Issue Paper on Hydromorphological Alterations in the Danube River Basin

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List of Acronyms

DRB	Danube River Basin
DRBM Plan	Danube River Basin Management Plan
DRPC	Danube River Protection Convention
EG	Expert Group
EU WFD	European Water Framework Directive
HYMO TG	Hydromorphology Task Group
ICPDR	International Commission for the Protection of the Danube River
JAP	Joint Action Programme
JPM	Joint Programme of Measures
MS	Member State
RBM	River Basin Management
RBM EG	River Basin Management Expert Group
SWMI	Significant Water Management Issue
UWWTP	Urban Waste Water Treatment Plant
WWF	World Wildlife Fund
WWTP	Waste Water Treatment Plant

Status Cover Page

This draft issue paper on hydromorphological alterations sets an overall frame how to approach the implementation of respective measures in the Danube River Basin according to the EU Water Framework Directive (2000/60/EC). Detailed actions – some of them already identified within this document - will be elaborated by the ICPDR Hydromorphology Task Group for under the coordination of the RBM EG. The specific activities and objectives of the Task Group are defined in the respective Terms of Reference. In parallel to the activities of the Task Group, specific topics need to be attributed to the other responsible ICPDR EGs in order to support the elaboration of the Danube River Basin Management Plan (DRBM Plan) and the Joint Programme of Measures (JPM) on hydromorphological issues.

The issue paper on hydromorphological alterations has been discussed by the RBM EG since its 19th meeting. After the workshop on *EU WFD & Hydromorphological Alterations in the Danube River Basin* (10-11 July 2006, Neusiedl/See), the document has been revised for further discussions. The 9th ICPDR Ordinary Meeting, discussions at the following RBM EG meetings and at the 5th StWG Meeting provided further guidance towards the finalisation of this issue paper. The key issues on hydromorphological alterations, which will be part of the DRBM Plan and JPM, were extracted from this issue paper and are included in the document on Significant Water Management Issues in the DRB (ICPDR document IC/WD/268)

The RBM EG presented a final draft of the issue paper at the 10th ICPDR Ordinary in December 2007 for information to the Heads of Delegations and requested its publication on the public ICPDR website.

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1. Introduction

In the context of the Danube, all countries that committed themselves to the Danube River Protection Convention (DRPC) stated to cooperate to enable a basin wide coordinated Danube River Basin Management Plan on the basis of the European Water Framework Directive (2000/60/EC). The EU WFD outlines a new approach for the management of European river basins and their groundwater bodies. The main environmental objectives of the Water Framework Directive (WFD) are, amongst others, set out as follows:

- *Reaching the good ecological and chemical status for all surface water bodies by 2015.*
- *Reaching the good chemical and quantitative status for all groundwater bodies by 2015.*
- *Reaching the good ecological potential for Heavily Modified Water Bodies.*

The International Commission for the Protection of the Danube River (ICPDR) provides the platform to achieve this objective on the basin wide scale. As a first step, the Danube Basin Analysis (WFD Roof Report 2004) was completed which provides a comprehensive assessment on the current situation and the gaps in the Danube River Basin. It represents a sound analytical basis towards implementing the WFD successfully. A subsequent step is the preparation of a River Basin Management Plan by the end of 2009.

To start the process, the strategy for the development of a Danube River Basin Management Plan is described in the ICPDR document DC-101 *"Development of a Danube River Basin District Management Plan – Strategy for Coordination in a Large River Basin"* and within the corresponding "*Road Map for the Development of a Danube River Basin District Management Plan 2005- 2010*" (ICPDR DOC 110, 2005). As part of the strategy, issue papers are being developed on the identified DRB significant water management issues, which are subsequently described.

This issue paper addresses hydromorphological alterations in compliance with the requirements of the EU WFD and the Danube River Protection Convention. At the ICPDR Ministerial Meeting in December 2004 the Danube countries endorsed the *Danube Declaration* expressing their commitment to further reinforce transboundary cooperation on sustainable water resource management within the Danube Basin. The Danube Declaration contains the following goals and objectives related to hydromorphological issues (Part 6):

We, the Ministers, High Officials and the Representative of the European Commission, being responsible for the implementation of the DRPC,

(6) agree that in the coming years we aspire to achieve the following goals and objectives, taking into account the sometimes more ambitious commitments already made by other countries at the national or EU level:

6 vi) to reverse the trend of the physical degradation of aquatic ecosystems by returning sections of the Danube and its tributaries to a more natural state inter alia by restoring floodplains, reconnecting wetlands and retention areas and by further efforts to reduce the physical impact of new projects;

6 vii) to protect, conserve and restore the biodiversity and diverse habitats of the water dependent ecosystems, in particular wetlands and floodplains, in the Danube basin with particular attention being given to rare and endangered species and the unique ecosystem of the Danube Delta;

This issues paper will be the basis of making the objectives - outlined in the Danube Declaration - operational within Danube River Basin Management Plan by 2009.

To ensure a harmonised approach, the EC guidance documents on WFD and hydromorphological pressures are also taken into account (both the policy and the technical document are available under www.icpdr.org).

2. Problem Description

Organic pollution, nutrient pollution, pollution caused by hazardous substances and **hydromorphological alterations** are the four basin-wide significant water management issues.

Referring to the findings of the Danube Basin Analysis the extent of hydromorphological alterations in the DRB has been significant over the past centuries. Anthropogenic influences on the type-specific hydromorphological characteristics of surface waters are manifold and impact the status of these aquatic systems in a corresponding way. Common anthropogenic pressures are dams, weirs and sluices, which interrupt the longitudinal continuity of rivers. The use of water resources e.g. for energy production can impact both the hydrology (e.g. effects due to inefficient residual water, hydropeaking) and morphology of rivers (e.g. longitudinal continuum interruption, reduced flow velocities, etc.). The disconnection of riverine floodplains and disturbance of the natural lateral connectivity of river systems can frequently result in a decrease of status. Further, the morphology of rivers has been impacted by the channelisation of river stretches for human uses, erosion of the river bottom as a consequence of reduced sediment transport (due do dams) or dredging for navigation. Constructions performed as flood protection measures (lateral dykes, weirs, etc.) also impact the morphology of riverine systems. Hence, frequently one driver results in several pressures.

As a result, the main hydromorphological impacts on the riverine status that have been observed include

- *the decline of species biodiversity*
- *the decline of species abundance*
- *altered population composition*
- *hindrance of species migration (focus fish species) and the corresponding decline of naturally reproducing fish populations (e.g. sturgeon).*

3. Scope and General Aims of this Issue Paper

3.1. Aims of this issue paper

In order to preserve and improve the ecosystem quality in the Danube Basin in accordance to the DRPC and thereby fulfilling the requirements of the EU WFD by 2015, the relevant measures addressing the significant water management issue of hydromorphological alterations have to be considered within the Danube River Basin Management Plan.

This issue paper provides an overall strategy and guidance how to address the management issue of hydromorphological alterations, how to develop a relevant management approach regarding measures and how an improvement of status can be achieved - all on a basin-wide scale. The document includes management objectives for the basin wide scale, which are based on visions and which will guide the Danube countries towards a common environmental aim. The objective is to develop a Joint Programme of Measures (JPM) within the frame of the Danube RBM Plan and therefore for the water bodies covered in the Roof Report 2004. The issue paper might also support the development of the Programmes of Measures at the national level.

3.2. What is covered by this document?

Environmental objectives, exemptions and management objectives (WFD Article 4)
Environmental objectives, respective exemptions and management objectives (according to WFD Article 4) are generally addressed in the document on Significant Water Management Issues (ICPDR document IC/WD/268). The correct application of exemptions should be ensured providing clarification when they can be applied. This issue paper supplements the general approach by outlining specific examples regarding environmental objectives (e.g. wetland restoration, longitudinal continuity) and exemptions.

Measures related to current hydromorphological alterations

This issue paper addresses current hydromorphological pressures, which are based on the findings of the Roof Report 2004 and which may impact the status of rivers by altering their hydromorphology. For each pressure visions, management objectives, needed input for the DRBM Plan and the preparatory process are outlined in order to achieve a Joint Programme of Measures on the basin wide scale. The JPM is largely based on a compilation of national measures. However, some individual measures might also be agreed on the international level (e.g. feasibility study for the Iron Gate I &II).

Approach for future infrastructure projects

Guidelines and recommendations for future infrastructure projects (hydropower, navigation, flood defence) in the DRB will be developed as part of the DRBM Plan to ensure the achievement and conservation of the environmental objectives. The issue paper outlines a vision, management objectives, a preparatory process and needed inputs for the DRBM Plan.

The issue paper addresses the ***improvement of methodologies and data availability*** related to procedures used within the Danube Basin Analysis (e.g. final identification of HMWB) and related to information gaps identified in the DRB. Inputs for the DRBM Plan and preparatory steps are provided. Further, the role of ***monitoring within the JPM*** is highlighted.

4. Environmental Objectives and Exemptions

The WFD environmental objectives are clearly defined within the WFD and have to be reached in the most efficient way by 2015. After the finalisation of the risk analysis (Roof Report) – these theoretical objectives now have to be translated into practice on the different implementation levels (national, sub-basins and basin wide scale). The procedure and agreement on environmental objectives and exemptions are performed in parallel for the first management cycle.

Regarding hydromorphological alterations visions and management objectives (see definition in the SWMI document – IC/WD/268) for the basin-wide level have been developed for specific pressures:

- Longitudinal and habitat continuity interruption:
  Based on the respective resolution of the 9th ICPDR Ordinary Meeting, sturgeon species and other migratory species will be addressed on the Danube basin-wide scale according to a proposed step-by-step approach. The respective vision and management objective for the sturgeon and other migratory species are included in this document (see chapter 5.1). Appropriate actions will be integrated into the DRBM Plan.

- Dis-connection of adjacent floodplain and wetlands:
  Regarding dis-connected floodplains/wetlands on the basin-wide scale, a vision and a management objective related to the re-connection by 2015 has been developed. To ensure a holistic approach, this vision takes both issues of flood protection (retention areas) and nutrient reduction into account. A register of disconnected floodplains/wetlands (see chapter 5.2) will support this activity.
- Hydrological alterations:
  Regarding hydrological alterations on the basin-wide scale, a respective vision has been developed. Regarding the management objective an analysis related to hydrological alterations in the DRB will be developed to be an addendum to the Roof Report 2004 as integral part of the DRBM Plan.

The management objectives will enable the specific demonstration of implementation success.

The RBM EG and both Task Groups for Hydromorphology and Economics will address the final designation of HMWBs and exemptions according to WFD Article 4.7. Solutions for an appropriate application will be provided.

In addition, the application of exemptions throughout the Danube River Basin should be comparable and consistent. To this end, the exchange of information on national approaches and experiences should be ensured (e.g. through workshops) and - if appropriate - guidelines for the application of exemptions in the Danube River Basins could be developed.

5. Measures Related to Current Pressures

For a practical procedure towards the development of the Joint Programme of Measures (JPM) the identified pressures (Roof Report 2004) have been used as a starting point. The pressures listed within the subsequent chapters 5.1 to 5.3 represent the most relevant ones as identified in the Danube Basin Analysis 2004. A set of coordinated measures is suggested to be part of the first international Danube River Basin Management Plan 2009.
Other pressures (see chapter 5.4) may be addressed if the assessment basis will be available and if it will be possible to prepare the detailed approach in time for the first river basin management plan. Otherwise, they may be addressed on national level only or in the subsequent international river basin management plans.
The ICPDR process towards a 'Joint Statement on Inland Navigation and Environmental Sustainability in the Danube River Basin' will in parallel address current and future pressures/impacts caused by navigation. Additional future infrastructure projects will be also identified. The outcomes will be integrated into the JPM.

The ICPDR's basin wide vision for hydromorphological alterations is the balanced management of past, ongoing and future structural changes of the riverine environment, so that the aquatic ecosystem in the entire DRB functions in a holistic way and is represented with all native species.

5.1. Morphological Alterations: Interruption of longitudinal river and habitat continuity

Results according to Danube Basin Analysis:

Longitudinal continuity interruption on the basin-wide level (surface waters with catchment areas > 4,000 km², among them also transitional and coastal waters) have been collected and were illustrated in Map 7 (Danube Basin Analysis 2004). 700 large continuity interruptions have been identified in the DRB. 30% of the length of the Danube River are impounded and many tributaries are also strongly affected by continuity interruptions (e.g. River Lech: 32 identified hydropower dams, 90% of the river length impounded).

Drivers DRB scale:

- Hydropower
- Navigation
- Flood defence

Possible impacts – failure of good status:

- Obstacle for fish migration
  - Reduction of naturally reproducing fish populations
- In impounded sections sediment retention, reservoir flushing, clogging of the river bed and floodplains with fine sediments and reduced transport of sediments
  - Loss of species habitats with a subsequent loss of typical species
- Alteration of flow regime – reduced flow velocities, hydropeaking, residual water below interruption of longitudinal continuum (for details see 5.3)
  - Change of species composition from riverine to lake populations
  - Species loss due to regular artificial flood pulse effects (hydropeaking)
  - Species loss due to habitat loss (insufficient residual water)

Besides the overall vision related to hydromorphological alterations in the DRB, the ICPDR's basin wide vision regarding the interruption of river and habitat continuity is, that anthropogenic barriers and habitat deficits do not hinder fish migration and spawning anymore - sturgeon species and specified other migratory species are able to access the Danube River and relevant tributaries. Sturgeon species and specified other migratory species are represented with self-sustaining populations in the DRB according to their historical distribution.

Basin Wide Management Objective – Restoration of River and Habitat Continuity

The way towards the vision will be achieved through the implementation of the following management objectives by 2015:

EU Member States, Accession Countries and non EU MS:

⇨ Construction of fish migration aids and other measures to achieve/improve river continuity in the Danube River and in respective tributaries to ensure reproducing and self-sustaining of sturgeon species and specified other migratory species.
  - Specification of number and location of fish migration aids and other measures to achieve /improve river continuity, which are intended to be implemented by 2015 by each country.

⇨ Restoration, conservation and improvements of habitats and their continuity for sturgeon species and specified other migratory species in the Danube River and the respective tributaries.
  - Specification of location, extent and measure type, which are intended to be implemented by 2015 by each country[1]..

⇨ Performance of a feasibility study regarding the possibility for sturgeon and other important species to migrate upstream and downstream through the Iron Gate I & II dams including habitat surveys. If the results of this feasibility study will be positive the respective measures should be integrated into the DRBM Plan and Joint Programme of Measures for implementation.

[1] *This specification will be determined as soon as the information on non-passable obstacles for fish is available.*

Input for the Danube RBM Plan

The subsequent deliverables will be part of the Danube River Basin Management Plan and will include a list of national projects (planned measures) – with or without available financing – related to

a. the construction of fish migration aids (e.g. natural and/or technical fish bypass channels, fish lifts, nature-like ramps etc.) as mitigation measures to ensure the longitudinal continuity on the basin wide scale

b. the connection of disconnected tributaries by e.g. constructing natural and/or technical fish by pass channels, reshaping of existing ramps, removal of obsolete barriers and artificial differences in level, etc. and

c. the restoration, conservation and improvement of habitats as measures to ensure habitat continuity

all on the basin wide level.

Preparatory Process

- Compilation of a register including longitudinal continuity interruptions/migration barriers in the DRB and evaluation regarding their basin wide impact (more comprehensive evaluation than provided in the Danube Basin Analysis). The Danube states are asked to provide this information.
- As a first step, the Danube states are asked to provide a list of national measures – with or without available financing - regarding the restoration of longitudinal river continuity/fish migration to the ICPDR PS. The information will be collected using appropriate templates. The bottom-up approach will be used for the evaluations. Hence, the positive effect of the national measures will be translated to the basin wide level to analyse if the international management objectives are achieved.
- As a second step, the Significant Water Management Issues (including the deliverables for the PoM) will be provided for review to the public by the end of 2007. Integrating the review results, the first draft of the Danube River Basin Management Plan will be available by the end of 2008.
- Performance of a feasibility study regarding the possibility for sturgeon and other important species to migrate upstream and downstream through the Iron Gate I & II dams including habitat surveys. If the results of this feasibility study will be positive the respective measures should be integrated into the DRBM Plan and Joint Programme of Measures for implementation.

Documentation of implementation success:

- Development of ways to illustrate implementation objectives in a clear and measurable way in comparison with the basin wide management objective.
- Develop suitable indicators/criteria to measure the implementation success (by ICPDR EGs and Task Group for Hydromorphology), e.g.
    - Development of a map showing the achievements (= restoration of river continuum) on a regular basis,
    - Description of the measures' success per location.

Economic aspects and future measures

Regarding measures, the different economic situations within the DRB countries have to be addressed and to be taken into account. A big variation of economic key aspects and subsequent measure costs are expected from upstream to downstream countries. This refers to all pressures within Chapter 5. In close cooperation with the ICPDR expert groups, the ICPDR Economics Task Group will investigate on those economic issues that should be addressed on the basin wide scale. The Economics Task Group will develop a general scheme and approach on economics according to WFD requirements for the basin wide level in relation to consideration on national level.

5.2. Morphological Alterations: Dis-connection of adjacent floodplains and wetlands

Results according to Danube Basin Analysis:

80% of the former flood plains/wetlands in the DRB have been lost during the last 150 years.

Drivers DRB scale:

- Hydropower
- Navigation
- Flood defence
- Urbanisation and agricultural land use

Possible impacts – failure of good status:

- If floodplains/wetlands are disconnected from the main river course the consequences can result in
    - loss of habitats
    - loss of species
    - alteration of natural flow regime and sediment dynamics – change of populations

Besides the overall vision related to hydromorphological alterations in the DRB, the ICPDR's basin wide vision regarding the interruption of the lateral connectivity (=disconnection of adjacent floodplains) is, that floodplains/wetlands in the entire DRB are re-connected and restored. The integrated functions of these riverine systems ensure the development of self-sustaining aquatic populations, flood protection and reduction of pollution in the entire DRB.

Basin Wide Management Objective – Re-connection of adjacent floodplains/wetlands

The way towards the vision will be achieved through the implementation of the following management objectives by 2015:

EU Member States, Accession Countries and non EU MS:

⇨ Protection, conservation and restoration of wetlands/floodplains to ensure biodiversity, the good status in the connected river by 2015, flood protection and pollution reduction.

⇨ To determine the implementation steps for restoration and reconnection of lost floodplains and wetlands along the Danube River and its tributaries, a priority ranking needs to be developed and introduced taking flood retention, nutrient reduction and wetland/floodplain re-connection into account (the identified 17 sites identified along the Danube River and tributaries of approximately 330.000 ha should be considered[2]).

⇨ Implementation of the *no net-loss principle*[3]

[2] The 330.000 ha restoration potential refers to findings of the WWF-Danube Pollution Reduction Programme report: Evaluation of Wetland and Floodplain Areas in the DRB(1999).

[3] No net loss principle = conservation of floodplains and wetlands whenever possible – if surface areas of wetlands are converted to other uses, the total wetland resource base has to be offset through restoration and creation of other wetlands).

Input for the Danube RBM Plan

The subsequent deliverables will be part of the Danube River Basin Management Plan and will include a list of national projects (planned measures) – with or without available financing – related to

a. the reconnection of former floodplains (e.g. side arms, oxbows and other wetlands) to ensure the lateral connectivity of riverine systems,
b. the breach of dikes or mitigate effects of dikes (e.g. use of sluices or weirs to allow water back into the areas, retaining the original form of the channel, resetting of dykes),
c. significantly change maintenance of dams/dikes (e.g. where dikes are no longer needed - no repairs, no removal of dead wood) and
d. the restoration of respective habitats.

Preparatory Process

- Compilation of a comprehensive register including dis-connected floodplains/wetlands.
- As a first step, the Danube states are asked to provide a list of national measures – with or without available financing - regarding the re-connection of dis-connected floodplains and the restoration of respective habitats to the ICPDR PS. Information on the reason for re-connection measures (achievement of good status, flood event management, nutrient reduction) should be provided. The information will be collected using appropriate templates. The bottom-up approach will be used for the evaluations. Hence, the positive effect of the national measures will be translated to the basin wide level to analyse if the basin-wide objectives are achieved.

Documentation of implementation success:

- Development of ways to illustrate implementation objectives in a clear and measurable way in comparison with the basin wide management objective.
- Develop suitable indicators/criteria to measure the implementation success (by ICPDR EGs and Task Group for Hydromorphology)
  - Development of a map showing the restoration success (= restoration of lateral connectivity, floodplains/wetlands) on a regular basis
  - Description of the restoration success per location

5.3. Hydrological alterations

Results according to Danube Basin Analysis:

Hydrological alterations refer to pressures resulting from water abstraction (e.g. hydropower generation: hydropeaking and residual water discharges, agricultural irrigation, etc.). Hydrological alterations are often of local importance and do not necessarily result in basin-wide transboundary effects. However, the cumulative effect of water abstractions may become significant in the transboundary context (e.g. planned irrigation projects in the Tisza River Basin). Hydrological alterations are mentioned within the Danube Basin Analysis but not dealt with in detail. Further investigations on the location, basin-wide relevance and impacts of these pressures have to be performed.

Drivers DRB scale:

- Hydropower generation (intermittent hydropower generation in the case of hydropeaking)
- Agriculture (irrigation)
- Industry
- Water supply (reservoirs)
- Flood protection (retention reservoirs)

Possible impacts – failure of good status:

- Species loss/alteration due to regular artificial flood pulse effects (hydropeaking)
- Species loss due to habitat loss (insufficient residual water and migration barriers)

Besides the overall vision related to hydromorphological alterations in the DRB, the ICPDR's basin wide vision regarding hydrological alterations is their management in such a way, that the aquatic ecosystem is not influenced in its natural development and distribution.

Basin Wide Management Objective – Hydrological Alterations

The way towards the vision will be achieved through the implementation of the following management objectives by 2015:

EU Member States, Accession Countries and non EU MS:

⇨ Performance of a respective analysis as an addendum to the Danube Basin Analysis 2004 to be part of the Danube River Basin Management Plan. Operational management objectives will be defined as soon as the analysis is finalised.

Inputs for the Danube RBM Plan

Due to existing data and information gaps – as also realised during the ICPDR Workshop on Hydromorphological Alterations (July 2006, Neusiedl/See – AT and by the ICPDR Hydromorphology Task Group) - further analysis related to pressures/impacts of hydrological alterations (water abstraction, water supply) in the DRBD are needed and will focus on

- water abstraction (hydropower, industry, agriculture) and corresponding pressures/impacts (e.g. hydropeaking, residual water)
- water supply and corresponding pressures/impacts

Preparatory Process

- Performance of an analysis related to hydrological pressures/impacts in the DRB (water abstraction/water supply) by the end of 2007 to be an addendum to the Danube Basin Analysis 2004 (see approach of Tisza Basin Analysis as an example).
- However, Danube states, which already set national measures (PoM) regarding hydrological impacts, are asked to provide these projects – with or without available financing - to the ICPDR Secretariat. The information will be collected using appropriate templates. The bottom-up approach will be used for the evaluations. Hence, the positive effect of the national measures will be translated to the basin wide level to analyse if the international environmental objectives are achieved.

Documentation of implementation success:

- Documentation of the implementation success related to hydrological alterations will be performed as soon as necessary information will be available. The approach will be similar to the other pressures.

5.4. Other hydromorphological alterations

The inclusion of measures for other hydromorphological alterations will be adapted over time. Some issues are included in the Danube Basin Analysis 2004. However, the assessment basis, which will be used for further actions needs to be strengthened. Once the assessment is improved by strengthening and comparing the methodologies as well as filling the data gaps,

specific measures can be developed for subsequent river basin management plans. In addition, other pressures may be identified through the discussion and consultation process, which then can be addressed, as appropriate. In any case, the lack of specific actions on basin wide level should not prevent that national or sub-basin programmes including measures on other pressures may and should be identified, where relevant. The ICPDR can provide a platform to exchange information on national activities.

Input for the Danube RBM Plan

The DRBM Plan will include an addendum and a future management approach related to the issue of sediment quality and quantity in the DRB. A respective issue paper has already been drafted as a living document[3]. The respective information aims to support the future decision whether sediment transport and contamination represents a further significant water management issue in the DRB. Other issues like climate and land use change may be part of the 2nd DRBM Plan. This requires the investigation of the issues in order to identify their specific relevance and possible future management needs in the DRB.

6. Approach for Future Pressures

In addition to the significant degradation of the Danube and its tributaries caused by existing hydromorpological alterations, a considerable number of projects on navigation, hydropower and flood defence are at different stages of planning and preparation. The Danube Basin Analysis includes a chapter on future infrastructure projects and a non-exhaustive list of the planned activities in the DRB (see Roof Report 2004 chapter 4.4.4.5 and Annex 6).

According to the Danube Basin Analysis the subsequent conclusions can be drawn:

- Many future infrastructure projects and their implementation may lead to a deterioration of the current status of the water bodies;
- It is not possible to quantify the overall pressures and impacts of these projects;
- Depending on the scale of the specific future projects, it is possible that significant transboundary effects will occur;
- Future infrastructure projects must fulfil the conditions set out in Article 4, in particular the provisions for new modifications specified in Article 4, Paragraph 7;
- Specific future projects must be subject to an Environmental Impact Assessment and/or a Strategic Environment Assessment during the planning phase, which takes account of the pressures and impacts to the aquatic environment and ensures that the conditions of Article 4 are met.

This ICPDR activity on hydromorphological alterations will support the development of an approach how to deal with future infrastructure projects towards the development of the DRBM Plan. The ICPDR process to develop a 'Joint Statement on Inland Navigation and Environmental Sustainability in the Danube River Basin' will also address future infrastructure projects within the navigation sector. The process respects the overall approach towards the JPM. The outcomes will be integrated into the DRBM Plan. Experiences gained through this process can be applied for the other sectors (hydropower, flood defence).

[3] ICPDR Issue Paper IC/WD/266 on *Management Problems of Sediment Quality and Quantity in the Danube River Basin*.

Examples of best practice approaches will be shared and could be used for a sustainable implementation of new projects in order to reach the environmental objectives and to prevent the degradation of status. Information exchange and transparency with regard to the possible transboundary impacts of projects, plans and programmes affecting the aquatic ecosystem will be facilitated and performed. The ICPDR will facilitate this process and serve as a coordination platform.

Besides the overall vision related to hydromorphological alterations in the DRB, the ICPDR's basin wide vision regarding future infrastructure projects is their management in such a way, that the projects are conducted in a transparent way using best environmental practices and best available techniques in the entire DRB – impacts on or deterioration of the good status and negative transboundary effects are fully prevented, mitigated or compensated.

Basin Wide Management Objectives – Future Infrastructure Projects

The vision will be achieved through the implementation of the following management objectives by 2015:

EU Member States, Accession Countries and non EU MS:

⇨ Conduction of Environmental Impact Assessments and/or a Strategic Environment Assessment in conjunction with the EU Water Framework requirements of Article 4(7) during the planning phase of the respective future infrastructure project if needed.

⇨ Fulfilment of the conditions set out in WFD Article 4, in particular the provisions for new modifications specified in Article 4, Paragraph 7.

⇨ Recommendations for stakeholders for the implementation of best environmental practices and best available techniques.

Input for the Danube RBM Plan

Where appropriate, the ICPDR will compile guidelines and recommendations related to future infrastructure projects in order to ensure the achievement and conservation of the good ecological and chemical status of the waters in the DRB. Specifications on best available techniques and best environmental practices will be elaborated to support this objective. The DRBM Plan will include these recommendations.

Preparatory Process

- Further development of the list on future infrastructure projects in the DRB (Roof Report 2004, Annex) including national information regarding EU WFD Article 4(7) for inclusion in the DRBM Plan 2009 (PoM).
- Compilation of ICPDR guidelines and recommendations related to future infrastructure projects taking the key drivers (navigation, hydropower, flood defence) into account. Therefore, specification on best available techniques and best environmental practices will be elaborated in one or more documents for the following issues:
  - *Hydropower operation management (hydropeaking regime, ecologically sufficient discharge of residual water)*
    - *Development of criteria for minimum discharges for uses and services (residual water)*
  - *Review of current maintenance objectives and practices related to river engineering*
  - *Floodplain management*

- Information exchange regarding the ICPDR process to develop a 'Joint Statement on Inland Navigation and Environmental Sustainability in the Danube River Basin'
  - *Integration of relevant outcomes into the JPM and DRBM Plan*
  - *Application of gained experience (e.g. best environmental practice, best available techniques) for the other sectors (hydropower, flood defence)*

The above steps of the preparatory process were proposed at the ICPDR Workshop on Hydromorphological Alterations (July 2006, Neusiedl/See - AT).

7. Improvement of Methodologies and Data Availability

This chapter addresses issues, which need improvement related to the procedures within the Danube Basin Analysis in order to achieve the WFD requirements and to fill specific data gaps.

Input for the Danube RBM Plan

The description of activities and related achievements will be part of the DRBM Plan:

a. Harmonisation and development of assessment system for eco-morphology and/or hydromorphological alterations.
b. Final designation of HMWBs.
c. Economic approaches related to measures.
d. Illustration of implementation success

Preparatory Process

- Development of harmonised/commensurated assessment systems on eco-morphology and/or hydromorphological alterations in the DRB.
- Development of an approach and criteria to designate HMWBs for the basin wide scale.
- Economic approaches – development of tools for practical application (cost effectiveness, ecosystem services, etc.).
- Development of indicators for the appropriate illustration of implementation success (including the link to measures and monitoring).

The Task Group on Hydromorphological Alterations will define a respective timetable.

8. Monitoring and the Joint Programme of Measures

Monitoring plays an essential role related to river basin management plans, and thus precisely related to the JPM. Monitoring results in relation to the JPM will be used for the subsequent tasks

a. Evaluation of the ecological efficiency of hydromorphological measures: The success of measures to improve the ecological status is assessed. Operational monitoring results are implemented for these analyses.
b. Validation of the risk assessment performed according to Article 5: Status class assessments deliver clarification if respective water bodies are *at risk*. Operational as well as surveillance monitoring results are implemented for these analyses.
c. Basis for a gap analysis.
d. Illustration of implementation success: The improvement of status is illustrated.

In the Danube River Basin the TNMN results will be used to implement the above. The strategy of the WFD compliant TNMN foresees that monitoring results from both international assessments (TNMN) as well as national assessments (national monitoring programmes) are integrated on the basin wide scale. Information related to operational monitoring (status class, assessed biological and/or chemical parameters, location of monitoring sites) is provided by the Danube states and as a follow-up translated to the international scale (for details see the ICPDR document Development of WFD Compliant Monitoring Programmes for the Danube River Basin District).

The ICPDR's Joint Danube Survey 2 – performed every six years as part of the WFD compliant TNMN – took place during summer 2007 and will significantly contribute to the improvement of hydromorphological information in the Danube River Basin especially of the Danube River. The results from the hydromorphological survey and assessments, which focused on the Danube itself, will support filling the respective data gaps and support the achievement of the management objectives. In that respect, hydromorphological JDS2 data will be exploited in the best possible way.

Precondition for this approach:

- Harmonised classification approaches between the Danube states, which will be ensured by the intercalibration process and allow the comparison of results.
- Use of WFD compliant sampling and assessment methods in all Danube states.
- Data exchange using the Danube GIS.

The ICPDR serves as a platform for knowledge and information exchange (e.g. a brief document on WFD compliant methods is drafted defining their composition and included elements).

Annex 1 - Sturgeon Background Document

Overlaps of the Sturgeon Action Plan with the Danube River Basin Management Plan

Note: The Sturgeon Background Document is not again provided for this 10th OM as it was already presented and reacted on at the 9th OM.