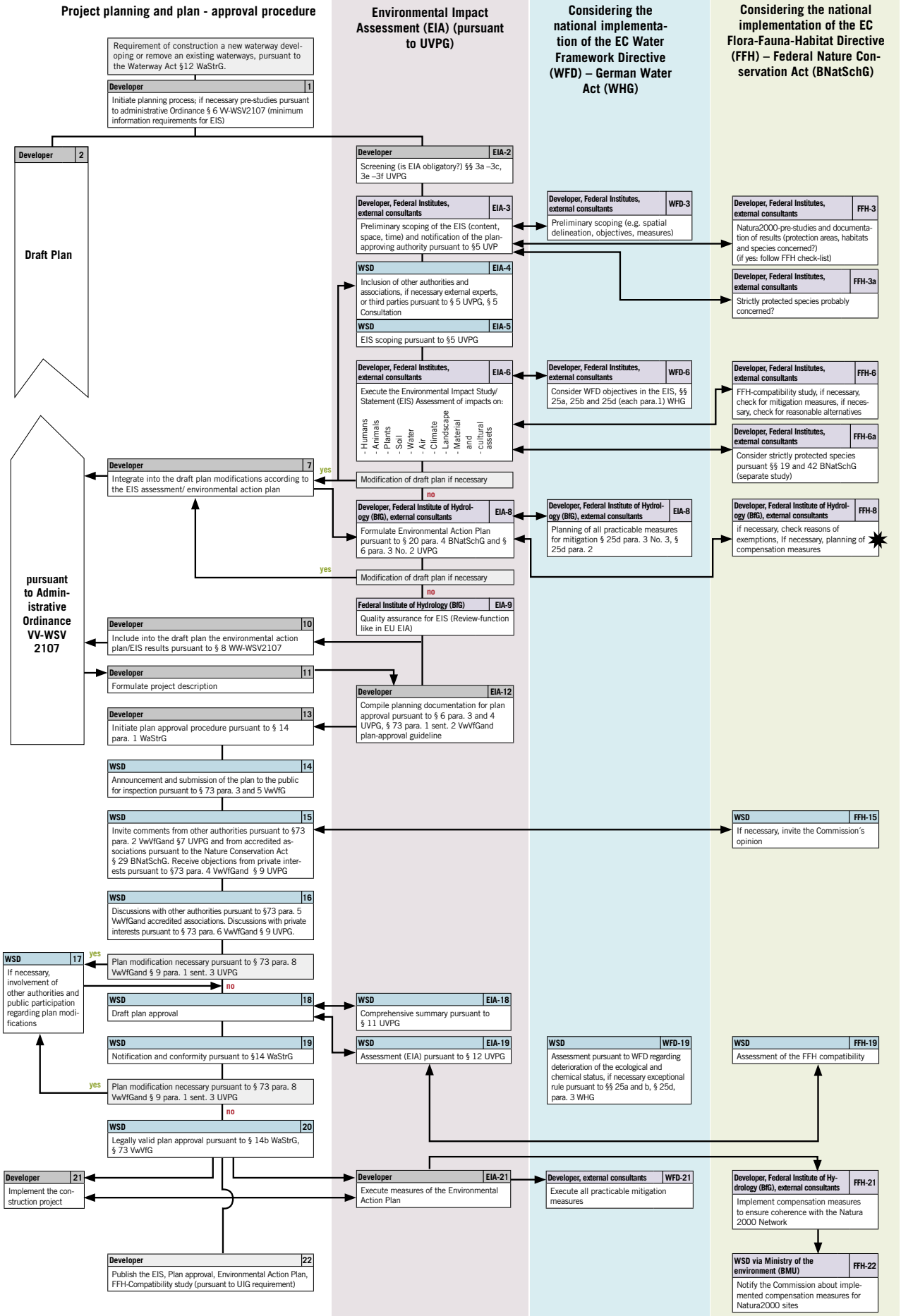
LEGEND:
BNatSchG - *Federal Nature Conservation Act*
UIG - *Freedom of Environmental Information Act*
UVPG - *Environmental Impact Assessment Act*
VwVfG - *Administrative Procedures Act*
WaStrG - *Federal Waterways Act*
WHG - *Water Act*
VV-WSV - *Administrative Ordinance of the Federal Waterways and Shipping Administration*

Developer in the German Federal Waterways and Shipping Administration (WSV):
- *Waterways and Shipping Offices (WSÄ)*
- *Offices for Waterway New Construction (Neubauämter)*

Plan-approving Authority in the German Federal Waterways and Shipping Administration (WSV) are the Waterways and Shipping Directorates (WSD)

✸ The protection of species following FFH-Directive and BNatSchG is an independent issue of the EIS and the Environmental Action Plan

DETAIL FLOWCHART FOR THE INTEGRATED EIA PROCESS *(BfG 2009)*



Legend: see page 75

C.1.3.6 Flood Risk Directive

Directive 2007/60/EC [1] on the assessment and management of flood risks, which entered into force on 26 November 2007, requires Member States to determine if water courses and coast lines across the whole territory of the EU are at risk from flooding, to map the flood extent and assets and humans at risk in these areas and to take adequate and coordinated measures to reduce this flood risk. This Directive also reinforces the rights of the public to access this information and to participate in the planning process.

The Directive is a response to the series of major and catastrophic flood events between 1998 and 2006, including the floods along the Danube and Elbe Rivers and very high economic damage.

The Directive aims to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. After carrying out a preliminary assessment by 2011 to identify the river basins and associated coastal areas at risk of flooding, the Directive then requires Member States to draw up flood risk maps for such zones by 2013 and establish flood risk management plans focused on prevention, protection and preparedness by 2015.

As also addressed in the CIS Guidance document EC 2006a (► ***ch. C.2.2.1***), the Flood Directive should be carried out in coordination with the WFD, notably the flood risk management plans and river basin management plans, and the public participation procedures in the preparation of these plans. All assessments, maps and plans prepared should be made available to the public.

Member States must furthermore coordinate their flood risk management practices in shared river basins, including with third counties, and in solidarity should not undertake measures that would increase the flood risk in neighbouring countries. Member States should take into consideration long term developments, including climate change, as well as sustainable land use practices in the flood risk management cycle addressed in this Directive.

C.2 REFERENCES FOR INTEGRATED PLANNING

C.2.1 EXPLANATION AND ILLUSTRATION OF THE JOINT STATEMENT AS A NEW COMMON STARTING POINT

Discussions on the protection of the Danube's natural landscape and the improvement of inland waterways have intensified since 2007. These discussions have led to agreements on planning principles at an international level that are intended to guide future actions to reconcile what might appear to be conflicting interests. The experience of planning the Integrated River Engineering Project (FGP) east of Vienna has served as the basis for an international dialogue, and this dialogue has become necessary as a number of new waterway extension and maintenance projects along the Danube have been proposed and have created potential conflict with the EU Water Framework Directive (WFD) and other EU environmental law.

The International Commission for the Protection of the Danube River (ICPDR, Vienna), together with the Danube Commission (Budapest) and the International Sava River Basin Commission (ISRBC, Zagreb), initiated an international dialogue in 2007 to create a basis for improving navigation and protecting the natural landscape and water quality of the Danube at the same time. After an intensive one year discussion process, the result was the Joint Statement on Guiding Principles for the Development of Inland Navigation and Environmental Protection in the Danube River Basin. The Joint Statement provides guiding principles and criteria for the planning and implementation of waterway projects that reconcile the conflicting interests of navigation and the environment. Through the endorsement of the ICPDR, DC and ISRBC, the countries of the Danube Basin have committed to using these principles in future project planning thus creating a new common basis for the sustainable use of the Danube River.

The Joint Statement is internationally recognised as a milestone for the development of the Danube region and an example of similar areas in Europe. For the first time, a common discussion and planning platform was created to address the potential conflict between waterway development and environment protection.

www 1
ec.europa.eu/environment/water/flood_risk/implem.htm

The Joint Statement assists in the prevention of conflicts and the creation of integrated solutions. Its application provides planning security for new infrastructure projects.
This manual also serves to explain and illustrate the key elements of the Joint Statement that can be applied in the Danube region and elsewhere in Europe.

C.2.2 SIMILAR PLANNING CONCEPTS FOR WATERWAY DEVELOPMENT

The Joint Statement was developed at a time when a number of guidance documents were published by the European Commission, PIANC and German authorities. They illustrate the importance of integrated planning and how to achieve it.

C.2.2.1 The EC approach – CIS guidance

Under the Common Implementation Strategy (CIS) for the WFD, the European Water Directors and the EC published 'Policy Paper – WFD and Hydromorphological pressures' (EC 2006a) in 2006, addressing the risk of conflict between other EU policies (hydropower, navigation and flood defence) and WFD. As hydromorphological pressures and impacts are some of the most important risks of failing to achieve WFD objectives, the paper addresses the three main hydromorphological driving forces identified in the WFD risk analyses: hydropower, navigation and flood protection. This situation entails promoting further integration between different policy areas at various levels:

- At the **policy development level** one major path of progress is increased transparency in decision making. This means there is transparency not only in data and procedures, but also in economic considerations (notably external costs due to pollution, physical alteration, habitat degradation or benefits).
- At the **planning and programming level** decisions made for geographical areas or whole sectors should be based on coordination and integration between different sectoral plans. This can be achieved by proper application of the SEA Directive, early development of common visions for certain areas and through involving all concerned authorities and stakeholders.
- Recommendations at the **project level** focus on the assessment of impacts and needed mitigation measures. Technical solutions that do not cause deterioration of status should be promoted, and **win-win situations can be achieved** for already deteriorated aquatic ecosystems, **if new projects are also designed to improve the ecosystems concerned**. Moreover, proper application of the EIA Directive and, if appropriate, WFD Article 4(7) are important at this level.
- At the **policy, planning and project levels**, dialogues and cooperation processes between the different competent authorities and organisations, experts and stakeholders contribute to better policy integration in the field of hydromorphology. This integration should take place with regard to the WFD stages of prevention, restoration and mitigation.

The Common Implementation Strategy (CIS) Policy Paper, for WFD, linking to the EC Communication NAIADES (2006) on the promotion of inland waterway transport includes an 'Integrated action programme for the development of this transport mode'. Part V of the action programme relates to the waterway infrastructure and proposes, among other things, the initiation of a European Development Plan for improvement and maintenance of waterway infrastructures and transhipment facilities to **make trans-European waterway transport more efficient while respecting environmental requirements**. The Communication underlines that the **development of waterway infrastructure should happen through coordination and integration,** by fostering the mutual understanding of multipurpose use of waterways to **reconcile environmental protection and sustainable mobility**.
The CIS document stresses that different policies do not always have to cause conflict and there is room for significant progress in policy integration. Promoting more integrated development strategies will require efforts and acceptance from all parties involved.
When required, **infrastructure owners, users or developers** – mitigating the impacts of existing and new equipment and activities – **will not only have to investigate and apply good practices, but may also need to develop alternatives to traditional solutions** to prevent deterioration. In certain cases, they will have to accept the modification of activities or infrastructure to restore ecological continuity and aquatic ecosystems.

Achieving a good balance between protection and uses of waterways will also require modifying the infrastructures for the restoration of the aquatic ecosystems where possible. Indeed, single mitigation measures at the scale of individual infrastructures might be insufficient in certain situations to maintain overall ecological quality.

The CIS document's **specific recommendations for navigation and ports** are given via the PIANC guidelines for sustainable inland waterways and navigation 2003, which **suggest an integrated approach for inland and maritime water transport design** that is relevant for WFD implementation, and offer important ideas for policy integration.

The CIS Policy Paper states that **coordinating the development of inland navigation strategies with river basin management plans is logical** and provides the necessary basis for addressing conflicts between the two policies. **At the transboundary level, international commissions for navigation and for river protection (such as for the Rhine and Danube) should use their mandates and actively support this integration.**

The PIANC guidelines suggest that current development methods include taking the necessary measures to reconcile the requirements of various uses. The overriding aim has become planning for the future with a strict regard for sustainable development. Within the context of these new methods, it is important that **new projects be assessed with consideration for the main natural functions of river systems; in other words that they ensure maintenance of the key functions and ecological functions**, including:

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

Maintaining these processes does not mean that any changes must be prohibited, but rather that each process is carefully examined, that 'before' and 'after' situations are assessed accurately, and that all possible consequences are considered with respect to the economic or other benefits derived from project implementation. This **overall assessment must be carried out not just at the local level, but also for the river basin as a whole**. The assessment of waterway schemes (from the ecological, economic and social standpoints) should be carried out for the scheme as a whole, rather than for its individual components, considering all alternatives and taking into account river basin management objectives.

Navigation can be a sustainable means of transport if the environmental requirements are properly considered; emissions to air and aquatic environments should be diminished. In some situations vessels can be adapted to the conditions of particular rivers, rather than the waterways adapted to common standards and designs. Measures to achieve needed depth, clearance, width or velocity can be designed to minimise impacts on important waterway functions or to restore lost ecological functions, or to implement strategies against the spread of invasive species. These measures can be modified to provide environmental enhancements.

Financing institutions and governments need to ensure that the full environmental and social costs and the long-term effects of proposed waterway schemes are included in cost-benefit analyses. **Affected parties must fully participate in the decision-making process for waterways.** This includes actively participating through the entire project cycle, from identification and preparation to implementation and evaluation. Therefore, a legal and institutional framework for civil society participation at the national and local levels must be established, and local participation in decision-making is therefore essential. Participation is not merely a set of formal requirements but also cost-effective for the long-term sustainable use of rivers as transportation ways.

Effective participation calls for full access to information, a time schedule appropriate to local social and cultural conditions and adequate resources. It also requires empowerment (i.e., capacity building by education and technical assistance) to enable citizens and organisations to assert their rights and interests in the process.

C.2.2.2 The new PIANC position: 'Working with Nature'

The World Association for Waterborne Transport Infrastructure (PIANC) is one of the global players in waterway transport. As "the leading partner for government and private sector in the design, development and maintenance of ports, waterways and coastal areas", PIANC organises numerous expert events, produces important studies, technical reports and guidelines about a broad range of waterway-related issues. This includes Report 107 (2009) 'Sustainable waterways within the context of navigation and flood management', and Report 99 (2008) 'Considerations to reduce environmental impacts of vessels'.

In October 2008, PIANC Environment Commission published a brief Position Paper 'Working with Nature' that provides a number of important findings and statements for this manual.

PIANC (2008)

- **Working with Nature is an integrated process** which involves identifying and exploiting 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 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 – 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.
- Fundamentally, therefore, **Working with Nature** means doing things in a different order:
  1. establish project need and objectives
  2. understand the environment
  3. make meaningful use of stakeholder engagement to identify possible win-win opportunities
  4. 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;
  - identifying mutually beneficial solutions rather than simply minimising ecological harm.
- **Working with Nature** considers the project objectives firstly from the perspective of the natural system rather than from the perspective of technical design.
- **Working with Nature** represents a real opportunity for all future navigation-related developments. PIANC acknowledges that a concerted effort will be required to raise awareness of the concept and the benefits it offers. All parties potentially involved in development projects will need to be engaged in the transition: port and navigation authorities, governments and regulators, project developers, local communities and environmental stakeholders. Some will undoubtedly find it difficult to accept or will be reluctant to accept the new way of thinking. Perseverance and patience will be vital. PIANC is convinced that Working with Nature is essential to future, sustainable, port and navigation development.

WWW

This paper was also endorsed by CEDA (Central Dredging Association). The full PIANC document can be downloaded from their website www.pianc.org.

C.2.2.3 Austrian waterway development policy (ecological measures)

In 1985, the Austrian waterway administration (then called 'Wasserstraßendirektion' – WSD) began to undertake related ecological improvement measures. Since 2005 the new waterway management and development company 'via donau – Österreichische Wasserstraßengesellschaft' 1 has continued these ecological activities.

The legal base for these activities is laid down in the Austrian Waterways act (2005) and requires to:

(§ 2) 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;

(§ 3) 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).

Furthermore, all obligations related to the Water Act (1995, later amended to implement the WFD) apply to the Danube, March und Thaya.

The number of ecological restoration projects carried out by the Austrian waterway administration increased significantly since the 1990s, including the reconnection of old side branches at the Danube River between Vienna and Bratislava, which became the 'Danube Floodplains National Park' in 1996. Furthermore the ongoing 'Integrated River Engineering Project on the Danube East of Vienna' aims to improve the navigability of the Danube and at the same time to restore and preserve the Danube Floodplain National Park (► ***the box on pages 82-83***).

One of the first measures completed together with the National Park was a river bank restoration project near the city of Hainburg, which was awarded one of the best LIFE projects of Europe in 2008 by the European Commission's DG Environment.

Ecological measures have also been undertaken in the free-flowing section of the Austrian Danube, the Wachau. These measures include the restoration of valuable gravel structures (islands within the river) and large-scaled reconnections of side branches. In addition, the LIFE+ Project 'Mostviertel-Wachau' is currently under way in the Wachau (in cooperation with the province of Lower Austria) to reactivate old Danube branches near Schallemmersdorf and Schönbühel.

Other ecological activities have been undertaken on the Upper Austrian stretch of the Danube, which is characterised by a series of hydro-power plants and impounded river stretches. In these backwater areas, ecological measures have been carried out to restore riverbanks (dismantling of old bank protections) since the 1980s.

1 www www.via-donau.org/en/

© via donau

Pilot Project Thurnhaufen – bank armouring before construction work.

Pilot Project Thurnhaufen – renaturated river bank after the construction work. The project was awarded the prize for Best Life Nature Project 2007-2008.

THE PLANNING PROCESS WITHIN THE INTEGRATED RIVER ENGINEERING PROJECT ON THE DANUBE EAST OF VIENNA

The planning process of the Integrated River Engineering Project on the Danube East of Vienna (IREP) is a showcase for the development of a sustainable waterway planning approach. Essential results of this manual are based on the experiences gained while planning this project.
The Austrian Federal Ministry of Transport, Innovation and Technology together with via donau (the Austrian Waterways Authority) initiated an integrated expert process for the IREP to improve the nautical and ecological conditions on this section of the Danube. The project balances the interests of inland navigation with the environmental needs of the Danube Floodplains National Park.
The joint process started from the fact that the free-flowing section of the Danube downstream of Vienna has long since been subject to river bed degradation (erosion, 2 to 3.5 cm per 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 hinder reliability and competitiveness of inland navigation in this section.
A chain of hydropower plants upstream of the project area, river regulation and bank protection measures have reduced former morphodynamics in this river reach and floods lead to sedimentation of side channels and the inundation area. These ecological deficits worsen the quality of habitats and species of the national park.
On the other hand, the complex and often diverging interests of navigation and ecology, as well as other groups like hydropower companies, have prevented sustainable solutions in recent decades that would satisfy all interests acceptably.

1 Model
Example of an integrated planning process

The IREP planning process 1 brought forward many interesting points (its current status is reflected from various points of view in the publication OIAZDI 2009) and 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. This group incorporated the four functions described in chapter B.2 of this manual. The ISG analysed in detail several alternatives and some **11 different variants for developing the Danube section** east of Vienna. The ISG excluded all alternatives that could not be agreed or that were legally impossible to realise (such as building a new hydropower plant in the project area). Then several scenarios of the selected alternative were discussed intensively and improved on over several years.

2 Model
Example for IWT project planning principles

- In parallel to these discussions, a **wider stakeholder involvement process** was carried out to reflect the interim results of the ISG. Facilitated by professional moderation, this process involved about 40 stakeholders representing NGOs, affected ministries, authorities, communities, the navigation sector, the national park and others. They met in four moderated workshops in 2003 and 2004 and the result led to **modified scenarios** which were assessed and improved by the ISG and the planning team in an intense discussion process.

- In April 2004, the ISG defined several essential **planning principles and preconditions** 2 to reach the above mentioned balance (aiming for an EIA):
  - application of the granulometric bed improvement for river bed stabilisation;
  - improvement of low water depth by dredging and defined refilling of material and construction of new and modification of existing groynes;
  - implementation of measures according to given river morphological processes;
  - integrated design of regulation structures, regarding hydraulic, morphological and ecological criteria equally;
  - realisation of measures in an adaptive form, focusing on pool reaches;
  - definition of width and depth specifically for the central part of the navigation channel and areas with granulometric bed improvement;
  - optimisation of the potential for river bank restoration and side channel reconnection;
  - keeping or if possible reducing flood water levels.

- In 2006 the Environmental Impact Statement (EIS) for the general project was finalised and accepted by the ISG. After a total planning and discussion period of over 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.

- According to Austrian law, an Environmental Impact Assessment (EIA) incorporates all approval procedures and foresees various elements of public information and participation. The EIS has to be published, allowing the public to comment on the planned measures. During the public hearing each chapter of the EIS can be discussed

with the authorities and the project owner.
In support of these required elements and in addition to the integrative planning efforts described above, several information events took place in 2008 in the wider project region to discuss the project objectives and planned measures prior to the hearing in October 2008. During the publication period of the EIS, further consultation hours were organised by the planning team.

THE MEASURES LEADING TO A SIGNIFICANT IMPROVEMENT OF ECOLOGY INCLUDE. 3

- The granulometric bed improvement: a 25 cm thick layer of ca. 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 all inner bends, allowance of side erosion), side-arm reconnection and a 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 this leads to higher water levels and more dynamics of the river bank.

THE MEASURES FOR THE IMPROVEMENT OF NAVIGATION ARE:

- 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 reinforces the need to **monitor the success** by an interdisciplinary team.
A prerequisite for the joint solution was a common language across disciplines, a common will to understand the problems of the 'other' side and a special communication and discussion culture that lasted more than three years.

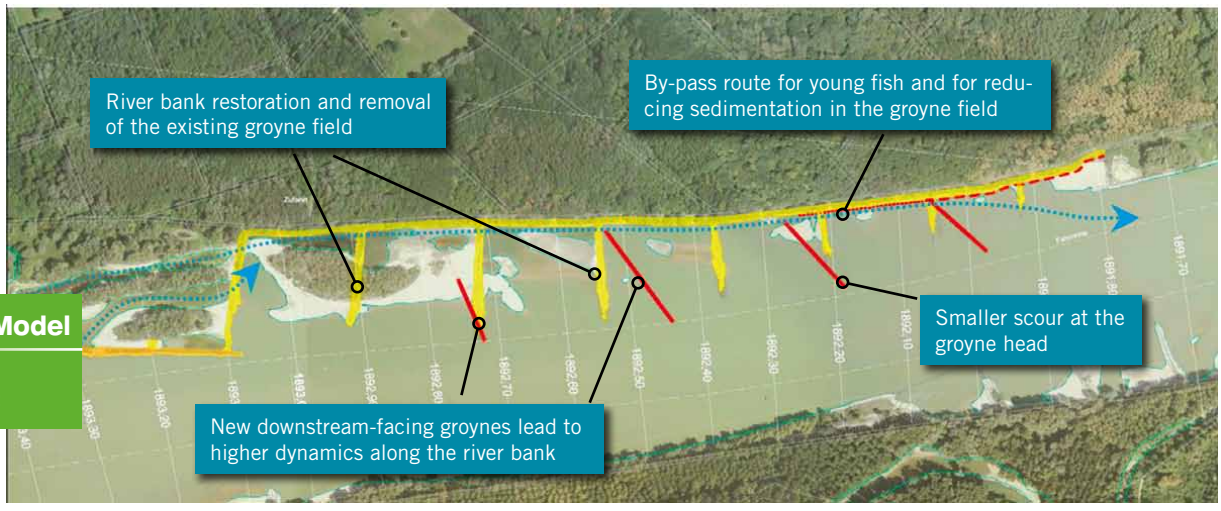
Model 3
Engineering types A1, A2, B1, C1 ▶ ch. C.3.1

www
Further information about IREP ▶ www.donau.bmvit.gv.at/en/

Pilot Project Witzelsdorf – old groyne at river km 1892.53 at low water level +50 cm before the construction work. Because of the bed degradation the groyne was much higher than necessary.

Pilot Project Witzelsdorf – new lowered and downstream faced groyne at river-km 1892.53 at low water level +30 cm. Note the new fish by-pass which is also reducing sedimentation in the groyne field.

RECONSTRUCTION OF GROYNES – IREP PILOT PROJECT WITZELSDORF



© viadonau & IREP Planning Consortium

Removal of old groynes and river bank restoration
Construction of new groynes

Model

Win-win solution for ecology and transport

C.2.2.4 German approaches and case studies for balancing navigational and environmental needs

Besides being transport corridors, the German federal waterways also have a multitude of functions for nature, such as providing habitats for plants and animals. The German Act on Federal Waterways (WaStrG) stipulates that in waterway maintenance, development and new construction projects the requirements of nature and the appearance of the water landscape and its recreational value must be taken into account. The natural foundations of life must be preserved, and the management objectives of the Water Framework Directive need to be considered.

Moreover, the Federal Waterways and Shipping Administration (WSV) has to observe the legislation on nature protection in the administration of waterways. This refers to the regulations on interventions into nature (Federal Nature Conservation Act), the protection of areas and species pursuant to the Habitats Directive (FFH), and the national legislation on the protection of species. In application of these regulations, the WSV may be obliged to implement measures for compensation or for the protection of the overall coherence of Natura 2000 areas.

The WSV's responsibility as the owner of the federal waterways extends even to maintenance for water management purposes. The extent of this maintenance is defined in the Federal Water Act (§ 28 WHG) and the applicable legislation of the Federal States. This maintenance of a water body for water management purposes includes its care and development. This must be based on the WFD management objectives, must not threaten the achievement of these objectives, and must meet the requirements of the programmes of measures. The latest administrative development on WFD responsibilities is presented in ► ***the box in ch. C.1.3.1***.

Due to the long practice of handling these requirements, the WSV has considerable experience with ecologically oriented measures on federal waterways. Some of these projects have been included in the European Commission documentation of case studies for good management practice (EC 2006c).

A new collection of case studies (BfG Mitteilungen Nr. 28, 2009) presents 13 examples, selected from approximately 50 projects covering very different types of measures. The study also serves as an aid for implementing the WFD, for nature conservation or landscape management cases. 1

For further assisting the planning by modelling, the

1

www

More than 50 cases are available via search function (in German) at www.bafg.de/fallbeispiele

The English version of the German case studies can be downloaded from www.icpdr.org/icpdr-files/15083 or from www.bafg.de/cln_016/nn_161676/DE/05__Wissenstransfer/01__InfoSys/Fallbeispiele/fallbeispiele.html?__nnn=true

BfG recently developed the **hydro-ecological software system INFORM** 2 (Integrated Floodplain Response Model). Its main goal is to support the evaluation and decision process during the planning stage of IWT measures along German waterways. The modelling framework allows predicting the impact on plant and animal habitats due to natural or anthropogenic interference in riverine hydrology and morphology. Key and innovative components of INFORM are biotic models which map and predict the occurrence probability, the distribution or the abundance of riverine organisms or habitats controlled by environmental predictor variables. At present models for vegetation, beetles, molluscs, macro-invertebrates and fish are included. INFORM is realised as an ArcGIS™ 9.3-Extension for ArcMap.

INFORM can help to optimise the planning of measures by selecting designs that are ecologically meaningful and by avoiding expensive compensation measures. It assists the planners and decision makers at an early planning stage in taking optimum decisions, targeting small interferences with nature or even promoting nature. This will contribute to an integrated planning process where all relevant stakeholders are included in discussing measure related impacts.

C.2.2.5 ECMT strategic planning

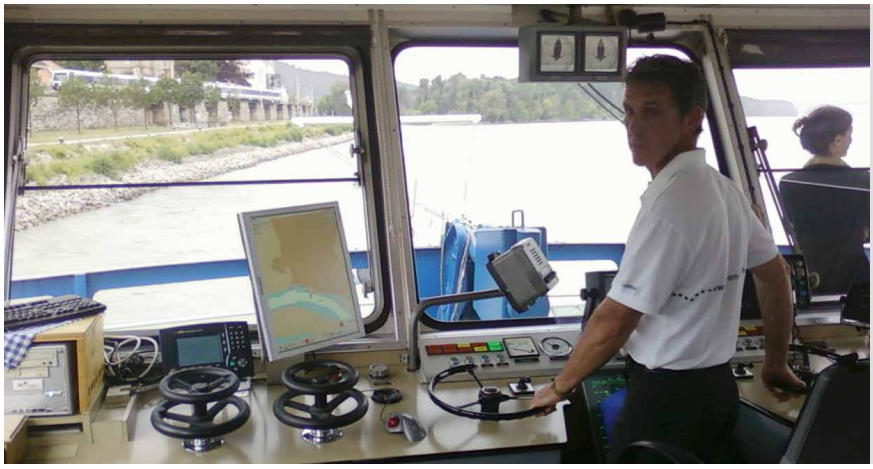
According to the European Conference of Transport Ministers (ECMT 2006), strategic plans for the development of river basins that integrate economic, social and environmental imperatives could facilitate consensus building on individual development projects. The Water Framework Directive (WFD) provides a strategic planning basis for this in terms of water quality objectives, and has created a valuable tool through the establishment of river basin management plans. The Birds and Habitats Directives and Natura 2000 sites clearly define the strategic imperative to preserve sites of international importance to wildlife.

There are no equivalent legal instruments to direct the development of inland navigation. **Preparation of inland navigation development strategies in parallel with the river basin management plans of the WFD may provide the missing strategic basis for addressing conflicts between the interests of navigation and the environment.** The report submitted to Ministers, CEMT/CM(2006)17, recommends that shipping and environmental protection authorities work together to produce strategies for environmental protection and development of inland waterways at the river basin level.

The ideal strategic planning framework would include a **Strategic Environmental Assessment** (SEA) covering transport on the basis of a multi-modal transport corridor analysis, along with non-transport demands on the waterway (for hydropower production, flood protection, irrigation, industrial use, drinking water abstraction and waste discharge). The relatively recent discipline of incorporating multi-modal corridor analysis in transport SEAs is examined in detail in the report

Info 2

Further information about INFORM: Dr Michael Schleuter (schleuter@bafg.de)



© A. Zinke

'Assessment and decision making for sustainable transport' published by ECMT in 2004. Transport ministers adopted a resolution and guidelines on good assessment in 2003 which were endorsed by environment ministers by an Act of the OECD Council. In the short term, however, a narrower focus on just navigation and environmental protection might be appropriate.

C.2.2.6 Maintenance dredging on the Thames: a decision support framework

In the past, port authorities were less aware of environmental issues and did not appreciate the importance of stakeholder engagement. In the Port of London's (PLA) case, this began to change more than 10 years ago through a new initiative which aimed to meet both its environmental responsibilities and operate the port in a safe, efficient and cost-effective way. 1

Since 2001, the Dredging Liaison Group, with diverse membership, has become an open forum to discuss ongoing and proposed maintenance and dredging operations on the tidal Thames. An electronic Dredging Spatial Information System (DSIS) allows for information sharing and eases decision-making. A new Conservation Management Framework (CMF) supports a similar process on nature conservation issues.

C.2.2.7 Living Rhine projects

The Rhine is both the largest inland waterway in Europe (with up to 180 mio t/year) and an outstanding river habitat connecting rivers and wetlands between the Alps and the North Sea. Its loss of natural hydro-morphological structures and dynamics triggered two consecutive projects (2003-2010) that support Rhine development policies.

The projects to revitalise degraded river sites along the Rhine waterway were initiated under the name 'Living Rhine – River of Thousand Islands' led by the German NGO NABU (BirdLife) 2 and developed step-by-step through trust-building and intense cooperation between environment and transport interest groups. Establishing joint advisory boards of NGO, waterway and government experts were important milestones.

Over the entire project period, 15 local projects were planned and 7 were implemented. Funding came from various public and private foundations, businesses and EU Interreg IIIb. They were financed and executed by federal and local administrations as well as NGOs.

Concrete results 3 included the removal of various bank protections, the reconstruction of groynes and restoration of side-channels. A monitoring programme verifying the effect of measures and a communication strategy secured wide public awareness, political support and a positive public image of this remarkable cooperation.

1 www

www.pla.co.uk/display_dynamic.cfm/id/254/site/environment

2 Model

NGO as a driver to set up ecological engineering projects

3 www

www.lebendiger-rhein.de

REMOVAL OF BANK PROTECTION, FLATTENING, BASELINE PROTECTION AT PROJECT OR1 PLITTERSDORF (RHINE KM 342.2)

Before

Costs: 1.100 Euro/running meter bank

Afterwards

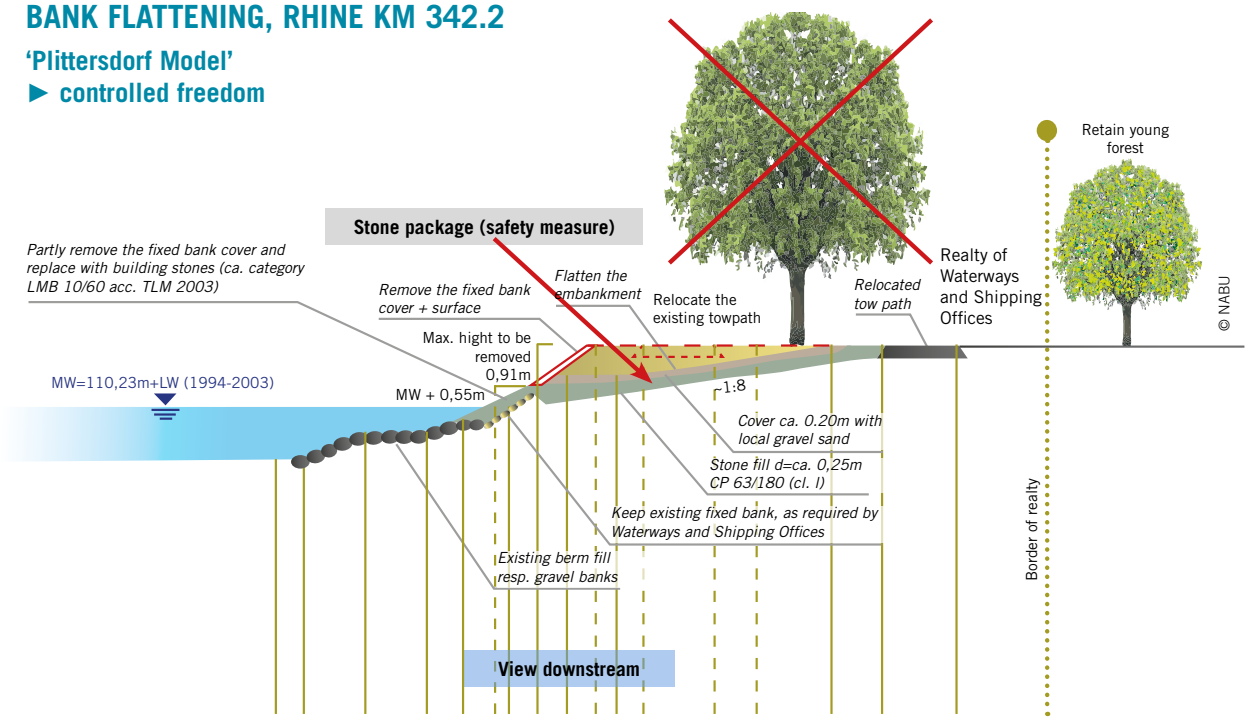
© NABU

LIVING RHINE PILOT PROJECT LOCATIONS

Living Rhine projects restoring river banks, rebuilding groynes and restoring side-channels (**blue** = implemented; **grey** = planned)

Source: NABU

1. **NR 1** Emmericher Wald
2. **NR 6** Bislich-Vahnum
3. **NR 8** DU-Beekerwerth
4. **NR 5** DU-Rheinhausen
5. **NR 9** Ölgangsinsel
6. **MR 2** Auf der Schottel
7. **MR 1** Bingen Rheinkribben
8. **IR 1** Stillwasser Bingen
9. **IR 2a** Ingelheim-Nord
   IR 2b Heidenfahrt
   IR 2c Budenheim
10. **IR 2d** Krappen
11. **OR 7** Mannheim
12. **OR 6** MA-Reißinsel
13. **OR 2** Südl. Murgmündung
14. **OR 1** Plittersdorf



Example of a river bank restoration project at the Upper Rhine near Iffezheim

1 www
www.vnsc.eu/english

C.2.2.8 Scheldt projects

Three interesting projects in the Scheldt River region serve as good examples:

The long-term vision of the Western Scheldt estuary and the deepening of the navigation channel to the port of Antwerp 1

The estuary of the Scheldt River, located partly in the Flanders region of Belgium and in the Netherlands, became the subject of a joint Long Term Vision (LTV; horizon: 2030) in 1988 to sustain its main functions: safety against flooding, optimal nautical accessibility to the ports and natural ecosystem.

In 2002 the '2010 Development Outline' (DO) was drawn up for the Scheldt estuary to define those projects and measures to be undertaken no later than 2010 to ensure the realisation of the LTV. The main 2010 DO projects are:

1. Safety against flooding: implementation of the updated Sigma plan in Flanders (see below).

2. Accessibility: deepening and widening of the fairway to the port of Antwerp (De Wit et al. 2007). The goal was to develop a sustainable maintenance strategy for accessing the port of Antwerp and for preserving the estuary. The morphological management of the estuary will be determined in the future by maintaining the navigation channel and safety, and by optimising the physical and ecological state of the estuary. Following an international EIA, the new disposal strategy requires that most of the dredged material is disposed of along shoals to maximise the creation of ecologically valuable ecotopes. The dredging works began in February 2010 and have been followed up by a monitoring and decision-making process. The monitoring results are discussed monthly in a bilateral Working Group (Flanders, the Netherlands) to fine tune or modify the dredging and disposal strategy. The quality of this process is assured by a scientific committee of six university professors from different disciplines. This process will continue beyond the execution of capital dredging works (2010-2011).

3. Ecosystem: development of 600 ha of estuarine nature along the Western Scheldt (NL) and 1,100 ha of estuarine nature and wetlands along the Scheldt Sea (Flanders).
Both countries decided to jointly monitor the evolution of the estuary and the effects of the implemented projects to extend their knowledge of the estuary and to facilitate possible corrective measures.

The SIGMA plan to protect the Scheldt Basin against flooding 2

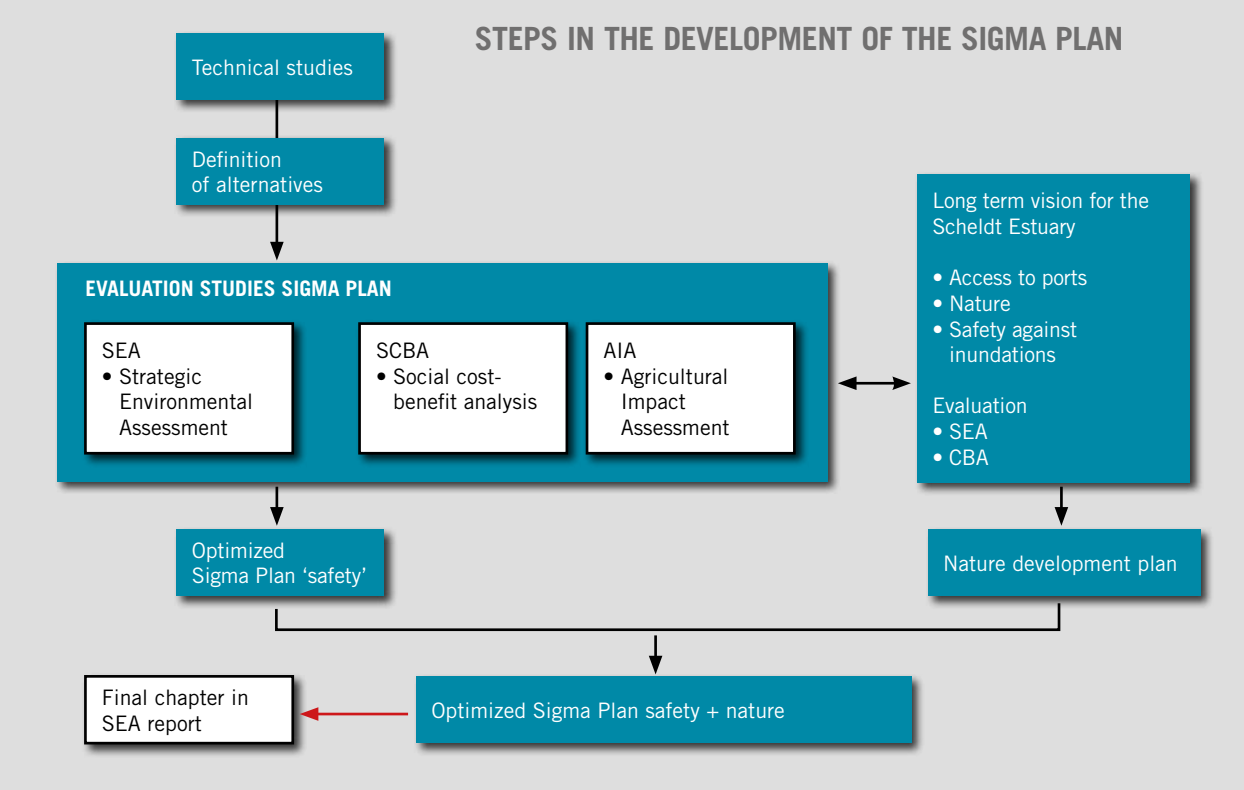
The new SIGMA plan integrates all projects to protect the Scheldt Basin against North Sea floods revising the former plan after the flood disaster of 1976. The plan drastically decreases the flood risk by storing flood waters in controlled inundation areas – thus it gives 'room to the river' and at the same time creates new, or strengthens existing, nature.
The development framework for the SIGMA plan (see figure below) illustrates the balance between environmental, economical, societal and agricultural evaluations as input for political decisions, all based on detailed technical analyses of the effectiveness and feasibility of measures.
Throughout the entire process, attention was paid to various EU directives:

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

www 2

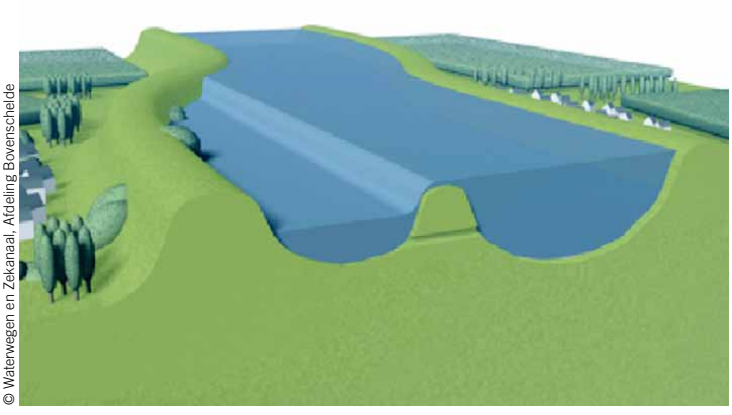
For further information ▶
www.sigmaplan.be/
(only in Dutch)

www.gogkbr.be/index.php?page=gog-kbr&hl=en_US



to the WFD river basin management plans and communication with the public.

The concept agreed upon is controlled inundation during dangerous water levels in the tidal river. The original Scheldt dike becomes an overflow dike from where the rising waters are directed into a controlled area (see figure below), where it remains until the Scheldt level allows drainage via an outlet. The integration of nature into the SIGMA plan leads to the restoration of several ecotopes (500 ha of mudflats, 1500 ha of tidal marshes, 1500 ha of grass land, 2000 ha of reed and riparian zones and 400 ha of marsh woodland).



© Waterwegen en Zekanaal, Afdeling Bovenschelde

The Seine-Scheldt waterway link integrating Lys River restoration 1

The Seine-Scheldt link is one of the EU TEN-T priority projects (► *ch. B.1.1*) and consists of a new canal yet to be constructed between Compiègne and Cambrai on French territory and of navigability improvements between Deûlémont and Ghent (mainly on Flemish territory of Belgium).

In the past the Lys River was canalised along 55 km and many old river branches were cut off, thus totally changing the dynamic system of the river and the landscape.

In view of the WFD requirements 'good ecological potential' of this HMWB by 2015), the Flemish government decided in 2006 to **incorporate** the related measures (Lys River restoration) directly into the Seine-Scheldt programme, whose main purpose remains to improve navigability to class Vb according to European standards between the French border and the Rhine-Scheldt Delta (at locks, bridges, cross-sections and mooring places for one-way traffic).

The **planning methodology** consists of different stages, all of which focus on incorporating the different ecological, economic or technical points of view (integrated development plan). A main issue in the planning process was to interview all possible stakeholders which, though very time consuming, proved to be a key success factor in reaching broad consensus and saving time to receive the needed permits.

Based on the different river functions, a vision was formulated of the Lys as a green valley, containing the canalised river as a hard backbone for economic functions (1 m deeper), and the meandering Lys as the soft backbone (restoring the river-valley ecosystem). This vision took shape through 16 different design principles, ranging from ecology and recreation to landscape, which were applied in the resulting spatial development plan. Six alternatives are being assessed, comparing one-way or two-way traffic as well as dependence on tide.

The **organisation** of work 2 is sub-divided between a project team (waterway administration and consultants), study groups, a steering committee (official consultation body of the Lys River Basin) and a Sounding Board Committee (political consultation body of the basin). There is also direct consultation of some actors and workshops.

The competent authority (Waterwegen en Zeekanaal NV) scheduled the works as follows:

- inland navigation sub-projects (locks, bridges and mooring facilities): 2009–2016;
- river restoration sub-projects (fish passages and new embankments): 2008–2015;
- river restoration sub-projects (dredging of filled in meanders): 2016–2021.

The effectiveness of all actions will be evaluated by a monitoring plan, where all necessary technical and environmental data will be compiled in yearly reports.

1 WWW

www.wenz.be/Projecten/Seine_Scheldt/

2 Model

for the set up of integrated planning bodies and for an integrated planning process

Plan for excavating former meanders


Current situation of meanders


Vision (meander excavation)

Example of the planned restoration at the Scheldt-Lys river.

C.2.2.9 NGO contributions

In October 2009, various NGOs from the Danube region agreed on a paper called 'Common NGO position on navigation in the Danube Basin'. This lists several recommendations for relevant planners, developers and policy makers on how to make IWT projects and programmes sustainable. NGOs consider the Joint Statement as the first step towards increased sustainability of the sector. Also they state that the PLATINA manual promises to contribute to a better planning process.

Most NGOs appreciate the role of inland navigation in the European transport sector and recognise the specific social and economic needs of Danube states. However, river engineering projects to improve IWT conditions should only be implemented or continued if they guarantee and restore functioning ecosystem processes, respect socio-economic needs of regional and local economies, prove that they meet all legal requirements (in particular comply with the non-deterioration clause of the WFD and achieve the environmental objectives of the Danube River Basin Management Plan and Natura 2000 sites) and do not require new dams or barrages on waterways. 3

According to NGOs, future solutions should be best adapted to the local environment and not just consider general depth recommendations. During IWT planning, non-structural measures should also be taken into account, such as the modernisation of ship design and the fleet. This option was addressed in PIANC (2008) as well as in a new study for the Danube River conditions (Radojcic 2009: 'Environmentally friendly inland waterway ship design for the Danube River') concluding that contemporary (modern) shallow draught vessels, particularly suited for the Danube waterway, are feasible and desirable. 4

3 www
assets.panda.org/downloads/ngo_danube_navigation_position_final_3.pdf

4 www
assets.panda.org/downloads/iww_danube_ship_design___final___december_2009.pdf

Restoration measures at the Rhine river – Waal branch near Nijmegen (B. Boekhoven (RWS, NL, 2003)

C.3 GOOD PRACTICE EXAMPLES OF ECOLOGICAL RIVER ENGINEERING IN WATERWAYS

The history of river engineering has shown that increased exploitation of natural resources results in a weakening and deterioration of the balance of biotic and abiotic factors. Conventional river engineering contributes to the following deterioration of riverine ecology:

- River straightening, including the cross-cutting of meanders and disconnection of side-arm systems, increases erosive forces in the main river bed and causes bed incision and the lowering of the water tables, which create problems for riparian forestry and agriculture as well as for fish species needing low velocities.
- Flood waters that once spread over extended floodplains in various parts of a river basin are now flushed through narrow channels with high levees, which are expensive to maintain and at risk of breaking while they provide smaller living space for even less biodiversity.
- Fish cannot migrate over impounding dams and disappear in upstream sections (in particular sturgeon in the Danube); new navigation links between different river systems facilitate the spread of alien species (neozoans) that can eradicate native organisms.

Over the last 20 years, however, many efforts have been made to improve river bed management, notably extending navigability and maintaining the fairway, in various ecologically benign ways. Increasingly, river ecology is seen as an objective that can be achieved, first as a side effect, then as an attractive asset and recently as a legal requirement to be met (as illustrated in ► ***ch. C.2, notably in C.2.2.3 and C.2.2.4***).

The following section presents a number of selected cases – far from a complete list – that are successful examples and even model cases. While each case is based on local circumstances and cannot be easily copied to other river sections or river systems, all these cases constitute successful examples and experiences of good practice.

Good practice examples have been identified in recent years as a form of guidance for the management of waterways, notably by:

- the EC in the **WFD Guidance** 'Technical Paper – Good practice in managing the ecological impacts of hydropower schemes; flood protection works; and works designed to facilitate navigation under the Water Framework Directive' (30 November 2006), separate document 'Case Studies' (EC 2006c);
- **joint recommendations** by the Central Commission for the Navigation on the Rhine (CCNR) and the International Commission

for the Protection of the River Rhine (ICPR) in 2008.

During the drafting phase, the SWP 5.3 team agreed to replace the term **'best practice'** by **'good practice'** throughout this document and the PLATINA task. The reason for this is that ecology-oriented river engineering techniques have only existed for some 30 years and are still developing dynamically – thus today's best practice may shortly be considered second best. The related EU guidance paper on WFD and hydromorphology case studies also refers to 'good practice'. Using this term, the level to reach in current and future river engineering and planning is not so high while the time period over which a certain practice has proven to function should be several years to better reflect the minimum time span of typical river ecology.

C.3.1 EXAMPLES OF NEW TYPES OF RIVER ENGINEERING AND RESTORATION MEASURES

In recent years, a number of new or improved engineering structures have been developed and tested in various waterways (Habersack et al. 2007). Their purpose is to improve river and riparian ecology as much as navigability. The figures below present a selection of new types of river engineering and restoration measures. The figures give the integrated goals, requirements and effects of the selected measures (degree of interaction), as well as monitoring aspects and the interrelation with other measure types. The following classification of these measures (examples) is based on their location within the river system 1:

Model 1

Another approach to this issue is given in: ► Annex 2 of the Joint Statement.

A RIVER BANKS / NEAR BANKZONE

1. Alternative groyne types
2. Restored / unprotected banks

B RIVER BED / FAIRWAY

1. Granulometric bed improvement
2. Chevrons

C FLOODPLAINS

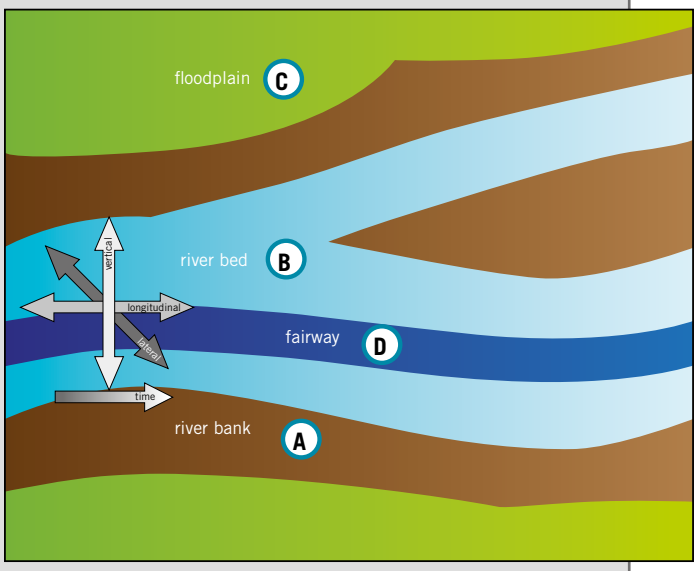
1. Reconnection of side-arms
2. Preservation / restoration of floodplains

D DREDGING

Modern dredging strategies should prohibit the extraction of material from the river for commercial reasons. In case of maintenance dredging for navigation (e.g. yearly ford dredging) a refilling of the material should be performed upstream. Furthermore, dredging activities should be harmonised with ecological needs, particularly concerning discharge and seasons.

Info

See also the report PIANC 2009b: Dredging Management Practices for the Environment - A Structured Selection Approach. Report no. 100

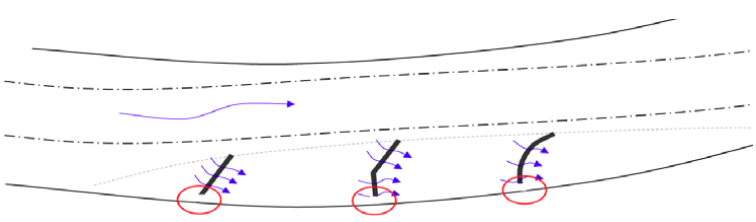


Classification of river engineering measures according to their location

A CLASSIFICATION OF RIVER ENGINEERING MEASURES ACCORDING TO THEIR LOCATION

LOCATION		RIVER BANKS / NEAR BANK ZONE				A 1
Type of measure		Alternative groyne types				
Goals of measure	TECHNICAL	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	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)				
Requirements	TECHNICAL	Groyne stability (against floods, scouring, river bed erosion) Protection of banks especially in outer curves and when necessary for flood protection				
	ECOLOGICAL	Lowered silt and fine sediment accumulations in groyne fields (e.g. colmation effect) Minimisation of habitat fragmentation Increase hydromorphological dynamics at the banks				
Effects	L low influence M medium influence H high influence		Technical effects (fairway)		Ecological effects (groyne field, banks)	
	HYDRO-DYNAMICS	water level	H	water level increase at low flows		
		flow velocity	H	increased flow velocity*	H	increased flow velocity diversity
		shear stress	H	higher shear stresses*	M	more natural grain size distribution, habitat diversity
	SEDIMENT TRANSPORT	transport capacity	M	increase of transport capacity*	M	improvement of meso and micro habitat diversity
	RIVER MORPHOLOGY		M	degradation in main channel*	M	minimised aggradation due to modified shape, orientation, height
Notes / Risks	Length, spacing, height determining effects					
	Scouring effects					
	Side erosion of river banks					
Monitoring		Flow velocity pattern, sediment transport, morphology, side erosion				
Interrelation with other measure types		Bank restoration, chevrons, side-arm reconnection				
Examples and photos						

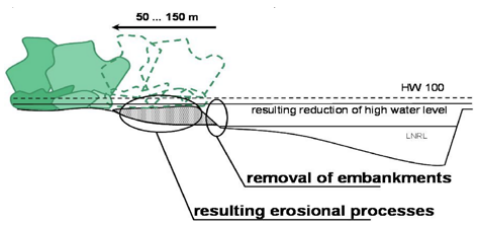
Variations of declinant groynes



Reference	Integrated River Engineering Project on the Danube East of Vienna (viadonau & IREP Planning Consortium, 2009) (www.donau.bmvit.gv.at)	(Danube/AT)

* depending on groyne height, orientation, spacing

LOCATION	RIVER BANKS / NEAR BANK ZONE					A 2
Type of measure		Restored / unprotected banks				
Goals of measure	TECHNICAL	Flood protection (increase of discharge cross sections) Increase of sediment input Reduction of river bed incision ('soft banks') by reducing shear stress				
	ECOLOGICAL	Natural morphological development of bank zones (morphodynamics) Sustainable improvement of the ecological conditions (particularly at the banks) Improvement of the landscape appearance				
Requirements	TECHNICAL	No alteration of the conditions for waterway transport (especially at low flow) Keeping of the low water level in combination with other measures Protection of banks at outer curves and when necessary for flood protection				
	ECOLOGICAL	Total (if possible) removal of bank protection Allowing morphodynamics and natural succession Defining a corridor along the river for side erosion				
Effects	L low influence M medium influence H high influence		Technical effects (fairway)		Ecological effects (banks)	
	HYDRO-DYNAMICS	water level	L*	reduced water level due to increased width	M	gradual depth variation
		flow velocity	L*	reduced flow velocity due to decreased hydraulic radius	M	decreased flow velocity due to increased roughness
		shear stress	L*	reduced shear stress due to decreased hydraulic radius	M	increased shear stress and grain size diversity
	SEDIMENT TRANSPORT	transport capacity	L*	reduced transport capacity due to decreased hydraulic radius	M	improvement of meso/micro habitat diversity due to erosion/aggradation
	RIVER MORPHOLOGY		L*	increasing morphodynamics	H	increase of morphodynamical processes, habitat diversity
Notes / Risks	The navigational conditions must not degrade as a result of the removal of river bank protections. Therefore the low water level must be guaranteed by a combination of other measures (e.g. the use of groynes). However, the bank areas may and should erode to a certain level.					
	Limitations are given on the outer river banks through the removal of bank protections (high flow forces -> erosion…) in the context of navigational conditions and flood protection.					
Monitoring		Side erosion process, morphology, water levels, flow velocity				
Interrelation with other measure types		Reconnection of side-arms, restoration of floodplains, groynes				
Examples and photos						



Reference	Removal of bank reinforement at the Rhine near Mannheim (Markgraf-M. 2007) (Rhine/DE)

* depends on river dimension (annual flood) and occuring side erosion

B

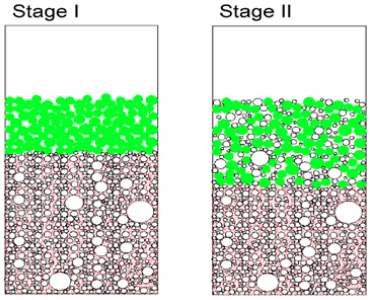
LOCATION	RIVER BED / FAIRWAY	B 1
Type of measure	Granulometric bed improvement*	
Goals of measure – TECHNICAL	Sustainable river bed stabilisation – stop river bed erosion Reduce maintenance (less ford dredging) Increase of low water level	
Goals of measure – ECOLOGICAL	Sustainable river bed stabilisation – stop river bed erosion Increase of water level Dynamic equilibrium	
Requirements – TECHNICAL	Decrease of the transport capacity (increase mean grain diameter by adding coarser material within the natural GSD) The mean layer thickness results from load-technical and engineering-practical reasons	
Requirements – ECOLOGICAL	Use grain sizes that do not stop sediment transport entirely (within existing grain size distribution) Add material only along flow-exposed and deeper areas (fairway) Perform a stepwise and adaptive implementation (including a monitoring)	

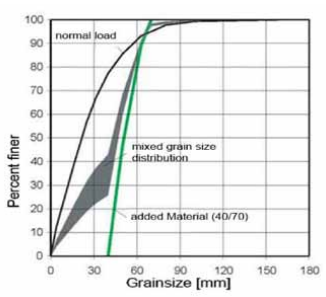
Effects	L low influence, M medium influence, H high influence		Technical effects (fairway)		Ecological effects (banks, riparian region)	
	HYDRO-DYNAMICS	water level	M	increased water level especially at low and mean discharge	M	increased water level especially at low and mean discharge
		flow velocity	L	eventually minor changes		
		shear stress	M	changed shear stress due to higher roughness		
	SEDIMENT TRANSPORT	transport capacity	H	increase of critical shear stress leads to lowered transport capacity		
	RIVER MORPHOLOGY		H	sustainable dynamic bed stability	M	dynamic equilibrium

Notes / Risks	
	New measure type
	Sensitivity to grain size of added material
	Mixing with subsurface material

Monitoring	Bed load transport measurements, freeze core or volumetric sampling, tracer
Interrelation with other measure types	Bank restoration, groynes, reconnection of side-arms

Examples and photos





Reference	Integrated River Engineering Project on the Danube East of Vienna (viadonau & IREP Planning Consortium, 2009) (www.donau.bmvit.gv.at) (Danube/AT)

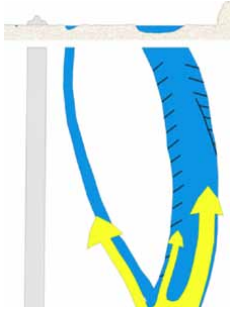
* related measures: open cover, adding coarse material, bed pavement

LOCATION	RIVER BED / FAIRWAY					B 2
Type of measure	Chevrons					
Goals of measure	TECHNICAL	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	Minimise engineering impact				
Requirements	TECHNICAL	Chevron stability (against floods, scouring, river bed erosion)				
	ECOLOGICAL	Minimise reduction of side-arm discharge and morphodynamics Optimised dimension and spacing (minimise impact) Lowered silt and fine sediment accumulations behind chevrons (e.g. colmation effect)				
Effects	L low influence M medium influence H high influence		Technical effects (fairway)		Ecological effects (side-arms, banks)	
	HYDRO-DYNAMICS	water level	H	increased water depth at low discharges	H	increased water depth at low discharges at banks
		flow velocity	H	increased flow velocity at low flow	H	lowered flow velocity in side-arms
		shear stress	H	higher shear stresses (> erosion)	M	lowered shear stress in side-arms
	SEDIMENT TRANSPORT	transport capacity	M	increase of transport capacity	M	decrease of transport capacity in side-arms
	RIVER MORPHOLOGY		M	reduction of side-arm morphodynamics	M	reduced morphodynamics in side-arms
Notes / Risks	Erosion processes due to the increased shear stresses in the fairway					
	Sedimentation of side-arms					
Monitoring	Flow velocity pattern, sediment transport, morphology, erosion process in the fairway					
Interrelation with other measure types	Side-arm connection, groynes, banks					
Examples and photos						

Reference	**a)** Mississippi - St. Louis Harbor. Mosentien Project, U.S. Army Corps of Engineers (USACE) St. Louis District. (www.mvs.usace.army.mil/eng-con/expertise/arec/index.html) **b)** Mississippi Project, Cairo (IL) - Saverton (MO), U.S. Army Corps of Engineers (USACE). (www.mvs.usace.army.mil/eng-con/expertise/arec/index.html)

C

LOCATION	FLOODPLAINS					C 1
Type of measure		Reconnection of side-arms				
Goals of measure	TECHNICAL	Emphasising flood retention (hydrological), lowered water level at higher discharges Sediment input Reduced shear stress in main channel				
	ECOLOGICAL	Permanent connection of the side-arm system (at low flow) Improvement of the ecological 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				
Requirements	TECHNICAL	Connectivity at low flow No aggradation at the upstream connection or end More sediment output than input				
	ECOLOGICAL	Leitbild-oriented hydrology (low flow <-> floods) and morphodynamics No or minor restrictions of the side-arm development No discontinuities of bed-, water level- and energy slope				
Effects	L low influence M medium influence H high influence		Technical effects (fairway)		Ecological effects (side-arms)	
	HYDRO-DYNAMICS	water level	L*	decreased water level at high flow	H	increased water level -> permanent connection with main channel
		flow velocity	L*	decreased flow velocity at high flow	H	habitat diversity, refugial habitats, higher flow velocities
		shear stress	L*	decreased shear stress at high flow	H	drift of macroinvertebrates to suitable habitats, higher shear stress
	SEDIMENT TRANSPORT	transport capacity	L*	decreased transport capacity at high flow	H	increased transport capacity
	RIVER MORPHOLOGY		M	minor technical measures for bed stabilisation	M	increased morphodynamics, habitat diversity
Notes / Risks	Sedimentation of side-arms					
	Not enough morphodynamics					
Monitoring		Monitoring of morphology, flow velocity or discharge measurements, suspended sediments				
Interrelation with other measure types		Restoration of floodplains, restoration of banks, groynes				
Examples and photos						



Reference	Integrated River Engineering Project on the Danube East of Vienna (viadonau & IREP Planning Consortium, 2009) (www.donau.bmvit.gv.at) (Danube/AT)

*depends on discharge in side-arms

LOCATION	FLOODPLAINS					C 2
Type of measure	Restoration or preservation of floodplains*					
Goals of measure	TECHNICAL	Flood protection Flood retention (hydrological and hydraulic effects)				
	ECOLOGICAL	Preservation of floodplains Restoration of floodplains				
Requirements	TECHNICAL	Effectiveness of the measure depends on the slope, width, roughness of the floodplain				
	ECOLOGICAL	Special consideration of ecological aims and parameters (land use, dynamics, connectivity, habitats)				
Effects	L low influence M medium influence H high influence		Technical effects (fairway)		Ecological effects (floodplains, Aue)	
	HYDRO-DYNAMICS	water level	H	lowered water level during floods (retention effect)	H	natural inundation (floods)
		flow velocity	M	reduced flow velocity	H	refugial habitats
		shear stress	H	decreased shear stress at high flow	M	transport of nutrients
	SEDIMENT TRANSPORT	transport capacity	H	decreased transport capacity at high flow	M	sedimentation (depending on possible floodplain morphodynamics)
	RIVER MORPHOLOGY				M	improvement of habitat diversity and quality (depending on possible floodplain morphodynamics)
Notes / Risks	Sedimentation of floodplains (when no floodplain morphodynamics)					
Monitoring	Floodplain deposits, sediment budget					
Interrelation with other measure types	Reconnection of side-arms, dyke shifting, changes in floodplain land use					

Examples and photos

Reference

a) Floodplain Evaluation Matrix (FEM), Flood risk reduction by preserving and restoring river floodplains (PRO_Floodplain), Era-Net CRUE. (www.crue-eranet.net, www.pro-floodplain.eu)

b) Restoration measures at the Rhine river - Waal branch near Nijmegen (Rhine/NL)

C.3.2 EXAMPLES OF GOOD PRACTICE

The following list of IWT projects provides some examples of good practice in Europe. The summary information is limited to specific key aspects, and further information is available from the contacts.

EXAMPLES OF INTEGRATED IWT PLANNING PROCESSES

EXAMPLE FOR TYPE	TITLE OF CASE STUDY/PROJECT	PRESSURE & IMPACT	MEASURE	
D	Accountability in maintenance dredging decision-making	Maintenance dredging; need for improved transparency in decision-making and stakeholder communication (concerns raised on impacts to environment and nature sites)	Development of a transparent decision-making framework involving stakeholders (new 'liaison group'); new data collection, modelling and monitoring	
A1, A2, B1, C1, D	Integrated River Engineering Project Danube east of Vienna	Upstream dams lead to disturbed morpho-dynamics (sedimenting of side-channels and floodplain); erosion of river bed	Granulometric bed improvement (pool reaches); removal of bank protection; re-connection of side-arms; rebuilding of groynes; dredging and defined refilling of material (leading to a sediment balance); relocation of certain sections of the existing navigation channel	
A2, C1, C2	Seine-Scheldt waterway link integrating Lys River restoration	For its navigability, Lys River was canalised along 55 km and many old river branches were cut off, thus totally changing the dynamic river – landscape system	The WFD-required measures (HMWB – 'good ecological potential') were incorporated into the new navigability programme: The new river vision and integrated development plan (incorporating ecology economics and technical points) were based on extended stakeholder interviews; execution is sub-divided between technical and consultative bodies	

EXAMPLES OF THE IMPROVEMENT OF RIVERINE ECOLOGY AND NAVIGABILITY (WIN-WIN CASES)

EXAMPLE FOR TYPE	TITLE OF CASE STUDY/PROJECT	PRESSURE & IMPACT	MEASURE	
D	Water column recharge of dredged material to sustain protected intertidal habitats	Dredging of harbour channel; removal of sediment from estuarine system (potential loss of intertidal habitats of birds)	Restoring and mitigating the effects of dredging on the intertidal mudflats (disposing part of dredged material in foreshore areas; improved flood defence); extensive monitoring	
D	Accountability in maintenance dredging decision-making	Maintenance dredging; need for improved transparency in decision-making and stakeholder communication (concerns raised on impacts to environment and nature sites)	Development of a transparent decision-making framework involving stakeholders (new 'liaison group'); new data collection, modelling and monitoring	
D	Morphological management in estuaries, conciliating nature preservation and port accessibility	Sediment removal associated with maintenance dredging and capital dredging (bigger navigation route); ongoing degradation of estuary morphology and ecology	New disposal strategy: precise placement of dredged material using a diffuser (stopping estuary degradation; reconciling nature conservation and port access needs); since 2001: bilateral working group and expert proposal, research programme, intensive monitoring	
A1	Ecological modifications of groynes, Elbe	Need to renew degraded groynes (long-term aggradation) or build new ones in free-flowing river section	Testing of alternative shapes of groynes (9 groyne fields at km 439 – 446 built 2001-2004) to stabilise and enhance species diversity and riparian morphology. Three-year monitoring study (hydromorphology, fish, MZB, ground-beetles, vegetation)	

	RIVER / COUNTRY	ECOLOGICAL EFFICIENCY	IWT BENEFIT	COMMENT / SOURCE OF INFORMATION
	Thames / UK	**High** (improved understanding of sedimentary regime; improved dredging techniques and planning)	Better stakeholder understanding, reduced conflict and associated delays; reduced costs	CIS Case studies (EC 2006c) Project no. N5 02 (p. 185) www.pla.co.uk/contact/index_enquiry.cfm/site/contact www.pla.co.uk/display_dynamic.cfm/id/254/site/environment For details see C.2.2.6
	Danube/ AT	**Expected to be high** (stopping bed erosion, allowing bank erosion and morpho-dynamics to re-establish pioneer habitats, lateral connectivity)	Fairway deepened to 2.70-2.80m, fewer maintenance works and lower costs	Contact: Via Donau Dieter.Pejrimovsky@via-donau.org www.donau.bmvit.gv.at/en For details see C.2.2.3
	Lys/ BE (Flanders)	**Expected to be high** (effectiveness of all actions is evaluated by a monitoring plan with yearly reports)	Navigability improved to class Vb; public and stakeholder support	Waterwegen en Zeekanaal NV www.wenz.be/Projecten/Seine_Scheldt/ For details see C.2.2.8

	RIVER / COUNTRY	ECOLOGICAL EFFICIENCY	IWT BENEFIT	COMMENT / SOURCE OF INFORMATION
	Harwich Haven / UK	**High** (effective mitigation of loss of protected foreshore bird habitat)	Better navigability (bigger vessels); mitigation measures reduced flood defence costs	CIS Case studies (EC 2006c) Number N5 01 (p. 183)
	Thames / UK	**High** (improved understanding of sedimentary regime; improved dredging techniques and planning)	Better stakeholder understanding, reduced conflict and associated delays; reduced costs	CIS Case studies (EC 2006c) Number N5 02 (p. 185) www.pla.co.uk/contact/index_enquiry.cfm/site/contact www.pla.co.uk/display_dynamic.cfm/id/254/site/environment For details see C.2.2.6
	Scheldt / BE & NL	**Medium** (retaining the dredged material in the estuary showed that degraded sites regenerated) Dredging works started in February 2010; monthly monitoring reports used to decide on optimised works	Expected win-win for port (e.g. reduced costs) and estuary	CIS Case studies (EC 2006c) Number N5 03 (p. 189) For details see C.2.2.8 Contact: Marc Sas, marc.sas@imdc.be
	Elbe / DE	**Uncertain:** Interfering land uses (e.g. cattle trampling on the bank), effectiveness analyses are distorted by impacts of flood events (deposits of sediment and debris) or weather influences (irregular annual river discharge). Evaluation ended in 2009	Waterway maintenance measure	German case studies (BfG 2009) Number 6.4 Contact: Dr. Andreas Anlauf, BfG, anlauf@bafg.de

EXAMPLES FOR THE IMPROVEMENT OF RIVERINE ECOLOGY ALONG WATERWAYS

EXAMPLE FOR TYPE	TITLE OF CASE STUDY/PROJECT	PRESSURE & IMPACT	MEASURE	
	Bed load management in the Elbe River	River training by groynes, dyke construction, impounding; increased sediment transport capacity, bed erosion, lowering of water levels	Dynamic bed stabilisation by artificial bed load supply; monitoring of river bed, MZB and alluvial forests since 1996	
A1	Modification of groynes at Elbe riverbanks – ecological investigations on the impact of construction on habitats and distribution of species	Cross profile construction (groynes); loss of structural diversity along riverbanks and of typical communities	Modification of groynes to induce higher hydromorphological dynamics	
C2	Establishment of a floodplain-typical island habitat dominated by the dynamics of varying river stages with an adjacent floodway	Changed routing; loss of typical floodplain sites dominated by the dynamics of varying river stages, loss of habitats for fish and MZB	Enlargement of the flood spillway at causeway and connecting it with the Moselle River for water exchange above mean-flow levels; monitoring 1994-2004	
A2, C1	Reconnection of oxbow lakes and wetlands	Straightening of the river channel, bank reinforcement, uniform shape of river channel; successive degradation of an oxbow river system, reduced hydrological connectivity	Four meanders in three localities were reconnected with the river channel but disregarded the sediment dynamics, thus worsened the meander status	
A2	Removal of a bank reinforcement on a slip-off slope of the Lower Rhine (at Duisburg)	Bank reinforcement; loss of structural diversity leading to biological deficiency (urban industrial landscape)	Removal of bank reinforcement (stone filling), replaced by a shallow gravel bank to initiate dynamic natural development; monitoring before (2003) and after (2006) the measure	
A2	Interruption of a bank reinforcement on the bank of the limnetic tidal river Elbe	Bank reinforcement (stone filling); loss of structural diversity (shallow water zone habitats)	Interruption of bank reinforcement in short sections (re-activation of hydromorphological processes and fish habitats)	
A2	Removal of a bank revetment in several sections of the limnetic tidal river Elbe (downstream Geesthacht)	Bank reinforcement (rough stone filling); loss of structural diversity (shallow water zone habitats)	Removal of bank revetment in several sections (re-activation of hydromorphological processes to develop natural bank profile and fish habitat)	
C2	Establishment of a shallow water zone protected against the impact of ship-induced waves	Bank reinforcement (steep with natural rock rip-rap); loss of characteristic bank zones (fish and MZB communities, typical vegetation) in impounded reach	Construction of a 700 m training wall parallel to the bank with connection to the river flow (1993); monitoring (until 2004)	
A2	Establishment of a shallow water zone protected against the impact of ship-induced waves, vegetation-free gravel and pebble areas and succession zones (between new harbour of Würzburg and river Main)	Bank reinforcement (changed routing to facilitate navigation); loss of characteristic river and floodplain habitats, declining biodiversity	Establishment of diverse shallow-water zones in 5 ha of former plough land connected to the Main River (1989); monitoring 1991-2002)	
A2	Improving the structural diversity of river banks by creating a bypass (floodway) to promote shallow waters and protect banks against impacts of ship-induced waves	Bank reinforcement (step profile of rip-rap); loss of natural river banks; impacts on fish and MZB communities	Establishment of a new artificial water body (oxbow with diverse structure and inaccessible bird site) in the floodplain connected to the Main River	

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	RIVER / COUNTRY	ECOLOGICAL EFFICIENCY	IWT BENEFIT	COMMENT / SOURCE OF INFORMATION
	Elbe / DE	**Low – high** (less bed degradation, stable water levels	No negative effects	CIS Hydro-morphology: Good practice in managing the ecological impacts … under the WFD – Case Studies (EC 2006c) Number N 2 01 (page 136) Contact: anlauf@bafg.de
	Elbe / DE	**Low – high** (less aggradation in groyne fields, better conditions for aquatic fauna)	No negative effects	CIS Case studies (EC 2006c) p. 140 Number N 2 02 Contact: anlauf@bafg.de
	Moselle / DE	**High** (improved water exchange, habitat structure and biodiversity: fish, MZB, birds, aquatic vegetation)	No significant negative effects	CIS Case studies (EC 2006c) Number N 3 01 (p. 143) Contact: sommer@bafg.de
	Morava / SK	**No** (division of water caused low velocity inducing sediment trapping that worsened the ecological degradation)	None	CIS Case studies (EC 2006c) Number N 3 04 (p. 153) This is an excellent example to show how not to do restoration: wrong repair of conventional engineering!
	Rhine / DE	**High** (development of natural and typical river bank)	No known effects	CIS Case studies (EC 2006c) Number N4 01 (p. 163) Living Rhine Project (see NR 5 on p. 87 and ch. C.2.2.7) Contact: klaus.markgraf@nabu-naturschutzstation.de
	Elbe / DE	**Medium** (natural link to the softwood zone created)	Not any known (low costs)	CIS Case studies (EC 2006c) Number N4 02 (p. 167)
	Elbe / DE	**High** (significant erosion and sedimentation processes, diverse habitat structure)	No significant negative consequences for navigation	CIS Case studies (EC 2006c) Number N4 04 (p. 173)
	Moselle / DE	**High** (enhanced structural diversity, much improved habitats; reduced ship waves impact)	No significant negative consequences for navigation	CIS Case studies (EC 2006c) Number N4 04 (p. 173) Contact: sommer@bafg.de
	Main / DE	**High** (improved physical-structural diversity favours habitat and biodiversity; reduced ship wave impacts)	No significant negative consequences for navigation	CIS Case studies (EC 2006c) Number N4 05 (p. 177) Impressive photos! Contact: wahl@bafg.de
	Main / DE	**Medium** (restoring river type-specific vegetation and succession, supporting MZB, fish, insects, birds)	No significant negative consequences for navigation	CIS Case studies (EC 2006c) Number N4 06 (p. 181) Contact: wahl@bafg.de

EXAMPLE FOR TYPE	TITLE OF CASE STUDY/PROJECT	PRESSURE & IMPACT	MEASURE	
C1, C2	Restoration of side channels of the Gameren floodplain, Waal River (Rhine)	River channel (fixed by groynes) eroded while 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	Excavation of three secondary river channels of diverse type in an area of 128 ha (= only a part of former floodplain): permanent channel of 2 km, a 1 km channel (water flow at 265 day/year) and a partly silted up channel (flow at 100 days/year); restoration of 200 m of riparian zone at main bed. Comprehensive monitoring 1996-2002; new evaluation in 2010	
C1, C2	Shallow-water zone at Kleinensieler Plate, Lower Weser	Transitional water body that became a 58 ha former dredged-material dumping site	Compensation measure to create at rkm 53-55 a landscape-typical succession of habitats with tidal waters, reed belts, floodplain shrubs and large-scale grassland: reconnect cut-off meander and lateral branches. Three bottom sills at 0.50 cm (heightened in 2005) below the mean tidal high water (MThw) provide the connection with the tidal cycle in the River Weser	
C2	Restructuring a poplar-tree stand on the island Niederwerth, Rhine		Compensation measure: stand of hybrid poplar trees on the island is successively restructured into a natural hardwood floodplain forest. Single old poplar trees are cut, and the gaps are either left to natural rejuvenation or are planted with new trees	
A2, D	Bank structures in the Wachau, dredging of fords, gravel structures	By regulating the Danube and creating barrages, the redistribution of bed load and the natural emergence of gravel islands is severely restricted. Consequences are a deficit of gravel embankments and islands	Dredged gravel for navigational purposes (to guarantee a minimum depth of navigable water) is turned into new gravel embankments and islands	
A2	River bank restoration at Thurnhaufen/Stopfenreuth, left bank at Hainburg	Bank reinforcement; loss of structural diversity leading to ecological deficiencies within the Donau-Auen National Park	About 50,000 m³ of rip rap were removed on a length of 2.9 km. On approximately 1.8 km, the rip rap was removed completely. On approximately 1.1 km, the bank protection was removed above low water level	
A1, A2	River bank restoration at Witzelsdorf, test of new groyne types	Bank reinforcement; loss of structural diversity leading to ecological deficiencies within the Donau-Auen National Park. Furthermore test of optimised groyne shapes in combination with river bank restoration in the context of the Integrated River Engineering Project	River bank restoration on approximately 1.3 km. Replacement of eight existing groynes with four new ones with optimised location, shape and height. The new, downstream-faced groyne type has the same positive effect for navigation and leads to higher dynamics at the river bank Realised between 2007 and 2009	
A2, C1	Water body reconnections at Haslau, Orth and Schönau without deteriorating the low water conditions for navigation	Hydromorphology of the Danube has been altered significantly. Major impacts are changes in channel morphology, reduced longitudinal connectivity, changes in bank morphology and reduced lateral connections	Reinstalling the connectivity between Danube and the floodplain. Reconnection of side-arms by opening of embankments near the inflow, and by removing dams along the channels Step-wise realised since 1996	
C1	Side-arm restoration in the Wachau at Grimsing, Aggsbach and notably Rührsdorf	By regulating the Danube, entire floodplains and distributaries were separated from the main current. Old tributaries and pools dry out in low-level water and become death traps for fish	Reconnection of three distributaries to ensure that these water biotopes are provided with permanent supply of Danube water. Most parts of the new channels were dredged a meter deeper than regular low-level water. Realised between 2005 and 2008	

	RIVER / COUNTRY	ECOLOGICAL EFFICIENCY	IWT BENEFIT	COMMENT / SOURCE OF INFORMATION
	Waal / Rhine / NL	**High** Much improved diversity in flow conditions and inundation frequencies, erosion and sedimentation. This restored typical habitats for rheophilic fish and macro-invertebrate species (higher diversity than in groyne fields)	No negative effects on navigation (minor sedimentation in the main channel at entrance of largest channel; no cross currents in fairway). Navigation affects flows in side channels	CIS Case studies (EC 2006c) Number F3 03 (p. 53) Ministry of Transport, Public Works and Water management (RWS Directie Oost-Nederland) and RIZA Contact: gertjan.geerling@deltares.nl See photo on page 92!
	Lower Weser river / DE	**High** Monitoring 2001-2010 of vegetation, avifauna, aquatic fauna. Undesired heavy siltation was corrected by clearing the silt in parts of the area in the winter 2004/2005 and heightening the overflow sills in 2005		German cases studies (BfG 2009): Number 6.10 Contact: Regina Kurth, WSA Bremerhaven, Regina.Kurth@wsv.bund.de
	Rhine / DE	**High** Disturbance by recreational activities		German cases studies (BfG 2009): Number 6.12 Contact: wegener@bafg.de
	Danube / AT	The new islands create shallow water zones, protected from pounding of waves, which are used by migratory fish species as places to spawn	Positive; guarantee a minimum depth of navigable water	Contact: via donau Hans.Woesendorfer@via-donau.org
	Danube / AT	**High** (significant erosion and sedimentation processes, natural river bank with diverse habitat structure)	Neutral (the project was realised without deteriorating the fairway conditions for navigation)	Best LIFE Nature Project 2007-2008 For details see C.2.2.3 Project of Donau-Auen-National Park and via donau Contact: Dieter.Pejrimovsky@via-donau.org
	Danube / AT	**High** (significant erosion and sedimentation processes, natural river bank with diverse habitat structure)	Positive (less groynes with the same effect for the fairway conditions as the older groyne field; reduction of maintenance needs)	Pilot project for the Integrated River Engineering Project. Result of the same integrated planning approach. For details see C.2.2.3 Contact: Dieter.Pejrimovsky@via-donau.org www.donau.bmvit.gv.at/en
	Danube / AT	Allow hydro-morphological changes and develop river inhabitants (kingfisher, gravel spawner, pioneer species)	No significant negative consequences for navigation	Pilot measures for ecological river engineering Contact: via donau Hans.Woesendorfer@via-donau.org
	Danube / AT	Creation of a refuge for fish and other river inhabitants (kingfishers, common sandpipers, amphibians and dragonflies)	No significant negative consequences for navigation	Contact: via donau Hans.Woesendorfer@via-donau.org

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USEFUL LINKS AND CONTACTS

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CCNR-ZKR (Central Commission for the Navigation of the Rhine). ► ***www.ccr-zkr.org/***

CEDA (Central Dredging Association). ► ***www.dredging.org***

Danube Commission has been established to supervise the implementation of the 1948 Convention on the Regime of Navigation on the Danube to ensuring adequate conditions for shipping on the Danube. ► ***www.danubecom-intern.org***

ECMT (European Conference of Ministers of Transport). ► ***www.cemt.org***
The European Conference of Ministers of Transport (ECMT) is an inter-governmental organisation of Ministers of Transport from 43 full member countries in Europe, seven associate member countries and one observer country (Morocco). The ECMT is a forum for Ministers for the inland transport sector to openly discuss current problems and agree upon joint approaches (economically efficient and meeting environmental and safety standards).

IAD (International Association for Danube Research): The IAD was founded in 1956 with the goal of promoting and coordinating scientific activities in the fields of limnology, water management and water protection in the Danube River Basin. ► ***www.iad.gs***

ICPDR (International Commission for the Protection of the Danube River). ► ***www.icpdr.org***

ICPR (International Commission for the Protection of the Rhine). ► ***www.iksr.org***

INE (Inland Navigation Europe): Membership organisation working across Europe to promote freight traffic on the inland waterway network. ► ***www.inlandnavigation.org***

International Sava River Basin Commission (ISRBC). ► ***www.savacommission.org***

NAIADES (EU programme for Navigation and Inland Waterway Action and Development in Europe). ► ***www.naiades.info***

PIANC (The World Association for Waterborne Transport Infrastructure). ► ***www.pianc.org***

PLATINA (Platform for the Implementation of the EU Naiades Programme). ► ***www.naiades.info/platina***

via donau (public company preserving and developing the Austrian Danube waterway). ► ***www.via-donau.org***

WWF DCP (World Wide Fund for Nature – Danube-Carpathian Programme). ► ***www.panda.org/dcpo***