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The Influence of International System Consolidation on Implementation of International Environmental Regulations at the Project Level of Catchment Management

-Case Studies of IWT Projects in the Danube River Basin-

Master Thesis

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Abstract

This thesis introduces the reader to sustainability concepts which are connected with the broader concept of Integrated Catchment Management. It bears in mind the additional complexity of management options in large international river basins which asks for international cooperation when objecting sustainable development. The thesis argues that large river basins cannot be regarded as either consolidated or fragmented international systems but as representing a variety of levels of system consolidation at the same time. The research tries to answer the question if the level of system consolidation influences compliance to international environmental regulations at the project level. It chooses for a comparison between river engineering projects in different countries along the Danube River and results in advices for project developers and policy makers to enhance compliance to environmental regulations.

Keywords

Catchment Management, International Cooperation, Environmental Regulations, System Consolidation, Danube River, River Transport, Austria, Hungary, Croatia, Serbia, River Engineering Projects

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Table of Content

List of Abbreviations

AGN – European Agreement on Main Inland Waterways of International Importance
BMVIT – Ministry of Transport, Innovation and Technology (Austria)
DC – Danube International Commission
DCP – Danube Cooperation Process
DRBD – Danube River Basin District
DRBMP – Danube River Basin Management Plan
DRPC – Danube River Protection Convention
EIA – Environmental Impact Assessment
EIS – Environmental Impact Assessment
EPDRB – Environmental Program for the Danube River Basin
EU – European Union
ICM – Integrated Catchment Management
ICPDR – International Commission for the Protection of the Danube River
ISRBC – International Sava River Basin Commission
IWRM – Integrated Water Resource Management
IWT – Inland Waterway Transport
KEHM – Ministry of Transport, Energy and Telecommunication (Hungary)
KÖVIZIGs – Environmental and Water Directorates (Hungary)
KvVM – Ministry of Environment and Water (Hungary)
MEPPPC – Ministry of Environmental Protection and Construction (Croatia)
NAIADES – Navigation and Inland Waterway Action and Development in Europe
NEWADA – Network of Danube Waterway Administrations
NGO – Non Governmental Organization
RBMP – River Basin Management Plan
Rkm – River Kilometer
SEA – Strategic Environmental Assessment
SVIP – State Institute for Nature Protection (Serbia)
TEN-T – Trans European Transport Network
UNECE – United Nations Economic Commission for Europe
VITUKI – Institute of Environmental Protection and Water Management (Hungary)
WCED – World Commission on Environment and Development
WFD – Water Framework Directive
WWF – World Wide Fund for Nature

List of Tables

List of Figures

1. Introduction

Multiple human interests are connected with river basins and catchment areas. Some of them are: drinking water supply, fishery, agriculture, hydropower generation, recreation, transport and natural conservation (Ashton 2000; Jaspers 2003; Olomoda 2002). Those interests affect each other throughout a river basin and most of them put the natural environment under pressure which means threatening human supply with essential ecosystem services.

The first part of chapter 2 presents concepts for creating sustainable development and for balancing interests in river basins. Within the last decades integrated approaches have developed which try to overcome sectoral management approaches of the past in order to manage the different interests throughout a river system. Integrated Catchment Management (ICM) tries to account for the complexity and interdependence of river basins, which are regarded as human-environment systems (Pahl-Wostl et al. 2007). Today it is widely accepted that river basins need to be managed as a whole because they are the natural entities that supply humankind with a variety of services, which are essential for human welfare.

Yet, river basins are not equal to administrative borders. A large part of the worlds´ population (about 40% in 2002) lives in river basins that are shared by two or more countries (Grey, Sadoff 2002). More than 260 international river basins worldwide cover about 45% of the Earths´ land surface (Bernauer 2001). Therefore, most of the mentioned interests on river basins are spread over two or more countries creating interdependence within the international system and at the same time making management of the river basin even more complex. Complex management issues in river basins for instance are the development of an international coherent river transport system, environmental protection, flood protection and drinking water provision. The second part of chapter 2 tries to identify mechanisms of international systems in general and in the case of shared river basins. Considering interdependence within river basins and the international setting, I assume that one major challenge of international river basin management is the creation of international cooperation. This part of chapter 2 describes factors that lead an international system to a higher or lower level of system consolidation which is deeply connected with the intenseness of international cooperation.

The theory, as laid out in chapter 2, states that basin wide, trans-sectoral, environmental sustainable and adaptive management is appropriate to guarantee human future supply with ecosystem services by river systems. It also gives input how cooperation in international systems in general and in international river systems in particular may be promoted in order to carry out sustainable management in case of international rivers. It regards the scientific background and policy level of relatively simple two-country river systems only. What is left open is the question, if scientific findings and policy objectives are translated to the project level of river management and if this translation is evenly done throughout large multi-country river systems. It is likely that such river systems do not represent the pure conditions of cooperation or unilateral action as mentioned in the theoretical part but that a variety of levels of system consolidation can be found within just one system. Nevertheless, international regulations may be developed for those basins at the policy level. The question that this thesis wants to answer is: Does the level of system consolidation influence compliance with international environmental regulations at the project level in case of river engineering projects that may create trans-boundary effects?

Chapter 4 presents a case study on the Danube River Basin. The choice is justified by its international setting, the variety of degrees of system consolidation due to the location of the catchment area in both member and non member states of the European Union and by present development efforts

that create a conflict of interests between the transport sector and environmental protection. Chapter 4.1 introduces the Danube River Basin and identifies which international regulations are relevant for this conflict of interests. Chapter 4.2 presents four cases of river engineering projects that aim at increase of navigability. The projects are national projects and are realized at four different levels of system consolidation.

Chapter 5 discusses and compares the data collected in Chapter 3. Six general results can be drawn:

1. International commitments are more or less equally binding or will become binding to each of the three investigated cases,
2. Compliance to those regulations differs between the projects,
3. The highest defined level of system consolidation complies best with international environmental regulations, but a possible general conclusion of compliance to international regulations being highest within EU borders, being lower with no EU country involved and being lowest at EU borders can only be indicated by this research,
4. Trans-sectoral management should be enhanced by the realization of a basin wide trans-sectoral actor platform in order to balance interests of transport development and environmental protection,
5. Even the highest defined level of system consolidation seems not to provide a basis for true joint action,
6. A major concern of this study is that no case complies with the implementation of a basin wide approach.

2. Theoretical Framework

This paper asks if the level of system consolidation influences the implementation of international environmental regulations in river systems. Before trying to find an answer to this question I need to explain the theoretical background of environmental regulations for international river systems. What is their aim and in what kind of political arena do they evolve?
This chapter identifies concepts of river management. What is their aim and how do the concepts work? The first part of this chapter introduces the reader to the topic of Integrated Catchment Management (ICM). It explains the concept of sustainability, sectoral integration and the importance of managing river basins within hydrological boundaries.
Since, in case of international river basins this logically leads to international river basin management, I also have to deal with concepts of international cooperation. The second part of this chapter identifies different levels of international cooperation and explains which factors are leading a system to a higher or lower level of cooperation.
Taking the findings of the two first parts into account, a third part of the chapter identifies principles and institutional arrangements designed particularly for management of international river systems.

2.1. Integrated Catchment Management (ICM)

During the past decades the awareness that environmental problems and human-environment systems are highly complex and unpredictable has led to the development of new management approaches (Pahl-Wostl et al. 2007). River systems are facing a variety of particular challenges:

- the complexity of the system and its internal upstream-downstream interactions across large distances,
- rivers are not respecting administrative boundaries,
- the potential existence of different national policies and strategies,
- the interaction of surface water bodies with each other and with ground water bodies,
- the interaction of the natural environment with human society and the involvement of a variety of sectors and interests,
- the uncertainty of future system changes and
- the potential incapability of new approaches with old institutions and emerging implementation obstacles.

A reasonable approach to face those challenges asks for an interdisciplinary dialogue between scientists, policy-makers and stakeholders (Falkenmark 2004). ICM is a concept that tries to pay attention to those challenges.
Since the first definition of the term ICM by Gardiner in 1984 it has been interpreted in different ways by scientists and decision makers and the term has often been transformed (Stades et al. 2008). Integrated Water Resource Management (IWRM) for example is often used in arid regions. Integration in this respect is limited to improve cooperation in order to improve availability of drinking water. Sometimes the term “integration” is left behind, which links to questions as: what does integration mean; what do we integrate and how far does integration reach? The following paragraphs underpin the necessity of integration of human and natural environment and of different sectors of water management to master the challenge of ICM.

Ecosystem Based Approach

The concept of ICM is connected to the broader concept of sustainable development. Sustainability today is a term often used in politics. Its definition is often rather vague. The first time the concept was presented to a broader public was with the so called Brundtland Report of the World Commission on Environment and Development (WCED) in 1987. It defines sustainable development as development "that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987, p. 43).

Since the United Nations` Rio Convention, that took place in 1992, the concept of sustainable development is broadly accepted as key note of international development and environmental politics (Reichert 2005). In general, the concept of sustainability tries to give an answer to negative effects of human development on the natural environment and resulting loss of human welfare in terms of inability of the system to meet human needs. It tries to balance environmental, social and economical factors in order to work out development strategies that do not cause social costs or environmental damage (Slodczyk 2010). The essence of this objective is the protection of functions of the natural environment in order to sustain services that are essential for human well-being for today and for future generations. Ecosystems are regarded as providing a variety of goods and services to humankind. Those ecosystem-services are defined by the Millennium Ecosystem Assessment as the "benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as regulation of floods, drought, land degradation, and disease; supporting services such as soil formation and nutrient cycling; and cultural services such as recreational, spiritual, religious, and other nonmaterial benefits" (MA 2005, p.V). In order to sustain these services a balancing of human activities and their impact on ecosystems and the protection of the resource water is essential for human well-being today and in future. In cases where human activities and ecosystems are partly incompatible, management will have to deal with trade-off regulations which in order to be broadly acceptable need to be negotiated in a multi stakeholder dialogue (Falkenmark 2004).

The outcomes of the Dublin Conference on Water and Environment from 1992 and the Rio Earth Summit from 1992 are regarded as the background for ICM. In addition to the awareness that human activities rely on ecosystem services and affect ecosystems, the concept of ICM is based on the perception of water as an integral part of ecosystems (Reichert 2005). A physical dimension is distinguished from a non-physical dimension of the resource water. The first refers to physical factors as location, type and quality. The non-physical dimension refers to human and societal use and management of the resource water. It includes different interests of users, national objectives and the institutional environment of decision making. All of those factors need to be regarded in respect to sustainable resource management. A coordinated approach for water is regarded as necessary because water is linking to most of the Millennium Development Goals as they are: eradicating extreme poverty and hunger, achieving universal primary education, promoting gender equality and empowering women, reducing child mortality rates, improving maternal health, Combating HIV/AIDS, malaria, and other diseases, ensuring environmental sustainability and developing a global partnership for development (Savenije, Zaag 2000; Falkenmark 2004).

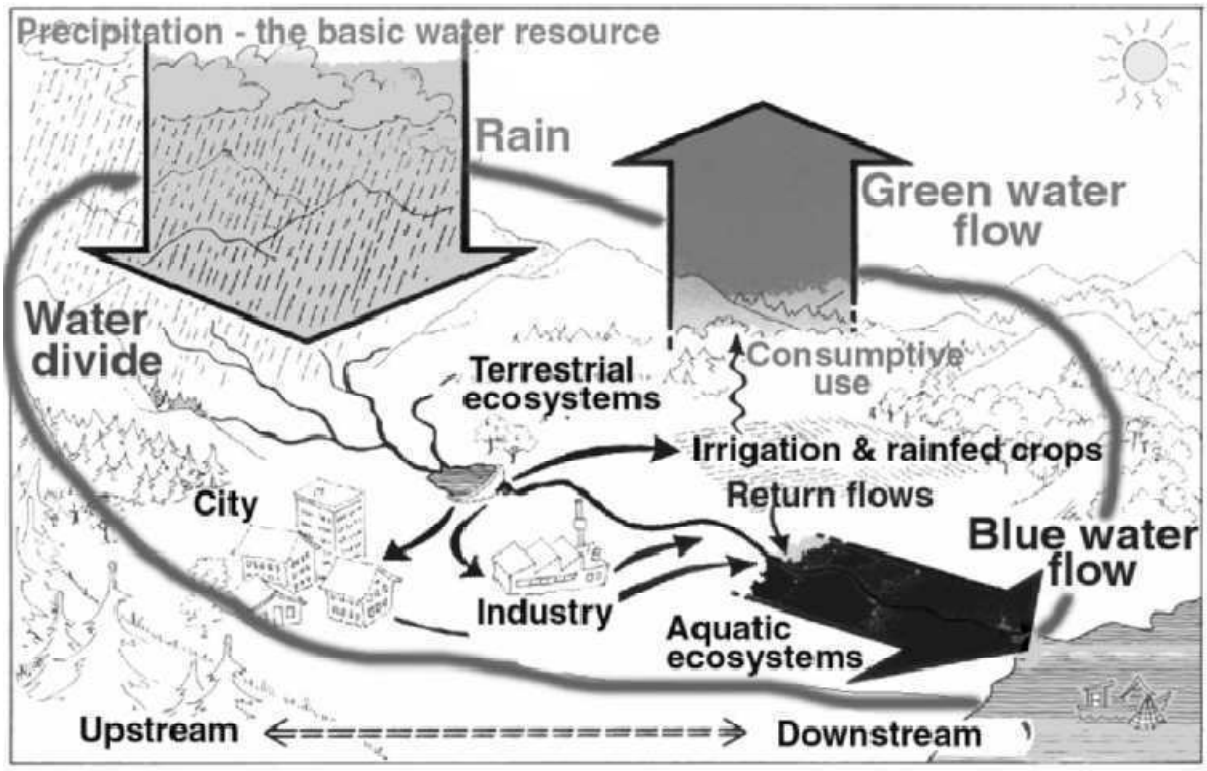

FIGURE 1: GENERAL INTERRELATION OF HUMAN SYSTEMS AND ECOSYSTEMS WITHIN A CATCHMENT AREA (FALKENMARK 2004, P.277).

As presented in the concept of the water cycle (Figure 1) water is usable to ecosystems and humankind during its flow in catchment areas between precipitation and evaporation. Catchment areas of rivers are the natural entities which play a major role in connection of ecosystems and life cycles, as source for freshwater used by ecosystems and humankind and as receptors for most wastewater (Jaspers 2003). Human activities that use water include direct use for domestic purpose, industry or agriculture which partially returns into the water cycle after use but then often is loaded with pollutants or nutrients. They also include in-stream uses as recreation, transport or energy generation for instance. Furthermore, land-use influences water quality and quantity (Falkenmark 2004). Each of the mentioned activities affects ecosystems and other human activities downstream to a certain degree. Due to the catchment areas` composition out of human water-related systems as well as water-dependent ecosystems and their linkage through the flow of water, a high degree of interdependence is created. When objecting sustainable development this issue has to be taken into account (Figure 1). In order to be effective, river basin management needs to take into account the complexity of the physical river system, the exchange of ground- and surface water, the continuous interaction between environmental elements and all relevant societal consumptive (industrial, agricultural, domestic supply) and non-consumptive (Hydropower generation, fishery, recreation, nature conservation) water uses (Jaspers 2003). The only reasonable way of addressing this complexity is a basin wide approach that regards the variety of interests and sectors within a whole catchment area.

The Concepts of Vulnerability and Adaptive Capacity

Pahl-Wostl et al. (2007) state that it is not due to the concept of integration that integrated approaches fail to get fully implemented but because of the surrounding mental models. Partly water management still follows the paradigm of `command and control`, aiming at controllability of a predictable system (Pahl-Wostl et al. 2007; Stades et al. 2008). However, river basins are systems that are more often than not characterized by environmental, political, economic and social uncertainties. ICM within river basins therefore needs to focus on measures and strategies that are appropriate to a wide range of uncertain factors rather than on measures and strategies that are appropriate to certain conditions (Pahl-Wostl et al. 2007).

In addition to the already mentioned complexity, recently expected changes in global climate may lead to major changes in water flow of rivers. Under changing climate, risks of water stress in terms of droughts and floods may occur more frequently, creating serious risk for natural ecosystems and human societies (Palmer et al. 2008). Highly developed river basins are much more affected by climate change than free flowing rivers because of the system relying on the controllability of the status quo.

In order to implement integrated and adaptive management Pahl-Wostl et al. (2007) argue that, rather than top-down approaches, social learning processes need to take place. Useful concepts in research about managing system change are “vulnerability” and “adaptive capacity”. Those concepts help to characterize complex systems as water management regimes for instance in terms of their components, interdependencies and performance in adaptation to system change (Pahl-Wostl et al. 2007).

Vulnerability tries to describe the damage risk of a Human-Environment-System concerning a specific factor, change or event (Zerbisch et al. 2005) as for example Global Change, flooding or a nuclear disaster. The level of vulnerability depends on the actual occurrence of the factor, change or event, the potential effect (including damage) and the level of adaptation of the system towards the factor, change or event (Zerbisch et al. 2005). Adaptation means the presence of adaptive measures in order to reduce damages (Zerbisch et al. 2005). If regarding present adaptation for eventual future events in order to paint a picture of future effects of the factor, change or event on the system without taking any additional measures, one speaks of actual vulnerability. A system may increase its adaptation by using its adaptive capacity which is the availability of resources (financial, institutional, knowledge,…) that are needed to gain an adequate level of adaptation (Zerbisch et al. 2005). If the adaptive capacity of a system is used to increase adaptation of the system one speaks of vulnerability with additional measures. Vulnerability is measured on a scale consisting of low, medium and high (Zerbisch et al. 2005). High vulnerability is given when the system is not adapted to the factor, change or event. Low vulnerability is given when the system is adapted to a certain degree.

Proactive management actions recognize ecosystem services and the natural capacity of river basins to buffer climate change effects. By trying to restore this natural capacity they are appropriate means to reach a low level of vulnerability, to prevent high damage of the system and to gain benefits as good water quality and restored fish population for instance (Palmer et al. 2008). Again, measures need to be coordinated in basin-wide trans-sectoral cooperation in river management in order to create the ability to adapt the whole system to changing circumstances and to a high degree of uncertainty.

Trans-Sectoral Management

As mentioned above, ICM asks for integration of all relevant sectors to water management. Sectoral integration can be regarded as a means to overcome segregation of objectives and interests of different public bodies in order to regard specific problems in a holistic way. Doing so would serve the balancing of interests across sectors (Savenije, Zaag 2000) as well as the availability of expert information from different perspectives.

Jaspers (2003) identifies five general institutional arrangements that may serve implementation of ICM (Figure 2).

- Creation of a platform for stakeholder involvement
- Focus of management on hydrological boundaries
- Organizational decentralization by creation of basin- and sub-basin authorities
- Basin wide-planning system and production of river basin management plans
- Introduction of water-pricing and cost-recovery

FIGURE 2: GENERAL INSTITUTIONAL ARRANGEMENTS FOR IMPLEMENTATION OF ICM (JASPERS 2003).

First, in order to integrate all relevant sectors to river basin management and to achieve environmental, social, technical, financial and institutional sustainability, a platform needs to be created where conflicting interests can be negotiated. This platform should represent all interests, should be under governance of the government in order to protect the interests of society at large (for national river basins – so: for international river basins an international public body would be required), should enable decision making, should have controlling and sanctioning powers, and should represent the different administrative levels (Jaspers 2003).

Second, to widen the focus of management to hydrological boundaries means to take all sources of water inflow into the basin into account, including surface- and subsurface water, wastewater, intruding seawater, seepage and ice melt. This asks for a comprehensive monitoring network with the objective of facilitating resources planning and operational management. Because often river basins are very large which makes comprehensive management more difficult, the use of sub-divisions may be helpful (Jaspers 2003).

Third, decentralization means the transfer of governmental competencies from the central authority to other administrative levels. Driving forces to transfer competencies are to achieve more effectiveness, to create more transparency, to make decisions and get information closer to the end user and to transfer decision making to well informed and accessible people. Decentralization may happen between public administrations or from public to semi-public or even private organizations and often is aimed at specific functions (Jaspers 2003). An important question to be answered is that of the right level of stakeholder participation. Who do we include in which step of management? In each case, acceptance and effectiveness rise with the involvement of affected and benefitting people and institutions. Stakeholders may be included in decision making or even in planning, monitoring and enforcement, depending on the goal of the process. Stakeholder participation at lower levels makes the decision making process more democratic and transparent and therefore more likely to be broadly accepted (Jaspers 2003). Therefore a decentralized, flexible way of management is useful. On the other hand, there are many issues that need to be managed on a basin wide scale in order to guarantee international cooperation. At the river basin scale, a difference needs to be made between regulatory institutions at the policy level and developmental institutions on the implementation level. The first define general objectives of management while the second obtain full legal status of operation and delegation. In order to be effective, river basin organizations need political and financial support from the nation states, well-defined tasks and procedures as well as an appropriate organizational structure (Savenije, Zaag 2000).

Fourth, the production of integrated river basin management plans helps to assess the actual and desired situations, to develop a set of measures to achieve the desired situation, to streamline the participation process, to increase transparency and to enforce vertical and horizontal co-ordination. Horizontal co-ordination refers to the integration of water quantity, water quality, environmental integrity and involvement of interests. Vertical co-ordination refers to co-ordination between sub-divisions and the whole river basin (Jaspers 2003).
Fifth, water pricing and cost recovery is not an easy issue. This is because water on the one hand is regarded as an economic good, on the other hand as a social inheritance. In order to pay the costs of infrastructure projects for supply to, protection from or treatment of water, a general principle is that the user, beneficiary or polluter should pay for water (Jaspers 2003).

Conclusion

The first part of this chapter identified sustainable management within hydrological boundaries and across all relevant sectors as important in order to preserve the functioning of the human-environment system that river basins form. ICM is presented as a useful concept to integrate the variety of interests and challenges of river management.
Resulting from the Brundtland Report in 1987, the Rio Earth Summit in 1992 and the Dublin Conference on Water and Environment in 1992 a sense for sustainable development is more or less commonly accepted. From this point of view the concept of ICM was derived which percepts the resource water, ecosystems and human activities as deeply connected. In addition, human-environment systems as river basins are not stable but always changing and hardly predictable. As the only reasonable way to address the interconnectedness of the system, ICM asks for a basin wide management approach in order to take all aspects that influence water quantity and quality as well as ecosystem development and human welfare into account. ICM thereby asks for sectoral integration and for integration of stakeholders in order to make decisions based on a holistic view and to serve the goal of balanced interests. The creation of a platform for stakeholder involvement, the organization of the catchment area in smaller sub basin authorities, the preparation of river basin management plans as well as the establishment of cost recovery systems might be appropriate tools to meet those objectives.
In order to reach true catchment management, ICM asks management to follow hydrological boundaries instead of administrative boundaries. This makes international cooperation necessary in cases where catchment areas touch the territory of more than one national state. The following part deals with the basics of functioning of international systems in general before a third part will address particular principles of international cooperation within river systems.

2.2. International Interdependence

From the above mentioned it seems that international cooperation is a crucial issue in order to reach sustainable development within river systems that cross national borders. It is worth to introduce a part about international interdependence at this point. This will open the view on how international systems work, what cooperation means and which factors influence stimulation of cooperation.

International Systems

Within international systems national states are dependent upon each other. Interdependency refers to a variety of issues as for example political or military actions, use of resources and trade. The interdependence within an international system leads states to cooperate with other states, but the degree of cooperation varies from system to system. Kaufman (1997) describes the historical development of the international system as changing between different levels of consolidation and fragmentation, with systems of balanced power being the historical norm. Extreme fragmented systems for example are systems consisting of tribes or city states. Extreme consolidated systems may be characterized by hegemony of one state. In between the two extremes Kaufman (1997) identifies a range of systems of balance of power which vary in number of poles and in degree of their domination. The "different degrees of system consolidation promote different dynamics in the international system" (Kaufman 1997, p. 174). Grey and Sadoff (2002) try to set up a scale of different levels of international cooperation (Figure 3). One extreme form of international dynamics is unilateral action, which actually means the absence of any cooperation. The opposite extreme is joint action, with the partners negotiating about joint plans, management and even investment. In between there is the level of coordination, which means the simple information and communication of national plans without mutual negotiation; and the level of collaboration, which tries to adapt national plans to each other in order to gain mutual benefits (Grey, Sadoff 2002).

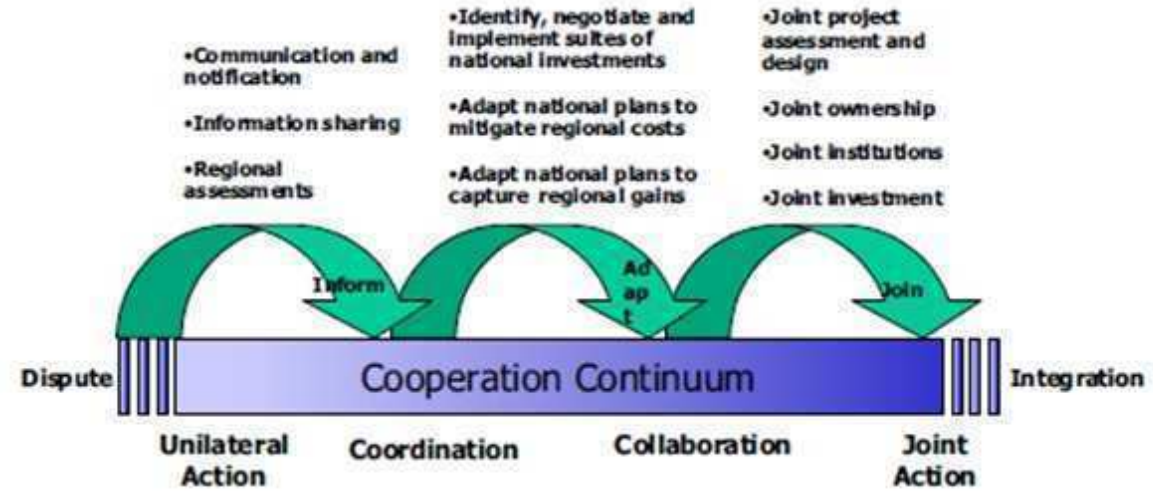

FIGURE 3: LEVELS OF COOPERATION (GREY, SADOFF 2002, P.104).

Creation of Cooperation

Following Kaufman (1997) the degree of consolidation or fragmentation depends on four factors. On the one side there are the factors of power balancing and economic interdependence that push the system to consolidation; on the other side there are the factors of unit identity and reduced administrative capacity, which may lead to fragmentation (Figure 4). This perception is a structural one, focusing not so much on individual effort but on factors that are inherent to the international system.

The factor of unit identity is brought forward by an earlier work. By using relative gains theory, Snidal (1991) identifies the national state as an actor within the international system. He argues with the realist perspective that national states seek relative gains rather than absolute gains, which means,

they are concerned not only with the welfare of the state itself but also with the welfare of the state in comparison with other states. This seeking for relative gains might inhibit cooperation (Figure 4) by the trial of states to gain a superior position and thereby threatening the goals of their competitor. Therefore states might not agree to any cooperation that provides more benefit to others than to themselves. Also, strong asymmetries between the states might lead to relative gains, negatively affecting cooperation efforts, which allows the assumption that cooperation is more likely between equal states or as Kaufmann (1997) calls it: a system with balanced powers pushes the system to consolidation. Snidal (1991) argues that this might be true for a two-state situation. On the other side prospects for cooperation are not negatively affected by relative gains when the number of states is large because then states might prefer a mixture of absolute and relative gains (Figure 4), seeking for balance of power.

Jagerskog (2002), similarly to Kaufmann (1997), percepts international interdependence as a major factor inherent to the international system. By using regime theory in order to describe different views on how cooperation in international systems comes into being he introduces national states` as well as individual action when he argues that cooperative arrangements have been developed to deal with this interdependence. Those arrangements are formed by a set of implicit principles, rules, norms and decision-making procedures that define a given area of international cooperation, the international regime. International regimes exist for different arenas as for instance international trade, monetary policies, security, arms control and use of natural resources and are not necessarily bound to the state as main actor.

Jagerskog (2002) identifies four main perspectives to regime formation. Firstly, realists imagine regimes to form because of interests of powerful hegemons, which means the state remains the main actor on the international tribune. Secondly, neoliberals argue that regimes also come into being in absence of strong hegemons because of states interests to estimate costs and benefits. This reminds on Snidals idea of cooperation being likelier between equal states than in presence of one powerful nation. For the case of river basins Grey and Sadoff (2002) argue that each of the riparian states will have its own agenda for river basin management. On the other side, they assume that national agendas may converge into a cooperative agenda with other riparian states when the cooperative agenda provides benefits that exceed those of the single national agendas (Figure 4). In that case the cooperation becomes a rational choice. At the same time that they ask for international cooperation in order to provide integrated river management, they state that more cooperation is not always the best option but the level of cooperation needs to fit to the specific situation. The benefits should outweigh the costs of cooperation and the outcome should be politically and socially acceptable (Grey, Sadoff 2002). Two other explanations identified by Jagerskog (2002) highlight individual action as major force of regime formation. One explanation is that regimes form in the follow up of crisis or shock events in a timeframe that can be described as window of opportunity. This might happen by state interference or individual action trying to cope with the situation in cooperation with other states or individuals in other states (Figure 4). The other expectation is that regimes may form out of communities of shared knowledge, which emphasizes the role of experts in epistemic communities (Figure 4). Those ideas enrich Kaufmanns theory of factors that push the system to more or less cooperation by adding the actors state and individual to the pure structure of the international system.

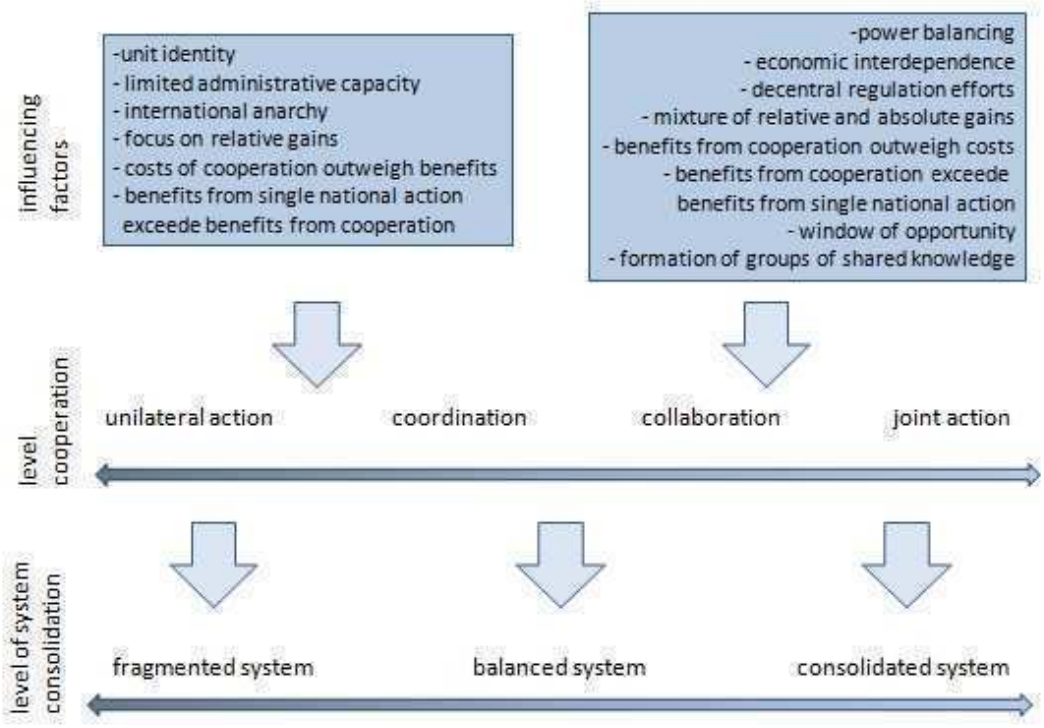

FIGURE 4: FACTORS THAT INFLUENCE INTERNATIONAL COOPERATION (DESIGNED BY AUTHOR ACCORDING TO SNIDAL 1991, KAUFMANN 1997, GREY, SADOFF 2002, JAGERSKOOG 2002).

Conclusion

We can differentiate between extreme consolidated international systems on the one side and extreme fragmented international systems on the other side. The different scale of consolidation within a system may lead to different dynamics namely a higher or lower degree of cooperation between the national states. A variety of factors promotes joint action as the one extreme and unilateral action as the other extreme. International economic interdependence leads a system to more cooperation while strong unit identity would lead a system to less cooperation. The national state is one important actor at the international tribune. Its decision to seek for relative or absolute gains influences its decision to cooperate or to act unilateral. This decision might be influenced by the benefits from both kinds of action. In case a state seeks for absolute gains a state might choose for cooperation if joint action provides more benefit than unilateral action and vice versa. On the other hand if a state seeks relative gains the decision depends on what the states benefit is in relation to that of the potential partner. In each case the benefits should outweigh the costs of cooperation or unilateral action. Individuals or groups of individuals might also be important players in international cooperation. Especially expert groups or groups affected by crisis may play an important role in formation of international regimes.

2.3. Institutionalization of Trans-Boundary Catchment Management

The first part of this chapter introduced river systems as highly interconnected human-environment systems as well as international systems. Management in river systems is affected by actions

upstream and downstream because of the natural flow of water and the interconnectedness of the system. Yet, most catchment areas do not fit into the system of administrative boundaries that define villages, districts, provinces or nations (Savenije, Zaag 2000). This system of administrative boundaries makes it difficult to organize river management because of different interests and policies spread over different countries. Consequently, competition and conflicts between upstream and downstream riparian, between sectors and countries are intensifying (Jaspers 2003). The second part of this chapter addressed the international setting and presented general perceptions on how international systems function and which factors influence cooperation between states. The third part now presents obstacles for international cooperation within river systems, identifies a range of principles that may serve balancing of interests within an international setting and shows how institutionalization of international management may be created.

The concept of managing a whole catchment area as one entity is an alternative approach of river management in comparison to that of following administrative boundaries (Stades et al. 2008). The approach argues that it is more reasonable to organize water management along hydrological boundaries because of the tendency of water to flow downhill and not to stop at any administrative border. This counts for surface water as well as for subsurface water (Jaspers 2003). Basic elements of ICM are the basin-wide scope, integration of surface waters as well as subsurface waters, attention to water quality, quantity and environmental integrity (Jaspers 2003). Major objectives of ICM are prevention of flood-damage and droughts, restoration of good water quality and to develop strategies that promote all riparian sharing costs and benefits of river utilization (Savenije, Zaag 2000; Stades et al. 2008). How can international cooperation to these ends be created within catchment areas?

Elaborating on the likelihood of conflict and cooperation between riparian countries in river systems different authors (Le Marquand 1977; Toset et al. 2000; Shlomi 2008) identify a variety of river systems with different conflict potential between the riparian countries due to the geographical setting. Le Marquand (1977) and Shlomi (2008) identify two types. Le Marquand (1977) identifies “successive rivers” and “contiguous rivers” which equal the typification of Shlomi (2008) who defines a “through-border” configuration which means a river that runs from one country to another and a “border creator” configuration which means a river that forms a natural border between two countries. Toset et al. (2000) describe three configurations. The first (“upstream/downstream relationship”) is equal to Shlomi´s through-border” configuration or Le Marquand`s “successive river”. The second and third configurations (“mixed” and “river boundary”) present two system configurations where the river forms the natural border between riparian countries, with the first representing an “upstream/downstream relationship” with the addition of a stretch of the river forming the border and the second representing a system where the river flows back to the offspring country after being part of the common border. Despite these slightly differing definitions of river systems each of the authors concludes that a relationship where the river flows from one country to another is more conflict prone than other types of river systems. Situations where rivers form a state border offer more incentives for cooperation (Le Marquand 1977; Toset et al. 2000; Shlomi 2008). This is the case because a common border river might create a sense of interdependency for both riparian while an upstream/downstream relation might create a situation where the downstream country is much more dependent upon the upstream country than the other way around. Nevertheless, Shlomi (2008) suggests that because of the high likelihood of conflict in an upstream/downstream relation those constellations are more likely to be solved by concrete institutional arrangements. Typically downstream riparian show more interest in cross-border cooperation than upstream countries because of the higher effects of upstream actions on

downstream interests than the other way around (Savenije, Zaag 2000). Some additional issues might promote development of international cooperation within river systems.

First, the subscription of all riparian to good neighborliness, given the recognition of mutual interdependence and cultural links, leads many countries to engage in international agreements on water resources (Savenje, Zaag 2000). As Jagerskog (2002) mentions, commonly accepted or negotiated rules, norms and principles define an international regime and form institutional arrangements of cooperation within international systems (follow chapter 2.2). Therefore the formulation of such principles seems to be an important step in creation of international cooperation within international catchment areas. Mechlem (2002) discusses three basic principles of international water law and their role at different levels of cooperation. The three principles are:

- Equitable utilization - refers to the principle of sovereign equality of states and asks states to use shared resources in a way that respects other states` legitimate rights. In praxis it can be achieved by sharing of benefits or equal sharing of the water resource itself;
- Obligation to not cause significant harm - strongly related to the principle of equitable utilization. In a process of balancing of interests states need to negotiate if significant harm of any type is caused or not;
- Duty to cooperate - refers to the exchange of data and information, a duty to notification, consultation and negotiation

Savenjie and Zaag (2000) are more detailed than Mechlem (2002) in identifying seven principles of international cooperation on international water resources that are emerging internationally:

- sovereignty principle - each nation has the right to use its own resources following its own policies, laws and strategies;
- trans-boundary principle - upstream and downstream water users have mutual responsibility;
- equity principle - all people need to have a basic right to access to resources that serve their survival and development. Therefore they must not be excluded from use of those resources;
- intergenerational principle - also future generations have a basic right to access to resources that serve their survival and development. Therefore they must not be excluded from use of those resources;
- user-pays principle - the real cost of water should be paid by its users, which is not necessarily the same as to pay the economic price of water;
- polluter-pays principle - polluters should pay the caused damage of their action;
- precautionary principle - asks for contemporary action to reduce pollution, and to preclude irreversible changes to ecosystems.

Although being generally widely accepted, these principles may be interpreted differently in specific situations and from different perspectives (Savenije, Zaag 2000). In case of no existing formal agreements on the shared water resources the mentioned principles remain abstract and general. This may lead to differing interpretations by the different players. Cooperation will depend on the political will of the parties (Mechlem 2002). Another important reason for difficulties in interpretation and acceptance of basic principles is that at national level, countries have developed their own strategies and policies concerning water resources based on their own cultures and histories. Three general systems have developed in different countries. In countries that were under influence of the British Empire, Riparian Rights, as derived from the Common Law link ownership or use of water to ownership of land. Countries with legal systems derived from the Napoleonic Code developed Public Allocation regulations, which work with public administrative distribution of water. Under Prior Rights the right to use water is linked to the actual use over time (Savenije, Zaag 2000). A

challenge of integration is to combine these different cultures and perceptions into cooperative catchment management where they meet.

Second, the recognition of each others` interests and the will to search for possible compatibility serves strengthening cooperation. An important link hereby is the creation of benefits that outweigh the costs of cooperation or exceed the benefit of single national action as presented in chapter 2.2. Additionally, a window of opportunity, which could be any crisis, may show up new solutions and thereby serve the strengthening of international understanding and collaboration (Savenije, Zaag 2000). If countries realize that cooperation is more benefiting than unilateral action, they might agree to develop institutional arrangements that clarify the form of international cooperation, provide mutual benefits and bind the parties to their commitments (Shlomi 2008). Commitments might for example include a limit in use of resources in order to prevent overexploitation and to ensure equal utilization (Stinnet, Tir 2008). The process of negotiating those arrangements is a main obstacle in international relations (Shlomi 2008). Concretizing the above mentioned principles of international cooperation within the negotiation process may support the process by giving guidance (Mechlem 2002). If the riparian succeed in negotiating on institutional arrangements the development of a treaty between states concerning a shared watercourse makes cooperation more precise than the general principles. Still it does not make the principles obsolete. The role of the principles in case of existing treaties is to serve the treaties acceptance and implementation (Mechlem 2002).

Stinnet and Tir (2008) state that even in cases where formal arrangements with the objective of sustainable river utilization are made between countries, obstacles to cooperation remain due to remaining incentives to over-consume resources. This may lead parties to cheat on the commonly negotiated obligations, creating a situation where the cheater enjoys benefits from cooperation while at the same time he avoids the costs of cooperation. It may also appear that international treaties on sustainable river basin management fail simply because of insufficient technical, regulatory and economic capacity of the parties (Stinnet, Tir 2008). Possibly the suggestions of Raadgever et al. (2008) on how international arrangements concerning management of river basins should be designed may help meeting the objectives of ICM. Raadgever et al. (2008) present an overview of institutional factors that support adaptive water management and trans-boundary cooperation in river basins. First, they identify **actor networks** in form of international river basin authorities as a tool to institutionalize trans-boundary cooperation. If the authorities obtain decision-making and enforcement powers they may contribute to restoration of water quality and management of infrastructure. Involvement of different governmental sectors, authorities, NGOs, citizens and experts may support international cooperation and public acceptance. Those actor networks may be able to make joint decisions when mutual dependence is realized, different perceptions are shared and potential solutions are developed based on mutual trust, recognition of diversity and critical self-reflection (Raadgever et al. 2008). International river organizations may also contribute to implementation of international policies by cost sharing and provision of a centralized administrative structure. They function as a locus for intergovernmental and trans-sectoral communication and thereby create a forum for negotiations on future agreements (Stinnet, Tir 2008). A second factor is the **legal framework**, which means the development of international agreements. Agreements should conform to principles of international cooperation, manage to deal with information exchange and communication across different legal and institutional frameworks, cultures and languages and finally be able to adapt to rapid physical or institutional change. In order to gain adaptive management legal frameworks should consist of arrangements for public participation, information management, financing, planning, operational management and regularly

reviewing (Raadgever et al. 2008). In addition Stinnet and Tir (2008) suggest to include conflict resolution procedures in the formulation of river treaties in order to be able to solve possible conflict between signatory states and prevent them from escalating to armed conflict. At a less extreme level conflict resolution mechanisms may also contribute to solve simple disagreements about interpretations of the treaty for instance. The third factor is **policy**, which means the objectives and strategies of national states or other organizations. In order to come into practice and not only be phrased in official documents, policy objectives need to be developed as representing interests and resources of the involved parties and be updated and adapted to changing conditions. In order to be flexible policies should consider the full range of possible measures and therefore take as many options as possible into account (Raadgever et al. 2008). Fourth, **information management** is useful to develop trust between riparian countries and leads to improved technical capacity, mutual understanding, shared vocabulary and shared insights. Institutionalization of information management, in form of centralized monitoring, may prevent selective information use, may prepare data for decision makers, helps sharing costs of information gathering and contributes to broaden the knowledge base. Information management should involve all relevant governmental and non-governmental stakeholders (Stinnet, Tir 2008; Raadgever et al. 2008). Fifth, **financing** often is a crucial issue without which trans-boundary river management would not be possible. Finance can be managed by donor and bank involvement or by cost recovery when regarding water as an economic good. Both types provide for benefits and disbenefits. In each case a strategy should be developed in order to handle the costs of river basin management (Raadgever et al. 2008).

2.4. Conclusion

The first part of this chapter introduces river systems as highly interconnected human-environment systems. Resulting from the Brundtland Report 1987, the Rio Earth Summit in 1992 and the Dublin Conference on Water and Environment in 1992 a sense for sustainable human development and the importance of ecosystem services to human wellbeing are more or less commonly accepted in national and international politics and planning. For the planning of river systems this point of view resulted in the development of the concept of ICM. It bases on the perception of the resource water, ecosystems and human activities being deeply connected within the entity of a catchment area forming a human-environment system. In addition, such systems are regarded as being not stable but always changing and hardly predictable due to the variety of influencing factors. As the only reasonable way to address the interconnectedness and unpredictability of the system, ICM asks for a basin wide view and management in order to take all aspects that influence water quantity and quality as well as ecosystem development and human welfare into account. This means it is important to follow hydrological boundaries instead of administrative boundaries because of running water, which does not respect administrative boundaries, being the main factor of connecting the system. ICM also asks for sectoral integration within the catchment area and for integration of stakeholders in order to make decisions based on a holistic view and to serve the goal of balanced interests. The creation of a platform for stakeholder involvement, the organization of the catchment area in smaller sub basin authorities, the preparation of river basin management plans as well as the establishment of cost recovery systems might be appropriate tools to meet this objective.

Management actions in river systems are affected by actions upstream and downstream because of the natural flow of water and the interconnectedness of the system. Yet, most catchment areas do not fit into the system of administrative boundaries that define villages, districts, provinces or

nations (Savenije, Zaag 2000). Therefore, the general system of administrative boundaries makes it difficult to organize river management because of different interests and policies spread over different countries. Sectoral integration and a catchment wide view make international cooperation necessary in cases where catchment areas touch the territory of more than one national state. This is reasonable due to the high degree of interdependence between the countries along the water course.

Regarding the mentioned issues above leads to the perception of river basins as human-environment systems and as international systems at the same time. The question of how to regulate international cooperation and how to make ICM possible in a satisfying way with benefits gained for all riparian makes it reasonable to identify basic rules of functioning of international systems. Generally international systems offer a range of possible degrees of system consolidation from extremely fragmented to extremely consolidated systems. The different degrees of consolidation promote a range of levels of cooperation between the national states. Extreme consolidated systems promote joint action while extreme fragmented systems promote unilateral action. Most international systems can be found in between the two extremes. But which factors influence the degree of consolidation or the level of cooperation? First, international economic interdependence is a major factor promoting international cooperation. On the other hand, strong unit identity would lead a system to less cooperation. The national state is one important actor at the international tribune. Its decision to seek for relative or absolute gains influences its decision to cooperate or to act unilateral. This decision might be influenced by the benefits that the levels of cooperation offer. In case a state seeks for absolute gains the state might choose for cooperation if joint action provides more benefit than unilateral action and vice versa. On the other hand if a state seeks relative gains the decision depends on what the states benefit is in relation to that of the potential partner. In each case the benefits should outweigh the costs of cooperation or unilateral action. Otherwise cooperation is likely to fail. Individuals or groups of individuals might also be important players in international cooperation. Especially expert groups or groups affected by crisis may play an important role in formation of international regimes. Expert groups may actively promote cooperation while groups that are affected by crisis often use a window of opportunity to get into action.

When countries decide to cooperate in international river basin management cooperation often appears in form of binding treaties between nations. The suggestions of Raadgever et al. (2008) on how international arrangements concerning management of river basins should be designed may help meeting the objectives of ICM, to support adaptive water management and trans-boundary cooperation in river basins. First, International agreements on river basins should conform to principles of international cooperation. While Mechlem (2002) presents three principles of international water law with a broader meaning (the equitable principle, the obligation to not cause significant harm and the duty to cooperate) Savenije and Zaag (2000) identify seven more concrete principles related to international use of water resources that are emerging internationally: the sovereignty principle, the trans-boundary principle, the equity principle, the intergenerational, the user-pays principle, the polluter-pays principle and the precautionary principle. The principles gain in importance and influence with increased level of consolidation and with institutionalization of cooperation. Further, international agreements should support information exchange and communication across different legal and institutional frameworks, cultures and languages, be able to adapt to rapid physical or institutional change and should consist of arrangements for public participation, information management, financing, planning, operational management and regularly reviewing (Raadgever et al. 2008). Institutionalization of cooperation by development of actor networks in form of international river basin authorities with decision-making and enforcement

powers may contribute to restoration of water quality and management of infrastructure because of the ability to make joint decisions based on intergovernmental and trans-sectoral communication. Different governmental sectors, authorities, NGOs, citizens and experts should be integrated in order to support international cooperation and public acceptance (Raadgever et al. 2008). Development of international authorities goes beyond agreement on international treaties and may contribute to formulation of international policies. In order to come into practice policy objectives need to be developed as representing interests and resources of the involved parties. In order to be flexible policies should consider the full range of possible measures and therefore take as many options as possible into account (Raadgever et al. 2008). Actor networks may also contribute to institutionalization of information management, in form of centralized monitoring. Information management may prevent selective information use, prepares data for decision makers, helps sharing costs of information gathering, contributes to broaden the knowledge base and supports improved technical capacity, mutual understanding, shared vocabulary and shared insights. It should involve all relevant governmental and non-governmental stakeholders in order to be comprehensive (Stinnet, Tir 2008; Raadgever et al. 2008). Finance of river basin management is an important issue which can be managed by donor and bank involvement or by cost recovery in order to handle the costs of river basin management (Raadgever et al. 2008).

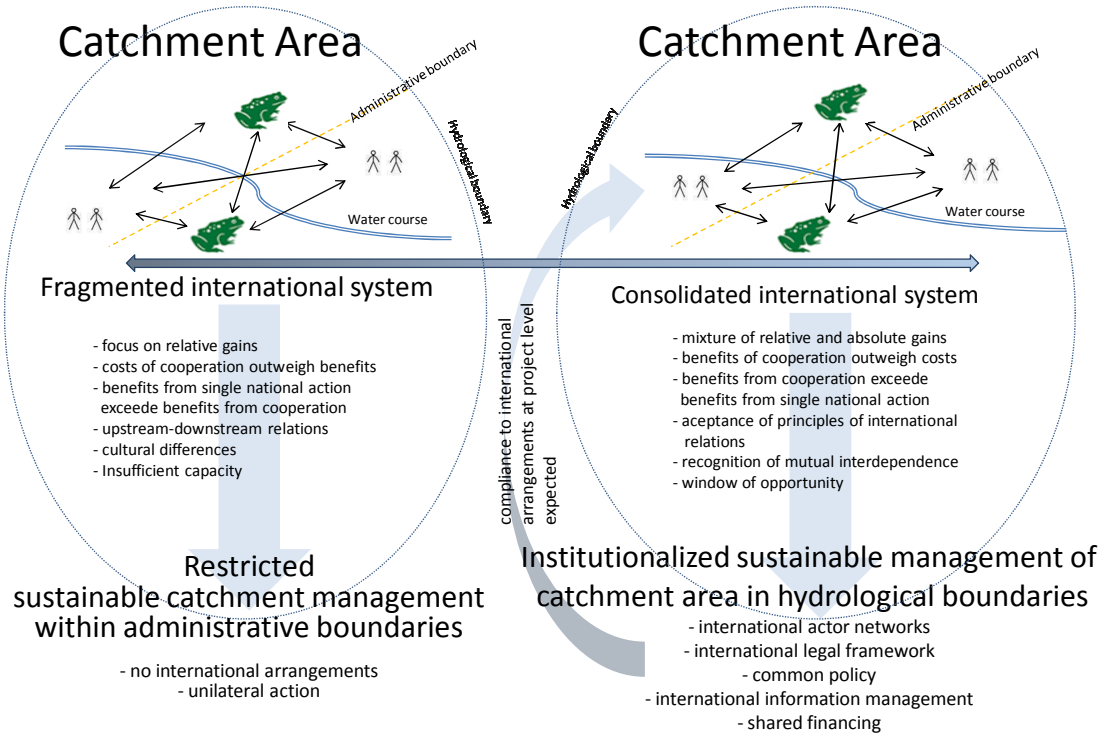

FIGURE 5: FRAGMENTED AND CONSOLIDATED INTERNATIONAL RIVER SYSTEMS AS UNDERSTOOD FROM LITERATURE ON CATCHMENT MANAGEMENT AND INTERNATIONAL COOPERATION (DESIGNED BY AUTHOR).

It seems that literature often regards catchment areas of international rivers as international systems that are either consolidated or fragmented with international treaties and arrangements either developed or not (Figure 5). But there are international river systems for which the level of consolidation is not that clear with more consolidated and more fragmented parts to be found in one and the same river system (Figure 6). In those cases international arrangements may be in place for the basin, but countries of the less consolidated part, although committed to the arrangements, might interpret their commitments differently than countries of the more consolidated part. Are

international regulations implemented evenly in cases of large river systems that show both a consolidated part and a fragmented part, or is there a difference in implementation between the levels of system consolidation? This question is dealt with in the next chapter, which presents the example of the large Danube River Basin that faces the challenge of international management within a setting of countries that enjoy membership to the EU and countries that are no member states of the EU.

3. Method

The analysis of the previous chapter makes clear that in order to create sustainable development for a river basin, which is defined by complex interdependence between different human actions and ecosystems, a catchment wide and trans-sectoral view is needed. Because most river systems touch the terrain of more than one country, this task is made even more complex by the variety of administrative competences and jurisdictions within the international setting. The conclusion is that a not too low level of cooperation between countries within a river system is appropriate in order to guarantee development that sustains basic system functions which are important for human welfare. A variety of factors are presented that lead an international system to a more consolidated state, defined by a higher degree of cooperation between the countries, or to a more fragmented state, defined by a lower degree of cooperation, potentially resulting in unilateral action. The subscription to basic principles of international relations may support and strengthen efforts of cooperation. In case the partners agree to cooperate international rules and regulations are developed at the policy level to balance conflicts of interest if the issues at hand have trans-boundary effects on ecosystems. Within an international system with a high level of consolidation implementation of international policy might occur relatively easy and direct while fragmented international river systems show no development of international arrangements (Figure 5).

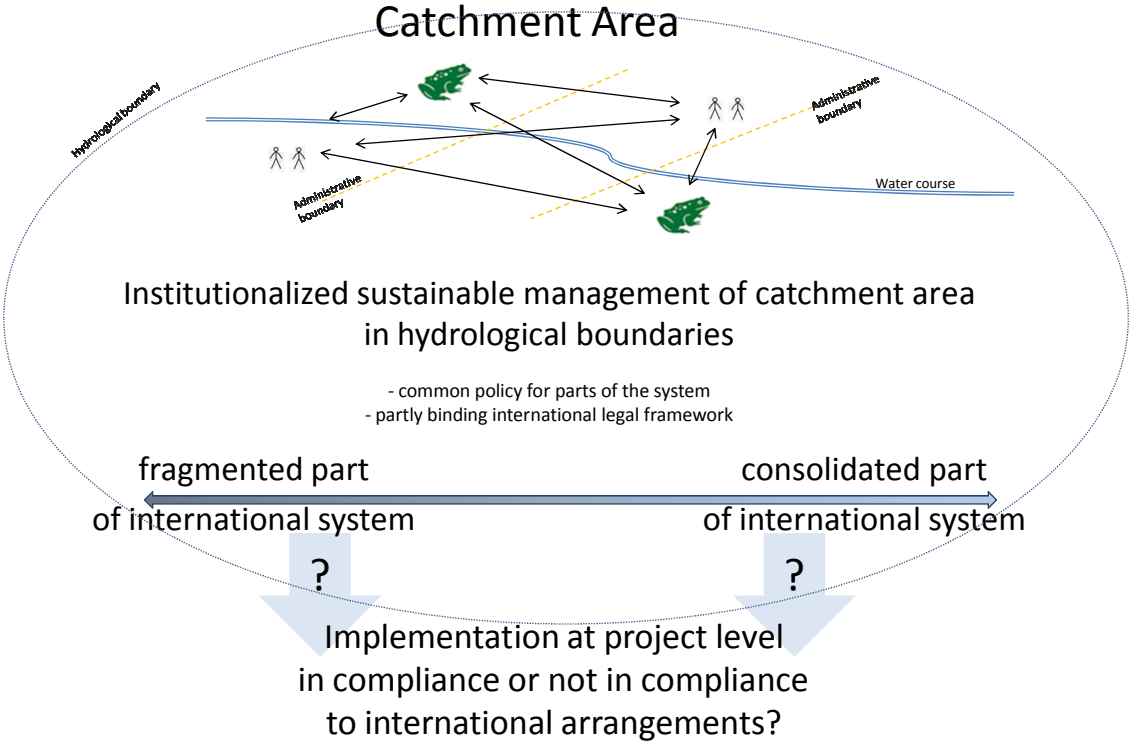

FIGURE 6: INTERNATIONAL RIVER SYSTEM FOR WHICH SUSTAINABLE DEVELOPMENT IS ENVISAGED BY MEANS OF INTERNATIONAL POLICY AND REGULATIONS BUT WHICH CONSISTS OF A MORE CONSOLIDATED AND A MORE FRAGMENTED PART (DESIGNED BY AUTHOR).

What literature not sufficiently explains is implementation of international arrangements in cases of large international river systems where not all countries share the same level of system consolidation. Some countries may engage in a common policy while others are not part of this engagement or different multinational arrangements are made for different parts of the system. For those countries that take part in the common policy, international environmental regulations might

be more strictly binding than for those who don`t. ICM asks for a basin wide approach. The question that this paper tries to answer is: **If international environmental rules are created for management of river basins that are shared by many countries, are they translated to the project level and is this translation influenced by the difference in the level of system consolidation? Does a variation in the level of system consolidation imply or allow a difference in the intenseness of implementation of international rules or are the rules implemented evenly throughout the system (Figure 6)?**

In order to find out how international environmental regulations are implemented at the project level of river basin management and how the level of system consolidation affects this process one could imagine a variety of possible approaches. First, conducting a literature review on implementation of environmental policies at project level would ask to find sufficient literature on this issue that covers different levels of system consolidation. Because this would request a similar definition of system consolidation of the various authors and bearing in mind the already mentioned lack of literature that asks if and how system consolidation works out on implementation of arrangements at the project level, this approach seems not to be appropriate. Secondly, one could conduct an implementation study on a special international arrangement along different levels of system consolidation within one river system. This approach allows a detailed survey on the issue. Possibly it would come up with the result of no differences if implementation of this special regulation is well done. This approach opens up the risk to disregard other environmental regulations within the same river basin that possibly would come up with a very different result. Third, a comparative research on projects in different countries and the elaboration on compliance to all relevant international regulations could be more appropriate because a broader pool of regulations could be regarded. To be able to give an answer to the research question a preferably high level of comparability needs to be achieved when conducting this research.

Questioning how system consolidation works out on compliance to international environmental regulations it is reasonable to conduct a comparative research between river engineering projects that are likely to have effects on the river and adjacent ecosystems and therefore are subject to international environmental regulations. There are many different kinds of river engineering projects that may affect ecology. For hydropower generating dams or flood protection measures different effects on ecology might be expected than for projects that have the purpose to increase navigability. Although some international regulations might be applicable for multiple kinds of river engineering projects, it is more likely that the same or equal regulations are applicable if the purpose of the projects is the same. So, an appropriate approach is to compare projects that aim at the same kind of human use and therefore may cause equal expected trans-boundary effects. It is to expect that still a number of environmental regulations are in state, so that the research not only regards a single regulation.

A second obstacle to achieve a high level of comparability is the choice of the projects location. All projects need to be located within the same river basin, because otherwise different regulations would be in state. Conducting a research on different river systems would present a broad view on the issue but the question would remain open if the different regulations as well as the river systems are comparable. It would be doubtful if system consolidation is the factor that creates differences in compliance to international regulations or if other factors cause significant effects. Which of the more than 260 international river systems worldwide is appropriate to be elaborated on? The basin needs to be shared by many countries. It needs to contain different levels of system consolidation and international environmental regulations need to be in state at least for a part of the basin. Therefore bi-national rivers are not appropriate. The most international river basins worldwide are

the Congo/Zaire, the Niger, the Nile, the Zambezi, the Ganges/Brahmaputra/Meghna, the Indus, the Mekong, the Danube and the Amazon. The Danube River Basin perfectly meets the requirements of this research because of its international setting and the variety of degrees of system consolidation due to the location of the catchment area in both member and non member states of the European Union. A variety of international regulations are in state in form of EU regulations and international conventions. Although EU environmental regulations are not binding to non-member states of the EU, those countries engage in the International Commission for the Protection of the Danube River (ICPDR) which formulate environmental objectives as well. Other river basins might as well be appropriate for research, but the scope of this master thesis does not allow a study too broad. Chapter 3.2 describes the political frame of the Danube River Basin in more detail.

Because for the Danube River Basin the conflict of interest between sustainable ecological development and river navigation currently is of great importance, this research compares compliance to international environmental regulations for river engineering projects that object an increase of navigability of the river. Chapter 4.1 introduces the conflict of interests between economic development of the Danube River for transport use on the one side and sustainable development in terms of sustaining the services that ecosystems supply humankind with on the other side. The guiding international policy principles and regulations concerning both interests are presented. At the end of chapter 4.1 indicators are developed from policy guidelines and regulations in order to measure the projects` compliance to international regulations.

Highest level of system consolidation	All involved or most directly affected countries belong to the EU
High level of system consolidation	More involved or most directly affected countries belong to the EU than not
Medium level of system consolidation	An equal amount of involved or most directly affected countries belong to the EU than do not
Low level of system consolidation	More involved or most directly affected countries do not belong to the EU than do
Lowest level of system consolidation	None of the involved or most directly affected countries belongs to the EU

TABLE 1: DEFINITION OF LEVELS OF SYSTEM CONSOLIDATION AS THEY CAN BE FOUND IN THE DANUBE BASIN.

Because the research task of this paper is to find out I how far the level of system consolidation affects the implementation of international environmental regulations, the projects need to cover a range of several levels of system consolidation. In order to be able to make a reasoned statement about the effect of system consolidation on the compliance of international regulations I need to properly define the levels of system consolidation. Since the EU is a federation of national states that develops a common policy and a number of common regulations, it is reasonable to define two major levels of system consolidation for the region as “countries, belonging to the EU” and “countries, not belonging to the EU”. Sub-levels of system consolidation which are important for the research can be defined by the relation between the countries involved in or possibly affected by river engineering projects. The highest level of system consolidation is represented by all involved or possibly affected countries belonging to the EU which may lead to the expectation of the highest number of international binding agreements being in state for this level. The lowest level of system consolidation is represented by no involved or possibly affected country, belonging to the EU. The lowest number of binding international agreements may be expected for this level. In between,

levels of system consolidation can be defined by the number of countries that belong to the EU and the number of countries that don`t belong to the EU (Table 1).
This definition offers two possible approaches for the research. First, one could elaborate on multi-national projects that are developed between two member states of the EU, between a member state of the EU and a non-member state of the EU, and finally between two non-member states of the EU. In those cases it is more likely that projects are in compliance with international regulations. It might be more interesting to decide for a second approach, which elaborates on single national projects with expected trans-border effects. I decided to regard the up- and downstream effects along the river as being most significant within the direct neighboring country which reduces the number of possibly affected countries to the project country and one or two neighboring countries although I am aware that most trans-boundary effects within international river systems affect more than just one or two neighboring countries. Nevertheless the second perception would result in an almost endless number of levels of system consolidation when assuming that between almost every country a different level of system consolidation might be expected. Applying the first perception allows to conduct a research on the different levels of system consolidation without getting confused about the high number of sub-levels. The actual choice of projects is done in chapter 4.2.
For the purpose of this research the projects need to be in a planning stage because if they were already completed, different regulations might have been in place at the time that they were in a planning sage. This makes completed projects not useful for a comparative study about implementation of recent policies and regulations. It also might be late to possibly advise decision makers and planners to adopt project plans. On the other hand, projects that are not even in a planning stage but only on the future agenda will not be comparable because too little information might be available and it yet might not be clear how international regulations will be applied.
By presenting different projects of river engineering within the catchment area, chapter 4.2 shows if policy guidelines and regulations work out for transport development as well as sustainable management in practice at the project level. Four projects of transport development are compared in order to find out if a variation in the international setting, namely the degree of system consolidation, influences the implementation of international policy guidelines. In order to show which environmental regulations as presented in chapter 4.1 are binding to the project countries and how they are implemented in national legislation, for each project the relevant national regulations are briefly explained. When drawing conclusions from the information gathered in chapter 4, this will help to correctly position the projects in terms of comparability.
Information about the projects is gathered by different means and sources. First, professional literature from project developers helps to get an overview about the projects. Project websites, if constructed, may serve this goal as well. The large amount of paper work concerning the projects produces lots of information that is not focused on this papers´ research question. Therefore the information needs to get filtered. The indicators that are already mentioned and are presented in chapter 4.1 help to scan sources in a focused way. In order to handle the still large amount of information, the relevant information is transcribed into a table with columns for each project and rows for each indicator. Due to the developed table being very extensive it is not shown in the text but in Appendix II. In order to get deeper and to critically reflect the information given by project developers, scientific literature and comments from interest groups about the projects need to get scanned as well. Finally, to fill up gaps of knowledge, it is necessary to directly ask involved and interested parties about issues that remain unclear in the literature review. This information is also transcribed to the table in Appendix II. The information is presented in chapter 4.2 for each project.

Indicator	Project 1	Project 2	Project 3	Project 4
Indicator 1				
Indicator 2				
Indicator 3				

TABLE 2: SAMPLE TABLE TO SHOW HOW INFORMATION IS ARRANGED AND MADE CLEAR.

In chapter 5 the gathered information is presented in a comparative analysis of the projects. First, the chapter compares the projects´ performance to implement international environmental regulations by making use of the indicators. Then, by applying the defined levels of system consolidation it tries to assess the influence of system consolidation on compliance to international environmental regulations. A scoring system is applied to make the information readable and to facilitate comparison between the levels of system consolidation. The scores “yes”, “partly” and “no” show if compliance to international environmental regulations is met or not.
Reflecting the drawn conclusions to the theoretical framework that is constructed in chapter 2, offers the possibility to partly explain the answers to the research question and to advise some improvement of the projects` performance in terms of compliance to international regulations. This is done in the last part of chapter 5.

Conclusion

To conclude, a comparative case study of transport navigation projects along the Danube River will be conducted in this research. In order to achieve a preferably high level of comparability the projects need to fulfill the following requirements:

- Planned projects
- Purpose to increase navigability and/or transport capacity of the waterway
- Location at the Danube River
- Expected trans-border effects of the measures
- Together the affected or directly involved countries need to cover a range of levels of consolidation (preferable: 1 project with effects between EU member states, 1 project with effects between non-EU countries, 2 projects with effects between EU member states and non-EU countries).

Information is drawn from:

- project websites and websites of relevant ministries and developers,
- project related documents (feasibility studies, EIAs),
- policy documents (plans, strategies),
- scientific literature,
- websites and published comments from environmental NGOs
- E-mail contact with NGOs and developers.

4. Case Study

This chapter presents a case study on four river engineering projects that aim at the improvement of conditions for Inland Waterway Transport. First, the Danube River Basin and the conflict of interest between transport development and environmental protection as well as the main international arrangements concerning those two issues are presented. Thereby chapter 4.1 results in deriving indicators for compliance of transport development projects to international environmental arrangements. Those indicators are applied in chapter 4.2. They serve as a red line to describe the performance of four transport development projects in Austria, Hungary, Croatia and Serbia in terms of compliance to international arrangements. Chapter 4.2 only presents data on the projects and thereby provides the basis for the actual comparison of the projects, which is carried out in chapter 5.

4.1. Object of Study: The Danube River Basin

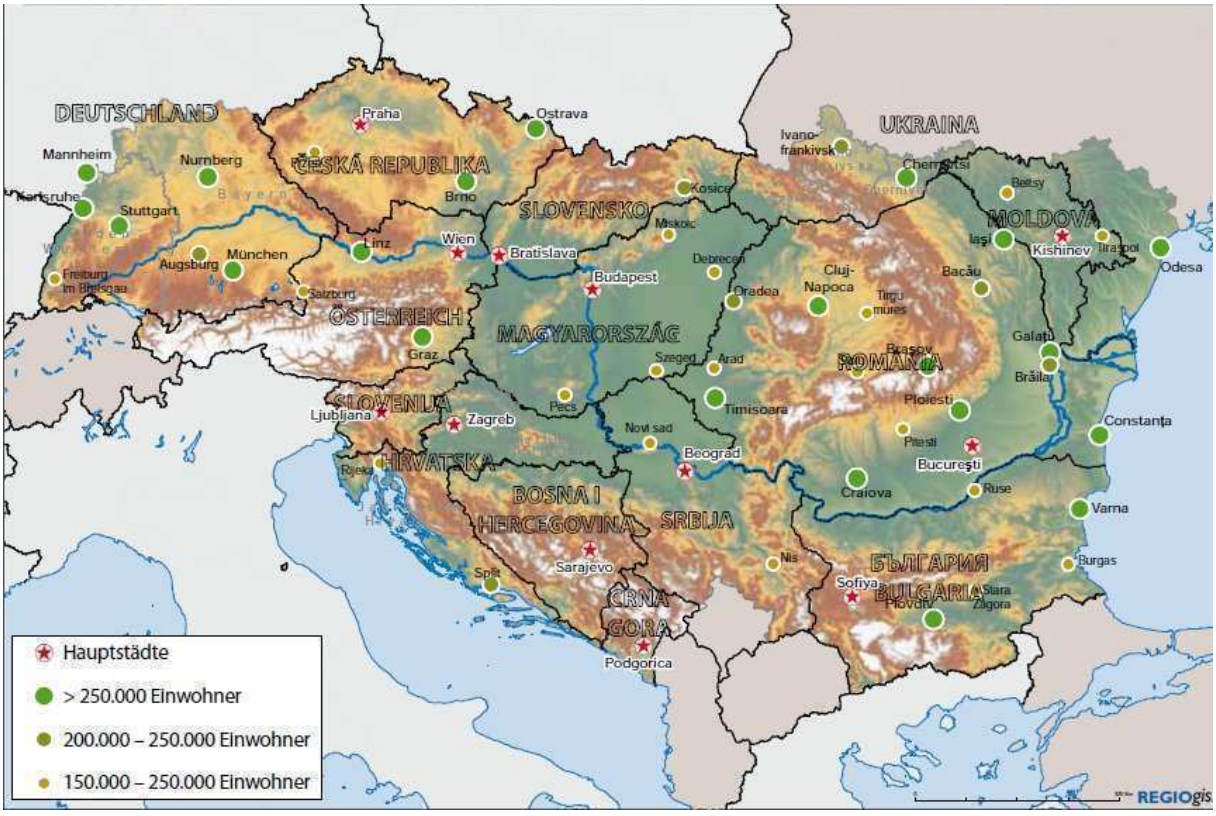

FIGURE 7: THE DANUBE REGION ACCORDING TO THE EU STRATEGY FOR THE DANUBE REGION, RIPARIAN COUNTRIES, CAPITALS AND POPULATION OF CITIES (WEBSITE EUROPEAN COMMISSION (B) [17.8.2011]).

The Danube River is called one of the most international river systems worldwide (ICPDR 2009; European Commission 2010). It has its springs in the German Black Forest and runs on its 2857 km long course through nine European countries and four of their capitals. Its discharge is about 6500 m^3/s (Baltalunga, Dumitrescu 2008). Direct riparian states of the river are Germany, Austria, Slovakia, Hungary, Croatia, Serbia, Romania, Bulgaria, Moldavia and Ukraine (Figure 7). The EU defines the Danube Region by the watershed which encompasses even more EU and non-EU countries at an area of about 817.000 km^2 and covers a population of about 100 million people (Baltalunga, Dumitrescu

2008). Since EU-expansion in 2004 and 2007 most part of the Danube Region belongs to the EU. Most recently negotiations on the accession of Croatia to the European Union were finished. The actual accession of the country to the European Union is expected to come into force by 2013. By then Serbia, Ukraine and Moldavia will be the three direct riparian of the Danube River not belonging to the European Union.

International Political and Legal Frame

The river system of the Danube basin does not represent a uniform consolidated or fragmented international system. Throughout the whole system at least two levels of system consolidation can be met. The part of the system which comprises EU countries can be described as more or less consolidated while the part of the system consisting of non-EU countries can be described as more or less fragmented. The countries of the EU are engaged in the ongoing process of European cohesion which means the development of common policies concerning a variety of political issues, including environmental policy, transport policy and management of international as well as national waters. For the part of single national states that are not engaged in development of a common policy, EU regulations and objectives are not binding. Nevertheless those countries are part of the same international river system.

A regional process for cooperation was launched in 2002 with the Danube Cooperation Process (DCP) which is based on cooperation between the ministries of foreign affairs of the countries in the Danube Basin. In addition, the European Commission and the Regional Cooperation Council for South East Europe enjoy full participant status as well. The objectives of the initiative are to deepen and broaden cooperation throughout the region, to deal with European integration and to give cooperation a multidimensional character. In 2009 the Austrian and Romanian delegation to the ministerial conference of the DCP proposed the development of an **EU Strategy for the Danube Region** (website SECI (a) [18.1.2012]). After a number of consultations with representatives from Danube countries the European Commission presented the Action Plan of the European Strategy for the Danube Region in 2010 which expresses the objective of development of the region in order to enhance citizens' future perspectives for higher education, employment and welfare. The paper asks for further development of precise goals which are binding to the EU-members of the region. Third countries shall be encouraged to apply the objectives of the strategy (European Commission 2010). The Action Plan identifies four major subject areas of development, which are:

a) Connecting the Danube Region
- Improvement of transport by means of road, railroad, air and water traffic
- Promotion of renewable energy
- Regional exchange of tourism and culture

b) Protection of environment
- Regeneration of water quality
- Adaptation to environmental risks
- Protection of biological diversity, landscape and quality of air and soil

c) Building prosperity
- Development of welfare by means of education, science and information technology
- Promotion of economic competitiveness
- Investment in people and qualification

d) Strengthen the Danube Region

- Establishment of institutional capacity and cooperation
- Collaboration in terms of security and organized crime (European Commission 2010).

The strategy was endorsed by the member states of the EU in April 2011 (website European Commission (a) [18.1.2012]). Besides this important recent development other regional initiatives for thematic cooperation have been launched earlier. The most important are the **Danube International Commission (DC)** (established in 1948) and the **Corridor VII steering committee** (established in 2001) which are concerned with Danube navigation; the **International Commission for the Protection of the Danube River (ICPDR)** (established in 1994) and the **International Sava River Basin Commission (ISRBC)** (established in 2001) which are concerned with sustainable development; the **Working Community of the Danube Regions (ARGE Donauländer)** (established in 1990) which objects general peaceful cooperation; and the **Danube Tourist Commission** (established in 1970) which is concerned with promotion of the region (website SECI (b) [18.1.2012]).

Conflict of Interests

When regarding the first two mentioned objectives of the EU Strategy for the Danube Region to develop the region one has to remark that they are possibly conflicting with each other. First, the EU wants to develop the Danube River as a major waterway, connecting the Rhine and thereby the North Sea with the Black Sea. Second, the EU asks for sustainable development, taking ecosystem services, trans-boundary effects and needs of future generations into account (European Commission 2010). The second objective refers to the management concepts of ICM, Ecosystem Based Approach and Trans-Sectoral Management as they are explained in chapter 2 of this paper. The two objectives are also represented in the major thematic regional initiatives that are presented briefly above. Thus, they are of special interest for the region as a whole. From the contributions of different national states, including the non-EU countries Croatia, Serbia and Bosnia and Herzegovina, to the development of the EU Strategy for the Danube Region I understand both interests are also major national objectives of most countries in the region. The following parts describe the importance of both interests to the Danube Region and show which international political and legal frame guides balancing of both interests throughout the river basin.

Objective 1: Waterway Danube

The goal of developing the Danube waterway is not new. The Peace Treaty of Paris, the Paris Danube Convention of 1921 as well as the Belgrade Convention of 1948 all concentrate on international use of the river in terms of navigation (Reichert 2005). The Belgrade Convention led to the formation of the **Danube International Commission (DC)** which was founded in 1948 and forms the first international organization that regulates river navigation along the Danube. Today, all riparian of the Danube are member states of the DC. Besides other regulations it obliges all member states to take measures that enable save navigation at the river (website Danube International Commission (a) [2.2.2012]).

The importance of the Trans-European waterway has been increased by the completion of the Danube-Black Sea Canal in 1984 and the Danube-Main-Rhine Canal in 1992, resulting in a 3500 km long waterway between the Black Sea and the North Sea (Figure 9) with the Danube accounting for 2600 km (Baltalunga, Dumitrescu 2008). It connects Central and South-Eastern Europe with Western

Europe (Figure 8). Especially for countries that have no direct access to the sea, as Austria, Hungary and Serbia for instance, the Danube plays an important role in facilitating international trade. Therefore, Danube navigation still is a growing economy. Between 1962 and 2005 the entire Danube fleet increased in number of vessels by 144% from 3142 to 4529. Within the same period of time the total heavy load on Danube vessels increased from 1,807,219 t to 4,385,986 t (Mihic et al. 2010).

The European Commission has developed the **Trans-European Transport Network (TEN-T)** policy which objects to create efficient transport between the European regions in order to promote European social and territorial cohesion and to provide the infrastructure (road and rail corridors, sea and inland waterways and airports) needed by the European market. Therefore new infrastructure needs to be created and existing infrastructure needs to be upgraded (Slodczyk 2010). In order to develop efficient water transport throughout Europe the **European Agreement on Main Inland Waterways of International Importance (AGN)** was drafted by the Working Party on Inland Water Transport of the United Nations Economic Commission for Europe (UNECE) and entered into force in July 1999. It identifies main European inland waterway links to be developed and may serve as the basis for the development of a coherent European waterway network (DVS 2010). As part of TEN-T, European waterways and ports of international importance, so called E waterways, are defined in the AGN as waterways that meet at least basic requirements of class IV (out of VII). This means navigability for vessels with a minimum size of 85 m x 9.5 m and a draught of 2.5 to 2.8 m (DVS 2010). The Rhine-Danube waterway is defined as TEN-T priority project 18 and forms the European transport corridor VII (Slodczyk 2010).

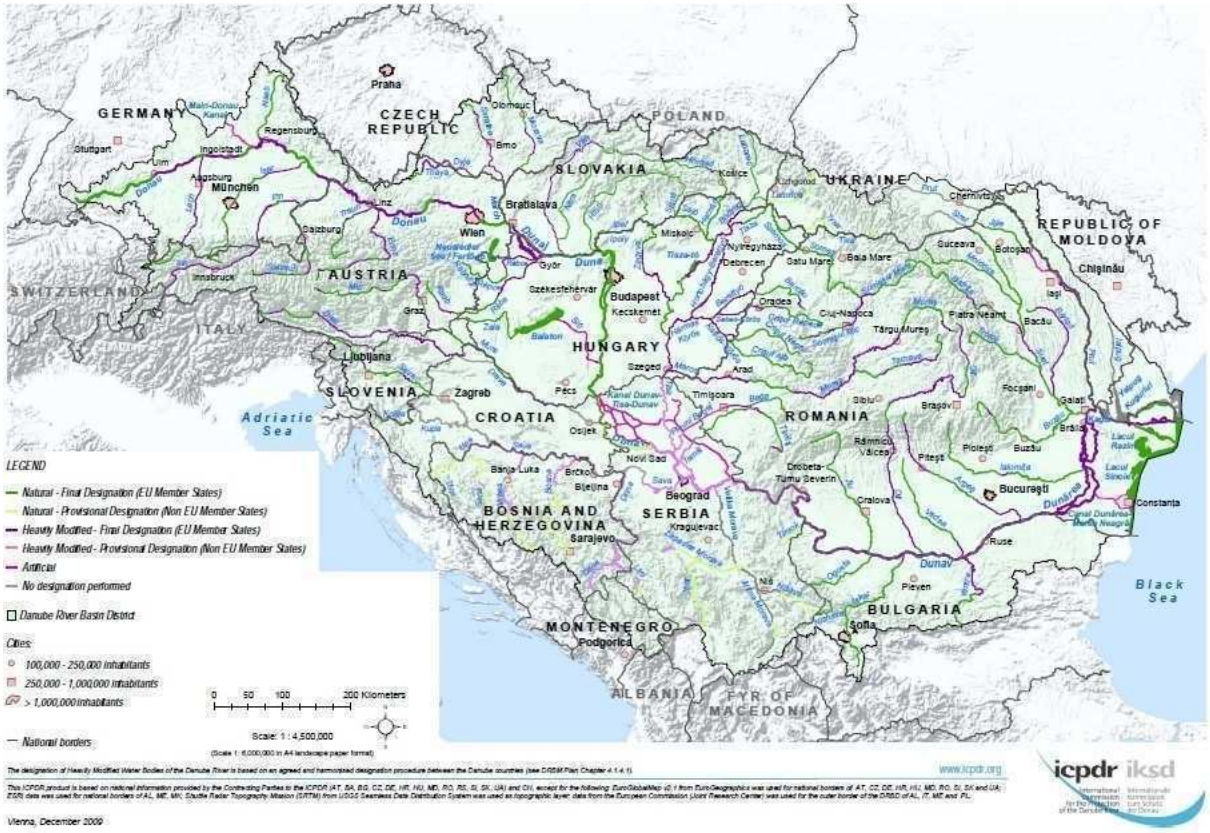

FIGURE 8: CURRENT LEVEL OF MODIFICATION OF WATER BODIES (ICPDR 2009).

A number of obstacles for inland navigation can be identified along the Danube waterway, most to be found in its Central and South-Eastern European sections but also in Germany and Austria. After

the political and social change of former communist and socialist societies in Central and Eastern Europe a time of economic decline and international conflict dominated the middle and lower reaches of the Danube River. The breakup of Yugoslavia resulted in the formation of a number of sovereign national states. Today the conditions for navigation therefore are characterized by different administrations, rules and border taxes (Baltalunga, Dumitrescu 2008). Other current obstacles for navigation are destruction of infrastructure and location of ship wrecks in the Danube, both resulting from the Yugoslavian wars in the early 1990s and the NATO intervention in 1999 (Baltalunga, Dumitrescu 2008). In addition at long stretches the Danube remains in a nearly natural state, from a water engineering point of view (Slodczyk 2010). As Figure 8 shows, the longest stretches are located in Germany, Austria, Slovakia, Hungary, Croatia and Serbia. The longest stretch that remains nearly natural begins at the Slovakian-Hungarian section, encompasses the whole Hungarian section and the Croatian-Serbian section as well as parts of the Serbian section of the river. The Danube Delta in Romania and Bulgaria also remains in a near natural state.

Following the AGN expert working group on inland waterway infrastructure, sections of waterways that do not fulfill the targeted requirements are called bottlenecks. Basic bottlenecks are parts of waterways which need to be upgraded in order to fulfill requirements for class IV. Strategic bottlenecks are parts of waterways which fulfill requirements for class IV but are objected to be upgraded in order to enhance economic capacity. A third definition is given by the introduction of missing links, which are parts of the objected network of waterways that today simply do not exist (UNECE 1998; DVS 2010). A list of the current bottlenecks and missing links of waterways throughout Europe is regularly published by the UNECE within its “Inventory of Main Standards and Parameters of the E Waterway Network”, the so called “blue book”. The latest version of the “blue book” dates back to 2006 (DVS 2010).

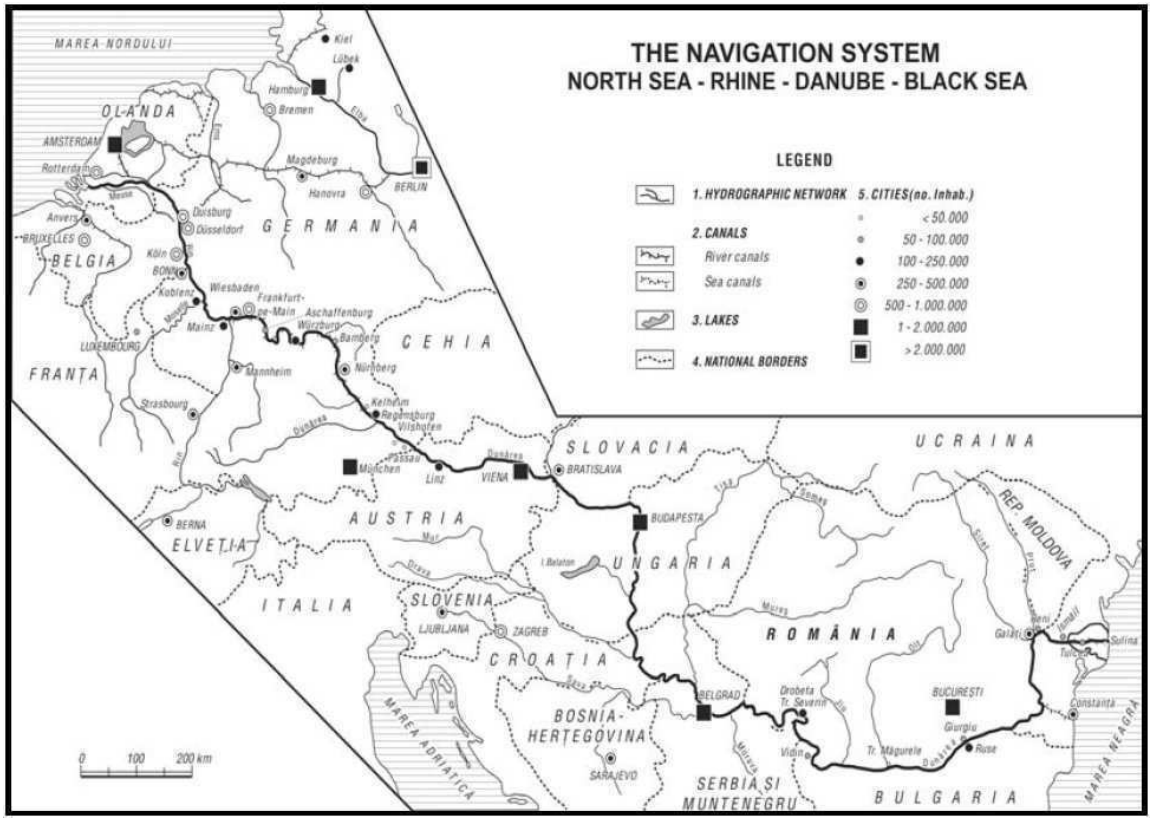

FIGURE 9: THE DANUBE AS PART OF THE TRANS EUROPEAN TRANSPORT CORRIDOR VII THAT CONNECTS THE BLACK SEA WITH THE NORTH SEA (BALTALUNGA, DUMITRESCU (2008, P.63).

The TEN-T project 18 tries to increase navigability at strategic bottlenecks, basic bottlenecks and missing links of the Danube waterway in order to increase competitiveness of the waterway in comparison to other modes of transport. The goal is to ensure a minimum draught of 2.5 m along the entire Danube River and to allow navigation for vessels of up to 3000 t (Slodczyk 2010). In order to reach this goal, a number of river works have to be carried out because of the mentioned nearly natural state of the river. The bottlenecks account for a total length of more than 1000 km along the river. Figure 10 shows planned and approved river engineering projects along the Danube. River works will contain deepening and broadening by dredging material, enforcing river banks and damming (Slodczyk 2010).

In order to promote development of inland waterways the EU adopted the Navigation and Inland Waterway Action and Development in Europe (NAIADES) program that sets out recommendations to take action between 2006 and 2013. It focuses on development of markets, fleet, jobs, skills, image and infrastructure (website NAIADES (a) [31.5.2012]). For implementation of NAIADES the European Commission has created PLATINA, a consortium consisting out of 23 partners from nine countries under coordination of Via Donau, the Austrian waterway agency (website NAIADES (b) [31.5.2012]. The PLATINA project was aimed to run from 2008 to 2012 and was funded with 8.35 million Euro (website ICPDR (b) [31.5.2012]). As an interim result an up-to-date inventory of the current condition of inland waterways in Europe has been produced and projects that aim to eliminate bottlenecks and missing links have been defined (website NAIADES (c) [31.5.2012]).

In addition to NAIADES and PLATINA the Network of Danube Waterway Administrations (NEWADA) project aims to develop international partnership and cooperation between national waterway administrations. Again the lead partner is Via Donau. The project will run between 2009 and 2012. Within this time frame among other issues it aims to improve the waterway infrastructure of the Danube by production of national action plans, feasibility studies, bilateral projects and implementation guidelines (website NEWADA [31.5.2012]).

Objective 2: Sustainable Development

As already mentioned, national states within the Danube Region, regional initiatives as well as the European Union object implementation of sustainable development. Nevertheless, the fact that sustainable development often is in conflict with radical economic development creates the question if principles of sustainability are implemented in the case of development of the Danube as the prior transport corridor VII between Central and South East Europe and Western Europe as part of TEN-T.

While international treaties concerned with transport on the Danube River date back to the early 20th century, international treaties to protect ecology of the Danube were considered quite late. The first international legislative document that concerns ecological protection of the Danube River was the Declaration of the Danube Countries to Cooperate on Questions Concerning the Water Management of the Danube (Bucharest Declaration) of 1985 that objected improvement of water quality, adequate monitoring measures as well as prevention of flood risk (Reichert 2005), which hints to the application of an ecosystem based approach to take vulnerability and adaptive capacity of the river system into account. As late as 1991, with the political and social change in Eastern and Central Europe, the Danube countries started basin wide cooperation with the establishment of the Environmental Program for the Danube River Basin (EPDRB). The program enforced the development of monitoring, data collection as well as improvement of early warning systems (Reichert 2005). In 1994 the **Danube River Protection Convention (DRPC)** was ratified by all countries that have a

territory of more than 2000 km² within the Danube River Basin (DRB). The parties are bind to national and international enforcement, harmonization and coordination of measures that object sustainable development of the Danube in terms of sustainable use of the resource water for industrial, municipal and agricultural purpose (Reichert 2005). The convention pays special attention to activities that are likely to have trans-boundary effects, including the field of water construction works (website ICPDR [1.2.2012]). Thus the convention objects Integrated Catchment Management and international cooperation. A first result of the convention was the development of a Strategic Action Plan for the Danube River Basin in 1994. The plan defined concrete objectives of ecological improvement until 2005. In 1998 when the DRPC came into force as legal and political framework for cooperation in the DRB the **International Commission for the Protection of the Danube River (ICPDR)** was set up as the roof coordination platform within the Danube River Basin (Reichert 2005; ICPDR 2009).

Since 2000, for member states of the European Union the **EU Water Framework Directive[1] (WFD)** forms the legal framework of protection and enhancement of the ecological status of inland waters, transitional waters, coastal waters, groundwater and water depending ecosystems. Until 2015 all waters are aimed to be transformed into a good ecological status. The directive also aims to ensure the sustainable use of water resources (ICPDR 2009). The WFD asks for management of the natural entities of the water cycle which are river basins within their hydrological boundaries. Therefore the WFD is in line with the concept of ICM. It sets deadlines for the preparation of river basin management plans and calls for international coordination in form of the creation of international river basin districts in cases where river basins are part of more than one country. The Danube and its tributaries form the Danube River Basin District (DRBD) (ICPDR 2009). One reason for the goals of the WFD is the application of an ecosystem based approach that aims to preserve ecosystem services for future generations and tries to reduce vulnerability of river systems and adjacent human societies to Climate Change by enhancement of their adaptive capacity. Not all countries within the Danube River Basin are part of the EU and therefore some are not directly bound to the WFD. Nevertheless all countries that ratified the DRPC committed themselves to implement the WFD (ICPDR 2009). According to the WFD and its first River Basin Management Cycle, a River Basin Management Plan was developed under governance of the ICPDR and finalized in 2009. This **Danube River Basin Management Plan (DRBMP)** is an important step to implement ICM for the Danube River Basin. It consists of three levels of coordination: the basin wide level (Part A), the sub-basin or national level (Part B) and the sub-unit level (Part C), with the last level being the most detailed in information. On the sub-basin level plans currently are under preparation for the Sava Basin, the Tisza Basin, the Prut Basin and the Danube Delta (ICPDR 2009). Concerning future infrastructure projects the DRBMP asks for the conduction of Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) in conjunction with WFD article 4, the fulfillment of the conditions set out in WFD article 4 and the implementation of best environmental practices and best available techniques (ICPDR 2009).

The trans-sectoral analysis of the Danube River Basin, carried out in 2004 for the preparation of the DRBMP, identified navigation as one main hydro morphological pressure on water bodies resulting in a classification of most waters as at risk or possibly at risk of failing the WFD objectives (ICPDR 2009). In general water transport often is regarded as ecologically more acceptable than other modes of transport for a variety of reasons. The use of already existing more or less natural waterways asks for

[1] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

a lower level of modification of the natural environment. High transport capacity of modern ships makes water transport cheaper than other modes of transport and causes less energy consumption. It thereby contributes to the contemporary popular political objective to reduce CO2 emissions and a reduction of pollution caused by transport (Mihic et al. 2010). Nevertheless water transport affects ecology of the river and the provision of ecosystem services to humankind and therefore needs to be handled with care when objecting sustainable development. The literature related to planed infrastructure projects along the Danube often highlights the benefits expected from these projects as well as a variety of ecological rehabilitation and compensational projects. On the other hand critical literature mostly from environmental NGOs is available which shows that river engineering methods as river straightening or construction of groins which aim to enhance navigation may cause negative effects on ecology as well as on the adaptive capacity and risk prevention of the whole river system. One main concern is that river works need to be carried out in ecological sensible areas. Following the **European Birds Directive**[2] and **Habitats Directive**[3] the European network of protected sites NATURA 2000 needs to be created in order to protect sensible habitats and species. Following article 6 of the Habitats Directive any plan and project that is likely to affect NATURA 2000 sites needs to be subject to an appropriate assessment of its implications on the site. If the plan or project is likely to negatively affect the site it should not be agreed on. In case the plan or project must nevertheless be carried out for lack of alternatives or overriding public interest the member state needs to provide for compensational measures. In addition to the NATURA 2000 network the **Convention on Wetlands (Ramsar Convention)** from 1971 asks signatory states to designate wetland sites of international importance to maintain the ecological character of those sites and to implement sustainable use of them. When comparing the maps in Figures 10 and 11, one can recognize that especially the planned Hungarian Danube modifications but also for the Austrian section between Vienna and the Slovakian border for example, are located within or next to protected natural sites. In total more than 60 % of the identified bottlenecks at the Danube coincide with designated NATURA 2000 sites (Sloczyk 2010). Therefore, damage to ecosystems and reduction of ecosystem services may be expected to appear while proceeding the planned river works. Possible damage includes:

- Decrease of self-purification capacity of the river by modification of river banks and cutting off the meanders,
- Threatening of drinking water supply, influencing agricultural conditions and threatening wetland ecosystems due to lowering of the water table in consequence of river deepening,
- Increase of flood risk due to flood plain modification,
- Reduction of income of local people by decreased fish population and
- Increased pollution in consequence of river works and increased navigation (Sloczyk 2010).

Most of these damages may cause trans-boundary effects which means that not only the project locations will be affected but that effects may be expected for the whole Danube River, its tributaries and adjacent ecosystems. Bearing in mind the mentioned possible effects of river engineering works one can state that vulnerability to certain risks as flooding or pollution may be increased while at the same time the adaptive capacity of the system is reduced. Regarding again the map in Figure 11 suggests that large protected and valuable ecosystems throughout the river system may be subject to the mentioned effects, which may result in a reduction of the provision of ecosystem services to adjacent human societies. Therefore an ecosystem based approach is necessary to manage

[2] Directive 2009/147/EC as amended
[3] Directive 92/43/EEC

infrastructure projects. The **Convention on Environmental Impact Assessment in a Transboundary Context (ESPOO Convention)** from 1991 asks contracting parties to conduct EIAs in an early planning stage and to consult each other in case of projects that are likely to cause trans-boundary effects (website UNECE [20.5.2012]).

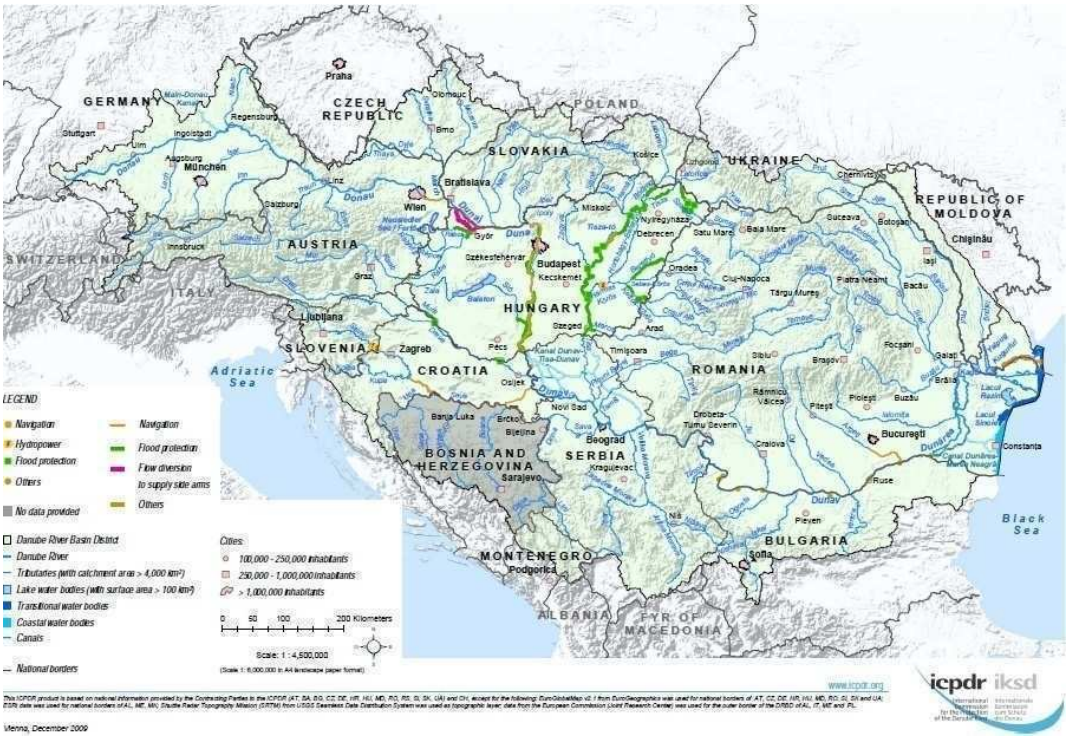

FIGURE 10: PLANNED AND APPROVED INFRASTRUCTURE PROJECTS WITHIN THE DANUBE RIVER BASIN DISTRICT (ICPDR 2009).

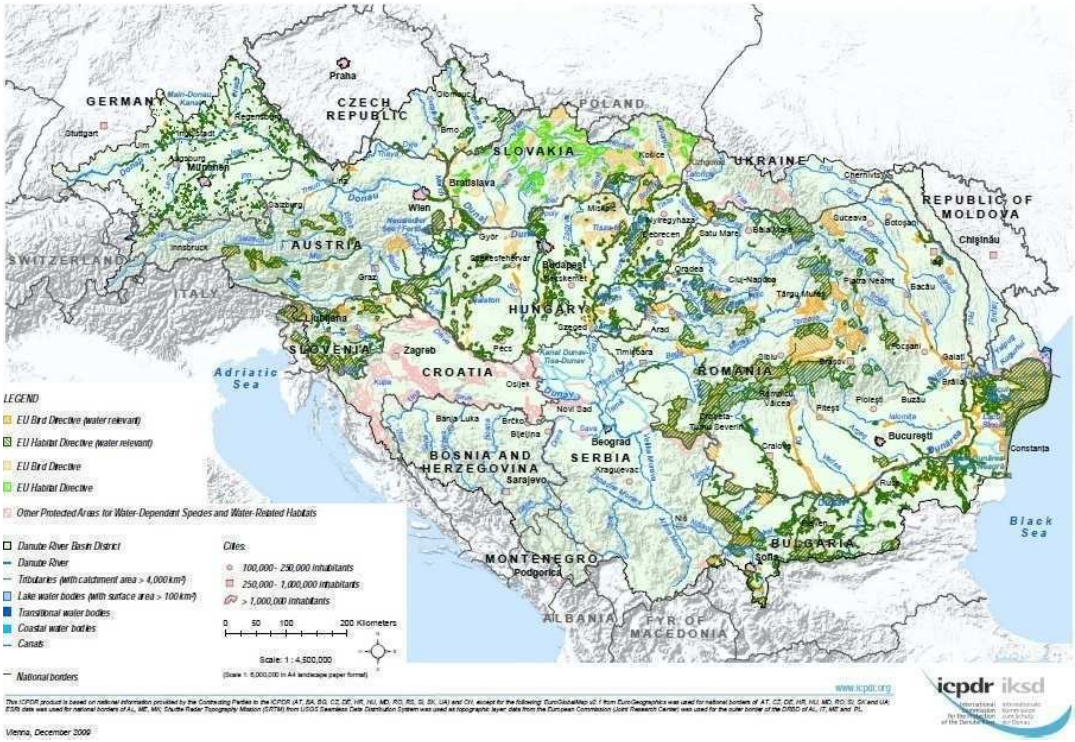

FIGURE 11: PROTECTED AREAS WITHIN THE DANUBE RIVER BASIN DISTRICT (ICPDR 2009).

According to Annex I of the European **EIA Directive**[4] "inland waterways and ports for inland-waterway traffic which permit the passage of vessels of over 1350 tonnes" are requested to be made subject to an EIA. It advices an EIA procedure within which the developer of a project in a first step needs to ask the competent authority about which information needs to be provided within the scoping stage. As listed in Annex IV of the EIA Directive, these information need to cover a description of the project, an outline of the main alternatives, a description of environmental aspects that are likely to be significantly affected, a description of the significant effects, a description of mitigation measures, a non-technical summary of these information and an indication of difficulties. In a second step, the developer needs to provide this information within an EIA report. Third, environmental authorities, the public and affected member states need to be informed and consulted. Taking this information and consolidation into account the competent authority decides about the ongoing of the project (website European Commission (c) [31.1.2012]).

In addition a SEA following **SEA Directive**[5] needs to be carried out for transport plans and programmes which set the framework for future development consent of projects listed in the EIA Directive or require an assessment under the Habitats Directive. In those cases relevant environmental authorities need to be consulted within the screening stage (website European Commission (d) [15.3.2012]).

Following a **joint statement of ICPDR, ISRBC and DC** on guiding principles for navigation development the three international regional organizations agreed on an approach and on principles that integrate both interests of water transport and interests of ecological integrity. The following list contains a summary of the principles that can be found in the joint statement as published under ICPDR (2007):

- interdisciplinary planning teams,
- joint planning objectives,
- transparent planning process (information/participation),
- ensure the comparability of alternatives and assess the feasibility of a plan or project,
- assess if the IWT project has a basin wide/trans-boundary impact,
- inform and consult the international river commissions in the Danube river basin,
- respect the Danube River Basin Management Plan and the respective sub-basin and national river basin management plans,
- define and ensure the prerequisites and goals of IWT as well as river/floodplain ecological integrity,
- avoid or minimise the impacts of structural/hydraulic engineering interventions through mitigation and/or restoration,
- take effects of climate change into account,
- use of best practice measures,
- priority ranking of possible measures to ensure the best possible environmental as well as navigation development,
- monitoring and adaptation of the effects of measure.

[4] Council Directive 85/337/EEC

[5] Directive 2001/42/EC

Conclusion

The Danube is an international river that connects six member states and four non member states of the European Union. Its entire watershed encompasses even more EU and non-EU countries at an area of about 817.000 km² and covers a population of about 100 million people. Therefore different levels of system consolidation may be expected throughout the River system, namely the countries of the European Union forming the more consolidated part of the system and the non member states forming the less consolidated part of the system.

The European Union has strong interests in the Danube Region, recently expressed in the EU Strategy for the Danube Region of 2010. Some of those interests are conflicting with each other. The main conflict of interests between European development goals for the region occurs between the objective of development of the Danube as a major transport corridor between the Rhine and the Black Sea and the objective of sustainable development. Both interests are important for future development of the region and therefore are not only objected by the European Union but also by sovereign states within the region.

On the one hand the interest of development of the Danube as transport corridor is expressed by the EU and the DC. Since the DC was founded in 1948 as first international organization that obliges all member states to enable Danube navigation, development has resulted in the creation of a trans-European waterway that connects the Black Sea with the North Sea by use of the rivers Danube and Rhine. The Danube waterway is identified as European transport corridor VII and forms part of priority project 18 of the European TEN-T network, which objects the development of the rivers Danube and Rhine as so called E-waterways. E-waterways are defined within the AGN as waterways that meet requirements of at least class IV, which means navigability for vessels of 85 m length, 9.5 m width and 2.5 m to 2.8 m draught.

For the Danube some obstacles make this objected development a special challenge. Those obstacles are: a large number of sovereign states with sovereign rules and administrations, border taxes, destruction of infrastructure and the nearly natural state of the river at long stretches which makes navigation more difficult or even impossible for large ships at low water periods. The TEN-T project 18 objects a number of river works, including dredging, damming and bank enforcement, to be carried out in order to deal with bottlenecks and missing links and to reach a minimum navigation draught of 2.5 m and navigability for vessels with a cargo load of up to 3000 t along the entire waterway.

On the other hand the EU as well as the DRPC object sustainable development and improved ecological status of water bodies, including rivers. Member stated of the European Union are bound to the ecological objectives of the WFD, the Habitats Directive and the Birds Directive. Although non-EU member states are not bound to the WFD, all countries that ratified the DRPC of 1994, committed themselves to implement the WFD. In fact this counts for all countries with a territory of more than 2000 km² within the Danube River Basin which makes the objectives of the WFD the most important and mutually agreed environmental goals at the water management sector within the region. Its aim is to transform all inland waters into a good status by 2015 and thereby asks for water management along hydrological boundaries and international coordination in cases of international river systems.

The ICPDR as the roof platform for implementation of the DRPC coordinates implementation of the WFD. According to the WFD a river basin district was created and the DRBMP was prepared in 2009 with River Basin Management Plans to be followed for the sub-basin and national level. The DRBMP objects to fulfill the WFD and asks for the conduction of EIA and SEA during the planning phase of

future infrastructure projects as well as for the implementation of best environmental practices and use of the best available techniques.

An ecological analysis of the river basin, carried out for the DRBMP, identifies most water bodies of the district as at risk or possibly at risk of failing the WFD objectives. One among many reasons is the intense modification of rivers for navigation purpose. Although water transport is generally regarded as more environmentally friendly than other modes of transport, the often necessary intense water works strongly affect ecology of rivers. Negative effects are expected for the self-purification capacity of the river, drinking water supply, flood risk prevention, fish population and pollution.

The EU Birds Directive and Habitats Directive as well as the Ramsar Convention, ask member states to create a network of protected areas. Projects that are likely to affect the integrity of those sites need to be subject to appropriate assessments and compensational measures need to be taken when negative effects cannot be avoided. The EIA Directive asks all inland waterways that permit navigation of vessels of more than 1350 t to be subject to an EIA. An EIA requires the description of the project, an outline of main alternatives, a description of environmental aspects that are likely to be affected, a description of those effects, a description of mitigation measures, a non-technical summary and an indication of possible occurring difficulties. The Espoo Convention, in addition, asks member states to consult each other about projects that are likely to cause trans-border effects and to conduct EIAs at an early planning stage.

The following research presents four river engineering projects and asks if the mentioned international policy objectives and regulations are translated to the project level and if there is a difference in the implementation between different levels of system consolidation that can be found within the Danube River Basin. Table 3 shows indicators that are developed to measure compliance of projects to international regulations. They are derived from policy objectives and international regulations as presented in chapter 4.1.

International policy objectives and regulations		Indicator to measure compliance to international regulations
Development of the Danube as transport corridor VII	TEN-T, AGN: Achieve a minimum draught of 2.5 m	Achieved/objected draught (in m)
	TEN-T, AGN: Enable navigation for vessels of up to 3000 t cargo load	Achieved/objected maximum load of vessels (in t)
	TEN-T, AGN: Eliminate missing links and bottlenecks in order to achieve those objectives	Achieved/objected number or length of eliminated missing links and bottlenecks
Create sustainable development	WFD: Management along hydrological boundaries, Espoo Convention: international coordination of measures	international scope of coordination of planning objectives and measures (national, bi-national, multi-national, basin wide)
	ICPDR, ISRBC, DC: information and consultation of the international river commissions in the Danube river basin	International river commissions informed and consulted (yes/no)
	ICPDR, ISRBC, DC: interdisciplinary planning teams	Completeness of relevant disciplines that are involved in planning process
		Relevant authorities and experts involved (yes/no/partly)

	ICPDR, ISRBC, DC: define and ensure the prerequisites and goals of IWT as well as river/floodplain ecological integrity	goals of IWT respected (yes/no/which)
		ecological integrity respected (yes/no/which)
	ICPDR, ISRBC, DC: transparent planning process (information/participation)	Which stakeholders are informed?
		Which stakeholders are involved?
		Which media is used for communication?
		Is participation possible? If yes, how?
	ICPDR, ISRBC, DC: feasibility assessment	feasibility assessment conducted (yes/no)
	EIA directive, SEA directive, WFD, Birds directive, habitats directive, DRBM plan: conduction of EIA and SEA for infrastructure projects	Location in protected areas (yes/no/partly)
		Other reason for conduction of EIA/SEA
		conduction of EIA/SEA (yes/no)
		Decision based on EIA/SEA and possible overriding public interest
	EIA directive: assessment of basin wide/trans-boundary impact	geographical scope of investigation on trans-boundary effects (local, regional, national, bi-national, basin-wide)
	EIA directive/RBM Plan: outline of alternatives	Alternative practices and techniques that are taken into account
		Reason for decision on alternative
	RBM Plan: Application of best environmental practices and techniques	Nature of practices and techniques
		Effect of practices and techniques
		Are they regarded as the best available?
	EIA directive: description of environmental aspects that are likely to be affected	number and nature of environmental aspects that are taken into account
	ICPDR, ISRBC, DC: take effects of climate change into account	effects of climate change taken into account (yes/no/which)
	EIA directive: description of effects	Description available and complete (yes/no/partly)
	WFD/DRBM Plan: Improve ecological status of inland water and groundwater and achieve a good status by 2015	expected effect on ecological status of waters (positive or negative according to WFD Annex V 1.2 and nationally defined reference status)
	DRBM Plan: 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	Habitats conserved, restored and improved
	DRBM Plan: Protection, conservation and restoration of wetlands/floodplains to ensure biodiversity, the good	Habitats protected

	status in the connected river by 2015, flood protection and pollution reduction-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.	Compensational measures
	ICPDR, ISRBC, DC: monitoring and adaptation of the effects of measures	monitoring process of measures initiated (yes/no/how)

Table 3: International policy objectives and regulations (according to TEN-T, AGN, WFD, Espoo Convention, ICPDR, ISRBC, DC, EIA Directive, SEA Directive, Birds Directive, Habitats Directive and DRBMP) and derived indicators.

4.2. Case Study of Waterway Transport Projects

This chapter presents four projects of river engineering and their compliance to international regulations. The projects are chosen on the basis of requirements that are defined in chapter 3.1. Project 1, "Integrated River Engineering East of Vienna", covers the 50 km long Austrian stretch of the Danube between Vienna and the Slovakian capital Bratislava. Its aim is to enhance navigability at the almost natural stretch of the Danube while improving ecological conditions at the same time. Major trans-boundary effects may be expected to affect Slovakian and Hungarian ecosystems. From the point of view of my definition of system consolidation the project is realized at the highest state of system consolidation, as both the project country and the possibly affected countries belong to the EU. Project 2 aims to improve the navigability of the Hungarian section of the Danube between Szob and the southern state border, which again is a nearly natural stretch of the river. For this project trans-boundary effects are expected for Croatian and Serbian waters. Regarding my definition on system consolidation this project is realized at the low level of system consolidation due to the project country belonging to the EU and both possibly affected countries not belonging to the EU. Possibly this status is changing to a high level of system consolidation because of the accession of Croatia to the EU in the near future. Project 3, the regulation of the Danube for transport purpose in Croatia is expected to cause trans-border effects on Serbian ecosystems. Currently this project is realized at the lowest level of system consolidation due to both countries not belonging to the EU. In future this level will change to the medium level when Croatia is a full member state of the EU. Project 4 covers the improvement of river navigation at the Serbian stretch of the Danube with trans-boundary effects expected for Croatian, Romanian and Bulgarian waters. This project currently is at the medium level of system consolidation due to the project country and one possibly affected country belonging not to the EU and two possibly affected countries enjoying EU membership. Again, this will change with EU accession of Croatia.

For each project a short introduction is given that follows by an overview of relevant national legislation before the compliance to international regulations is measured by help of the indicators developed in chapter 3.2 and presented in Table 3.

Project 1: "Integrated River Engineering East of Vienna"

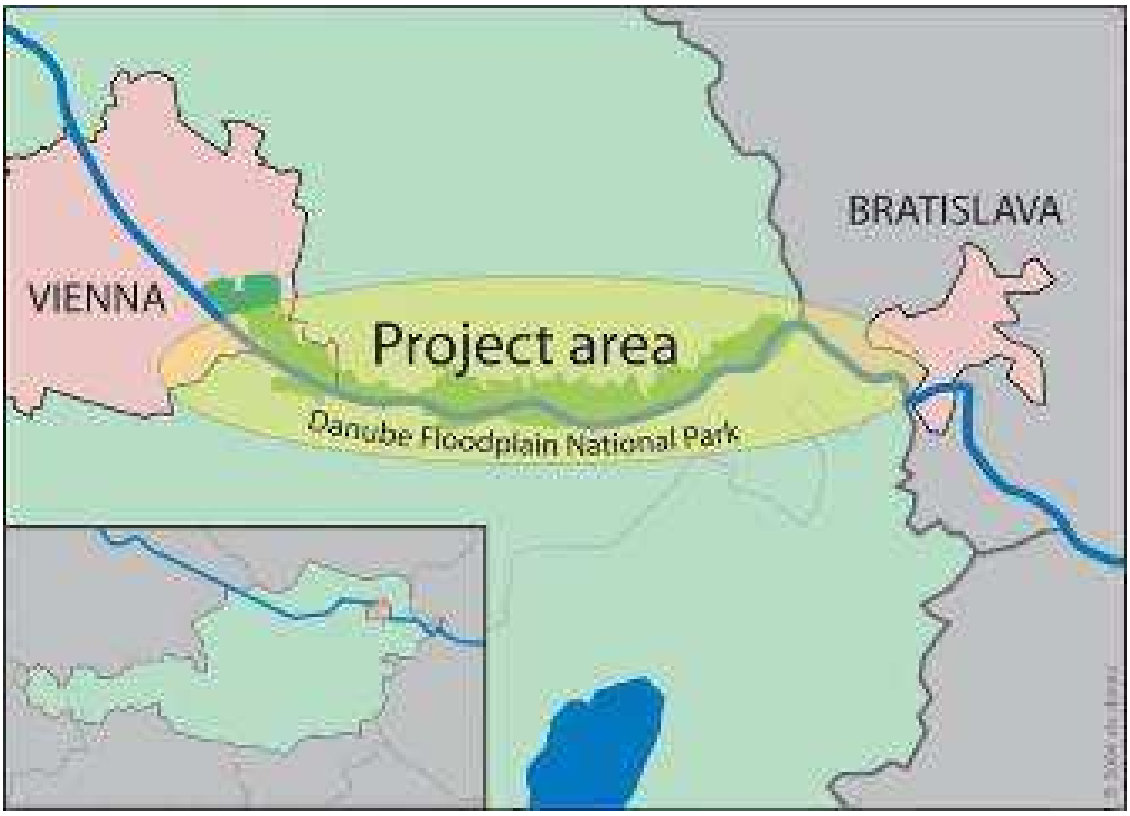

FIGURE 12: PROJECT LOCATION OF "INTEGRATED RIVER ENGINEERING EAST OF VIENNA" (WEBSITE VIA DONAU [15.5.2012]).

Introduction to the Project: Location, Problem, Initiator, Objective

Although heavily regulated for river navigation purpose since the 19th century, the 50 km long Austrian Danube stretch to the East of Vienna is critical for navigation due to riverbed erosion and an unbalanced sediment budget (Schabuss et al. 2008). The section is recognized as being the weakest Austrian part of the Transport Corridor VII due to not sufficient and fluctuating fairway depth, resulting in long waiting periods, reduced reliability and reduced competitiveness of the waterway. Austrian transport policy has set a high priority to the elimination of this bottleneck (Via Donau 2004) and the project is founded by TEN-T founds (website NAIADES (d) [20.5.2012]). Yet, riverbed erosion is not critical for navigation only. East of Vienna the Danube flows through the National park Donauauen, a nature reserve that protects 9.300 ha of one of the last big alluvial meadows of Central Europe. Deepening of the river bed is leading to lowering of the ground water table, which threatens valuable ecosystems adjacent to the river. The functioning of the wetland ecosystems within the National park Donauauen is heavily threatened by this process (Kordina et al. 2004).
Located at this major remaining free flowing stretch of the upper Danube River the project "Integrated River Engineering East of Vienna", initiated by the Austrian Ministry of Transport,

Innovation and Technology (BMVIT) and the Austrian waterway agency Via Donau, which is responsible for management and development of Austrian waterways (BMVIT 2006), aims to stop river bed degradation, improve navigability, improve fluvial dynamics within the inshore zones, enhance connectivity between the river and the floodplain and reduce high levels at flood periods. In order to achieve and combine those goals, side arm reconnections, riverbank restorations, granulometric bed improvement, ford dredging and low flow river regulation are planned to realize (Reckendorfer et al. 2005).

The projects` objectives in terms of improvement of navigability are an objected draught of 2.5 m at a length of 50 km between rkm 1921.0 near Vienna and rkm 1872.7 at the Slovakian border (website BMVIT (a) [10.5.2012]). The projects` ecological target is to achieve a status which is closest to the reference status before large scale river regulation in the 19th century. Figure 13 shows the structure of this objected anabranched, dynamic system consisting of a main branch, several side branches and extended woodland on a width of 2.5 km along the river. Main ecological deficits today are the reduced fluvial dynamics, riverbed degradation in the main channel, and reduced habitat quality inshore (Reckendorfer et al. 2005; Schabuss et al. 2008).

The objected time frame was to deliver the Environmental Impact Statement (EIS) in 2005 and to start a modeling experiment in the same year. From 2006 on, an in situ experiment should get started with the EIA consenting procedure starting and finalizing in the same year. From 2007 on it was envisaged to conduct the real construction works (Kordina et al. 2004). This was not achieved. Construction works are envisaged to take about 8 to 9 years (website BMVIT (a) [10.5.2012]).

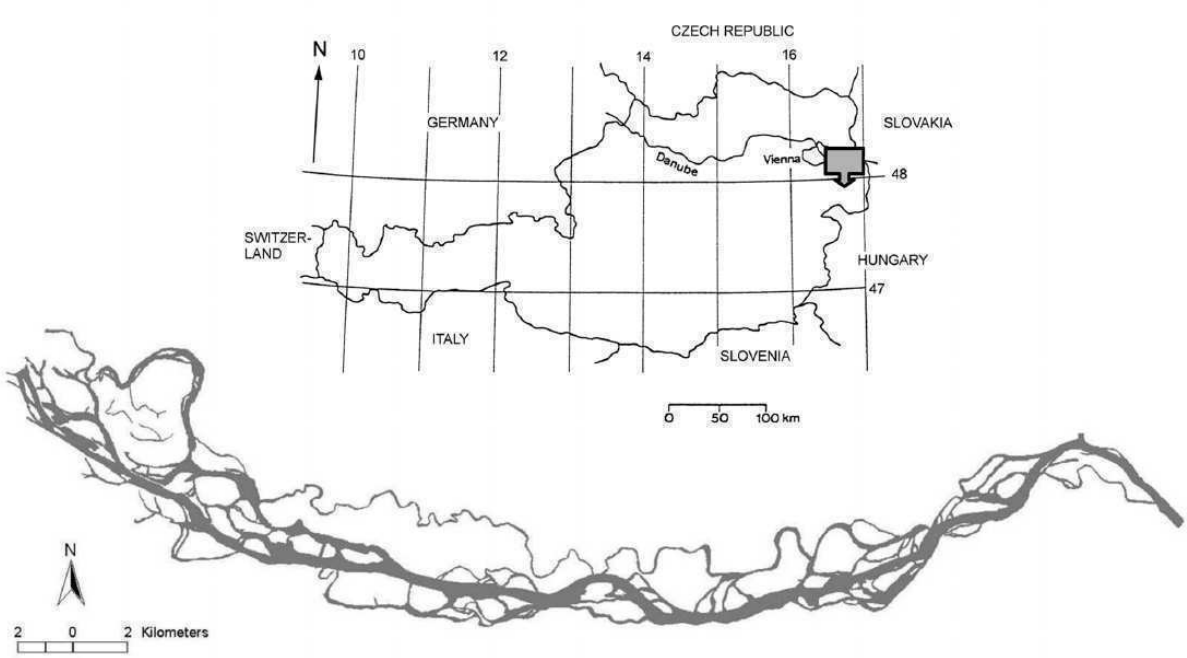

FIGURE 13: LOCATION OF THE HISTORICAL DANUBE EAST OF VIENNA AND STRUCTURE OF THE RIVERBED AS OBJECTED (SOURCE: RECKENDORFER ET AL. 2005).

Austrian Legislation concerning International Policy, Conventions and Directives

Among the Austrian priorities towards the EU Strategy for the Danube Region, the first priority area deals with Danube Navigation and defines the following priorities:

- Implement the agreed TEN-T priority Danube waterway infrastructure projects (TEN-T Priority Project 18) on time and in an environmentally sustainable way,
- Promotion of Danube Navigation within national policy,
- Development of Danube ports into multimodal logistics centres,
- Improvement of the environmental performance of Danube navigation,
- Implementation of harmonised River Information Services on the Danube,
- Investment in jobs and qualifications in the Danube navigation sector,
- Improvement of comprehensive waterway management of the Danube and
- Examination of potential effects of climate change on Danube navigation (Federal Ministry for European and International Affairs 2010).

Thus, Danube Navigation is a major Austrian national priority.

The basic instrument for the Austrian transport infrastructure is the General Transport Plan from 2002. It defines the priority project for improvement of navigational and ecologic conditions at the Danube between Vienna and Bratislava, the "Integrated River Engineering Project East of Vienna" (website NAIADES (d) [20.5.2012]). In 2006 BMVIT published a National Action Plan on Danube Navigation which defines Austrian navigation policy up to 2015 and contains a catalog that concretizes single measures to achieve the objectives of that policy (website NAIADES (d) [20.5.2012]).

A number of international policies and regulations from the fields of environmental protection and transport development as mentioned in chapter 3.2 are relevant for conduction of national waterway development projects in Austria. The country is committed to several international conventions. Since 1960 it is a member state of the DC due to its signature to the Belgrade Convention. In 1983 it ratified the Ramsar Convention. Since then Austria has designated 20 Ramsar sites of international importance. Among those sites are the Donau-March-Auen that are part of the National park Donauauen (website Lebensministerium (b) [13.5.2012]). Austria ratified the Espoo Convention in 1994. Since 2005 a bi-lateral agreement with Slovakia is in state that regulates the implementation of trans-boundary EIA (ÖVG 2009). Again in 1994 Austria signed the DRPC to which it is a contracting party since 1998 (website ICPDR (c) [20.5.2012]). Austria is a contracting party of the AGN since 1999 (UNECE 2012).

EU directives are binding to Austria since it is a member country of the European Union. Implementation of the European EIA Directive is done by the federal administration as well as by the provinces. There is no EIA law at the federal level. Each province develops its own legislation (website Strategische Umweltprüfung [13.5.2012]). Since 2004 Austria has transported the requirements of the SEA Directive into its legal system by implementing them into several material laws on federal level and at provincial level through amendment of planning acts or through SEA Acts. The Austrian SEA model is regarded as pro-active because of the participation of local and national authorities, external experts and interest groups in a SEA round table throughout the whole SEA procedure (Environmental Protection Department 2007).

Both the Birds Directive and the Habitats Directive that form the background of the NATURA 2000 network became binding for Austria in 1995 when the country became member of the European Union. 217 NATURA 2000 sites have been designated since then, covering about 16% of Austrian territory (website CBD (a) [13.5.2012]). Because environmental protection is regulated by the

provinces, implementation of the directives differs between the provinces, depending on the single strategies (Greitzenauer 2011).

The Austrian Water Act[6] from 2003 regulates the implementation of the WFD (Environmental Protection Department 2007). In 2004 river districts and responsible authorities were defined in Austria. An inventory of water bodies was done at the end of the same year. Monitoring programs of waters that were defined at risk of failing the management objectives were started in 2006 and the public was informed about management objectives in 2007. Many waters were defined as being at risk to fail achievement of WFD management objectives by 1015, which makes it necessary to expand the achievement of the good status for all waters to 2021 or even 2027 (presentation Koller-Kreimel 2008). In 2009 the country published its first National Water Management Plan which contains elements of a River Basin Management Plan as requested by WFD (website Lebensministerium (a) [13.5.2012]).

Compliance of the Project with International Policy, Conventions and Directives

The project tries to combine the two conflicting interests of developing the river as major transport corridor on the one side and ensuring functioning of the ecological system that is connected with the river on the other side. By guaranteeing a steady waterway depth of 2.5 m throughout the year it is aimed to respect the goals of IWT. By objecting an ecological status that is characterized by improved fluvial dynamics, a self sustaining landscape and a dynamic equilibrium, it is aimed to respect and improve ecological integrity (Reckendorfer et al. 2005).

Because the project offers a high potential for conflict between the objectives for navigation and environmental goals BMVIT and Via Donau decided to initiate a process of accompanying conflict moderation to deal with arising conflicts between stakeholders. Participating institutions were selected and invited by the project initiators with a focus on a broad representation of the different stakeholders. The following institutions are involved in the accompanying moderation process:

- BMVIT, Ministry of Finance and Ministry of Life, representing federal politics,
- Governors, departments and planning communities of the federal states Niederösterreich and Wien,
- Majors of local Danube communities,
- Border waters commission, representing Slovak Republic,
- NGOs in the topic of ecology,
- Stakeholders from navigation, fishery, chamber of trade,
- Experts in the topics of transport, ecology and regional development,
- license authority,
- property stakeholders: federal forests, National park Donauauen,
- Environmental lawyers: Wiener UA, Niederösterreichische UA (Kordina et al. 2004).

The relevant public was informed and consulted parallel to the planning process (Kordina et al. 2004).

Although the basic geographical scope of project planning is national, an international component is added according to a bi-national agreement with Slovakia from 2005 in terms of consultation of Slovak authorities within the planning stage of the project. Content and progress of the plans was presented in a transparent manner to Slovak authorities who raised concerns about fairway

[6] Federal Legal Gazette No 82/2003

conditions and possible mobilization of suspended load. The Slovakian side basically agreed to the plans although they commented that the objectives only could be met by the realization of a common barrage. In addition to this early involvement Slovak Republic was involved in project moderation accompanying the EIA, in professional meetings and on-site inspections by way of a common border waters commission (ÖVG 2009). The EIS was submitted to relevant Slovakian ministries in time. Slovakia took part in the EIA negotiations and asked for further consultations but Austria does not see necessity for further consultations due to correct involvement of Slovak Republic and lack of additional complains concerning earlier consultations (ÖVG 2009).

As a result of information of the ICPDR, the Austrian project has been listed in the list of future infrastructure projects to be found in Annex 7 to the DRBMP published in 2009. Its status was defined as being officially planned with no expected deterioration of the water body status, no expected trans-boundary impacts. No conduction of SEA is mentioned but conduction of an EIA intended (ICPDR 2009).

The analysis of potential alternatives was given a high priority within the planning process and different stakeholders were involved at an early stage in order to achieve a compromise between development for navigation and improved ecological conditions (Reckendorfer et al. 2005). An assessment of alternatives has been conducted between 2002 and 2004 (website BMVIT (a) [10.5.2012]). In a first step (from 2002 on), the comparison of 16 possible measures of bed stabilization resulted in the elimination of not appropriate measures. Only two alternatives remained for various reasons. For example slope reduction by increase of length of the river would cause intolerable effect on navigation while a compensation of bed load by artificial bed load addition would cause intolerable effect on ecology (Reckendorfer et al. 2005). The second step comprised the comparison of the remaining two alternatives which are: sediment addition and granulometric bed improvement. Both alternatives were elaborated concerning their performance in terms of waterworks, shipping, ecology, economy and planning. Because both alternatives were not sufficient, an additional alternative based on findings of investigation was developed in a third step. In the last step a blueprint of the project was developed that should be subject to the EIA (BMVIT, Via Donau 2006). The proposed measures comprise granulometric bed improvement, low water regulation by groynes and training works, widening of the river bed, side arm reconnection and navigation-technical measures (website BMVIT (b) [13.5.2012]). The alternative was developed and selected because it meets all sectoral criteria that were not met by eliminated alternatives (BMVIT, Via Donau 2006).

Granulometric bed improvement is aimed to contribute to the goal of bed stabilization and reduction of river bed degradation and deepening. The type and amount of added material thereby needs to guarantee ecological dynamics between the river and its bed as well as a sufficient distance between bed and vessel in order to prevent damage. Groyne construction and river training works are aimed to contribute to the nautical objective of guaranteeing safe navigation during low water periods. Distance between groynes as well as height of constructions need to be optimized from ecological, nautical and efficiency points of view. For example the occurrence of potholes needs to be prevented. Widening of the riverbed shall allow improvement of ecologic functioning of the system by use of the power of water. Bank protecting constructions at slip-off slopes are planned to get removed while concave banks are planned to remain protected from erosion. Navigation-technical measures, as partly relocation of the shipping channel for instance are planned in order to use existing pot holes and to avoid navigation across sand banks. In order to improve the fluvial dynamics between the river and its wetlands side arm reconnection at low water level shall allow water to run from the river to the floodplain. This practice shall improve habitat quality of the floodplains.

Regeneration of dynamic habitats is promoted by allowing of side erosion (website BMVIT (c) [13.5.2012]). The proposed restored and conserved habitats include the following sub-projects:

- Water body connection Zainet Hagel,
- Water body connection Beugen-Arm,
- Water body connection Fischamend (Bi-Graben, Melichar-Arm),
- Water body connection Schönau – optimization (Schönauer-Arm),
- Water body connection Orth – optimization (Kleine Binn),
- Water body connection Haslau-Regelsbrunn – optimization (Regelsbrunner-Haslauer-Arm),
- Water body connection Stopfenreuth (Stopfenreuther-, Karpfen-, Spittelauer- und Tiergarten-Arm),
- Water body connection Röthelstein - Röthelsteiner-Arm, Losl-Anschütt-Arm (website BMVIT (b) [13.5.2012]; Schabuss et al. 2008; website BMVIT (c) [13.5.2012]).

Because of the location of two NATURA 2000 sites, one Biosphere Reservation, one National Park, two Nature Protection Areas, three Landscape Protection Areas and several Natural Monuments within the project area an EIA is required. BMVIT has installed a committee to coordinate the EIA. Besides the coordinator and members of the ministry as well as Via Donau, the committee consists of four expert groups: navigation experts, river engineers, ecologists and socio-economics (Reckendorfer et al 2005). An EIS was produced between 2004 and 2006 (website BMVIT (a) [10.5.2012]). The geographical scope of the assessment of effects of the measures is restricted to local Austrian communities that are divided in four parts (Wiener Bereich, Fischamend-Windungsmauer, Windungsmauer – Marchmündung, Grenzstrecke). Within the investigation area the river bed, the banks, the floodplain and the area outside the dike are investigated (BMVIT, Via Donau 2006).
The EIS was delivered in 2006 and presented in a public edition from December 2007 to January 2008 with a following public hearing on the matter in October 2008 and a final assessment in June 2009 (website BMVIT (a) [10.5.2012]; presentation Robert Toegel 2011). Because of the large EIA report environmental NGOs claim that it is “objectively not possible to give a statement to all relevant issues at time” (Alliance for nature 2008). The EIS, comprised the following aspects: waters, groundwater, use of water and groundwater, soil, air/climate, animals/plants/habitats, nature protection (Habitats Directive, fish, Birds Directive), hunting economy, fishery, agriculture, forestry, landscape, cultural goods, housing, health, leisure, terrestric traffic, waterway traffic, technical infrastructure, resource, disposal (BMVIT, Via Donau 2006). An assessment of trans-border effects or cumulative effects with other river engineering projects is not reported.
NGOs complain that although ground water bodies were taken into account, ground water ecosystems did not appear in the considerations. The same counts for deep ground water bodies. Although the description of potential effects of the planned measures is presented in the EIS, the description of potential mobilization of pollutants was reduced to suspicion cases and therefore was taken into account for parts of the whole project area only (Alliance for Nature 2008).
No decision on the project is taken by now. Nevertheless a part of the project has already been finalized in terms of five test areas which are:

- Side Arm reconnection Schönau (realized in2004),
- Side arm reconnection Orth (realized in 2002),
- Side arm reconnection Haslau-Regelsbrunn (realized in 1998),
- 1.7km River Bank Restoration Groyne optimization Witzelsdorf (realized in 2009),

- River Bank Restoration Turnhaufen (realized in 2006);

A sixth test project is in preparation:

- 3 km River Bed stabilization, river bank restoration, side arm reconnection, groyne optimization Bad Deutsch Altenburg (presentation Robert Toegel 2011).

The last mentioned pilot project shall encompass all measures that are planned within the whole project in order to get experience in practice and to test the technical and ecological evaluation procedure. For this purpose, for the three km long section between rkm 1887.5 and 1884.5 consent was granted in late 2011. Via Donau asked the project developer consortium under leadership of Strabag to immediately start construction works. For the pilot project Via Donau initiated a participation process that shall integrate a broad range of stakeholders from National park Donauauen, WWF, Bird Life, the federal trade chamber, industry and ICPDR. A science board consisting out of five scientists from navigation, biodiversity, ecological water engineering, hydrology and groundwater and hydro-biology and fish-ecology shall give scientific advice to the stakeholders. The time frame for the project is 2.5 years. Throughout the whole time scientific monitoring and ecological construction supervision shall guarantee accountable implementation of the planned measures (website BMVIT (d) [14.5.2012], website BMVIT (e) [14.5.2012]).

Financed by BMVIT a three km test reach for effectiveness of measures and accompanying monitoring has been initiated. For the entire reach a successive adaptive approach with feedback loops between monitoring, planning and execution is envisaged. Monitoring activities of pre- and post restoration conditions shall be conducted until 2020 (Schabuss et al. 2008).

Project 2: "Improvement of Navigability of the Hungarian Section of the Danube between Szob and the Southern State Border"

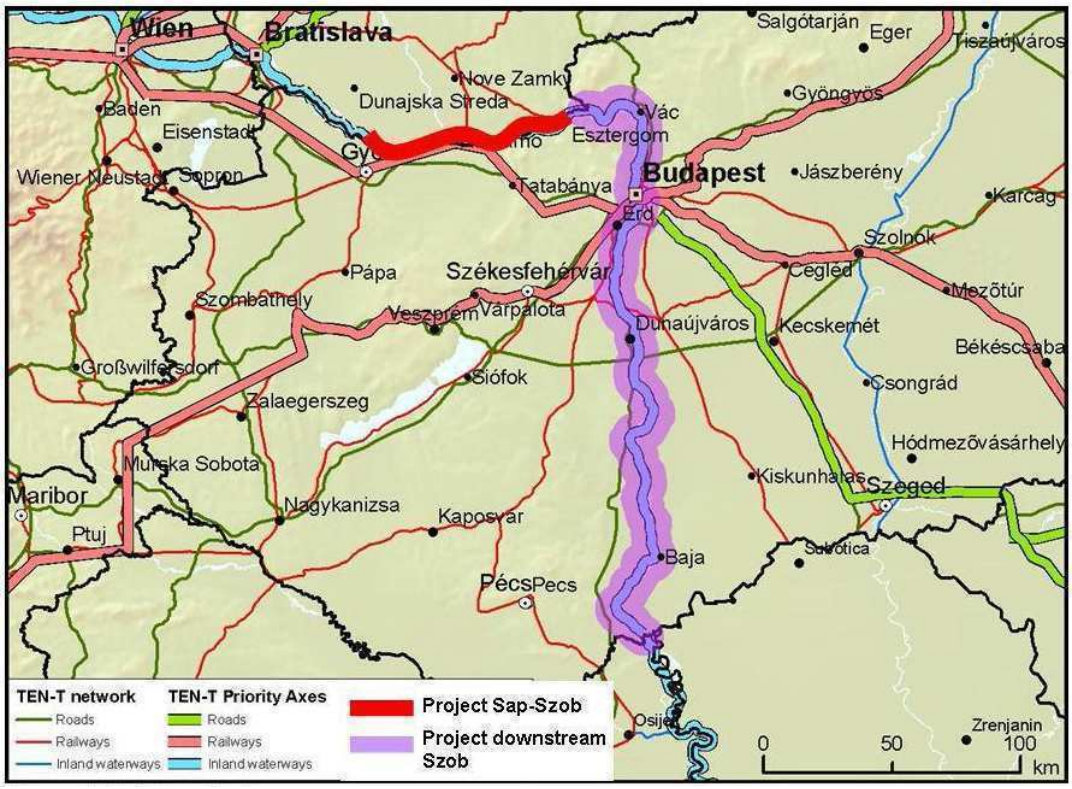

FIGURE 14: LOCATION OF "IMPROVEMENT OF NAVIGABILITY OF THE HUNGARIAN SECTION OF THE DANUBE BETWEEN SZOB AND THE SOUTHERN STATE BORDER"(WWF 2010).

Introduction to the Project: Location, Problem, Initiator, Objective

Due to its central location, the entire Hungarian section of the Danube River plays a dominant role in the development of the trans-continental waterway and is aimed to be upgraded in the frame of European TEN-T policy (Ministry of Economy and Transport, VITUKI 2007). Hungary fully agrees with EU objectives to develop the Transport Corridor VII as an international waterway (Ministry of Economy and Transport, VITUKI 2007). NEWADA supported the Ministry of Economy and Transport in preparation of an inventory of inland waterways in 2010. The outcome is that the Danube in its present state does not meet the requirements for waterway classes VI/B and V/C which are the objected classes for the Hungarian stretch of the river. At more than 50 locations between rkm 1811 and 1433 there are limitations in depth or width of the waterway (Magyarics 2010). Two projects in Hungary aim at the elimination of fords and bottlenecks along the Danube in order to guarantee stable and predictable conditions of the fairway. The first encompasses the Hungarian stretch of the river that forms the common border with Slovakia. The second encompasses the Hungarian stretch of the Danube between the town of Szob and the southern state border (Ministry of Economy and Transport, VITUKI 2007). The present study deals with the second project because it is the major stretch of the Hungarian Danube (Figure 12).

Between 2005 and 2007 the Hungarian Ministry of Economy and Transport decided to initiate a tender for a study that supports improvement of navigability of the Danube between the town Szob and the southern state border. The winning bidder is a consortium of organizations led by VITUKI-Environmental and Water Management Research Institute Non-profit LTD (website dunahajozhatosag [13.5.2012]). VITUKI is a public research institute which was founded in 1952 on the basis of the Hydrologic Institute to perform research for Hungarian water management, as well as to conduct studies related to development, conservation and sound management of water resources of the country (website DMCSSE [13.5.2012]). The other members of the consortium are Aquaprofit, Ter-Team Mernök Kft. and VTK Innosystem Ltd. Aquaprofit is responsible for compilation of licensing documentations and technical bidding documentations, compilation of comprehensive environmental studies pursuant to Government Decree No. 314/2005 on Environmental Impact Assessment[7], examinations related to water source protection for the planned interventions, conduction of NATURA 2000 impact assessment documents and performance of public relations and communication tasks for the entire project (website Aquaprofit [13.5.2012]).

Currently, Hungarian infrastructure for inland waterways is co-financed by the EU cohesion fund and the European regional development fund. A feasibility study for the project at hand was co-financed by EU TEN-T budget (website NAIADES (e) [20.5.2012]).

Hungarian Legislation concerning International Policy, Conventions and Directives

In Hungary the Ministry of Environment and Water (KvVM) is responsible for environmental protection and water management policy. The Ministry of Transport, Energy and Telecommunication (KEHM) besides other issues is responsible for navigation and transport and thereby for the classification of waterways. The two ministries collaborate in the field of preparation of legislation. As a central operational body, the Central Directorate for Water and Environment (VKKI) is used by

[7] Governmental Decree No. 314/2005 (XII.25.) regarding the procedures of environmental impact assessment and the single procedure of authorization of utilization of the environment.

the ministries to coordinate, supervise and control the work of the 12 Environmental and Water Directorates (KÖVIZIGs) which perform professional activities at the lowest level of water management. The KÖVIZIGs are responsible for operation and maintenance of the state owned water bodies. Three of the 12 directorates are responsible for the Danube River:

- North Trans-Danubian Environmental and Water Directorate is responsible for rkm 1850 to 1708 (142 kms),
- Middle Danube Valley Environmental and Water Directorate is responsible for rkm 1708 to 1560 (148 kms)
- Lower Danube Valley Environmental and Water Directorate is responsible for rkm 1560 to 1433 (127 kms) (Magyarics 2010).

Responsibility for research lies with VITUKI. The institute works in close connection with the different levels of governmental administration and also is directly involved in planning, preparation works, monitoring and supervision. It can be seen as a central information center (Magyarics 2010).
Among the Hungarian priorities in the frame of the EU Strategy for the Danube Region are:

- Protection of natural values and
- Improvement of the Danube-region transport (Magyarics, VKKI 2011).

The country is bound to a number of commitments it made in the light of international conventions. Hungary ratified the Belgrade Convention which forms the basis for the Danube Commission, in 1949. Since then the parameters for safe navigation were actualized from time to time. As every signatory party, Hungary committed itself to achieve the DC recommendations, currently regulated by Governmental Decree 151/2000 (IX.14.) as well as KöViM Decree 17⁄2002 (III.7.) at national level (Magyarics 2010). The Ramsar Convention came into force for Hungary in 1979. Since then, the country has designated 29 sites as wetlands of international importance. In total they cover an area of 244,913 ha. Important Ramsar sites at the Danube are Béda-Karapancsa, Gemenc and Nyirkai-Hany, which contain floodplain habitats along the Hungarian Danube (website Ramsar Convention (a) [21.5.2012]). Hungary has been a signatory party to DRPC since 1994 (website ICPDR (d) [21.5.2012]). Hungary ratified the Espoo Convention in 1997 (website UN [21.5.2012]) and is a contracting party of the AGN since 1999 (UNECE 2012).
Due to its membership in the European Union, common regulations of the EU are binding to Hungary. The EIA and SEA Directives are implemented through a small number of laws. Act LIII of 1995 forms the legal basis for EIA and SEA requirement, content and form in Hungary. After the accession of the country to the European Union, Government Decree No. 314/2005 (XII. 25.) was established to harmonize Hungarian EIA legislation with EU legislation (Bela, Kelemen 2008). While Government Decree No. 314/2005 deals with single projects, Government Decree 2/2005 (I. 11.) was issued to deal with plans and programs (Bela, Kelemen 2008). Responsibility for EIA and SEA lies by the Ministry of Environment and Water and the National Chief Inspectorate for Environmental Protection and Water Management (Bela, Kelemen 2008).
As required by the European Habitats and Birds Directives Hungary has designated NATURA 2000 sites on its territory. All together they cover 1.96 billion ha, which equals 21% of the countries territory (website CBD (b) [13.5.2012]). The legislative background is set by the following laws and decrees:

- 1996. LIII. Law on nature conservation,
- 13/2001 [V.9.] Decree of Minister of Environment about protected, strictly protected plant and animal species, strictly protected caves, and plant and animal species of Community interest,
- 275/2004. (X. 8.) Governmental Decree on Natura 2000 sites,

- 45/2006. (XII.8.) Decree of minister of environment and water on land registry numbers of Natura 2000 sites and
- 269/2007. (X.18.) Governmental Decree on rules of land use on Natura 2000 grasslands (Presentation Shashalmi 2008).

According to the WFD, Hungary published a draft version of a time schedule and work program concerning the national RBMP in late 2006. According to Article 14 of the WFD an overview on the identification of the significant water management issues was published in late 2007 followed by a public consultation process. The outline of the national RBMP containing the conceptual program of measures was published in late 2008 with a following discussion being opened until early 2009. The regional environmental and water directorates were responsible for the preparation of the RBMPs at sub-unit level and sub-basin level, while at the national level VKKI took over responsibility. The final version of the Hungarian RBMP has been adopted in May 2010 (Szilagy et al. 2010).
Water management functions in Hungary are primarily regulated by Act LVII on water management of 1995. Three government decrees give a new framework for the management of water-related ecosystems, and serve the legal harmonization with the Water Framework Directive:

- Government Decree 219/2004 (VII. 21.) on the protection of subsurface water bodies,
- Government Decree 220/2004 (VII. 21.) on the regulations pertaining to the protection of surface water bodies and
- Government Decree 221/2004 (VII. 21.) on certain regulations pertaining to river basin management (Szilagy et al. 2010).

Compliance of the Project to International Policy, Conventions and Directives

The expected navigational effect of the elimination of bottlenecks at 50 locations will allow an increase of navigational days from currently 206-270 days per year to 320-330 days per year (website Aquaprofit [13.5.2012]). In accordance with AGN requirements the envisaged fairway depth is 2.5 m along the stretch between Szob and the southern state border. Vessels with a maximum load of 4000-4500 t are objected to navigate on the river between Szob and Budapest while downstream from Budapest vessels with a load up to 6200 t shall be able to navigate (Ministry of Economy and Transport, VITUKI 2007; website Dunahajozhatosag [13.5.2012]). Thus, goals of IWT are respected in the project design. Elimination of shallow fords and bottlenecks that shall guarantee save navigation and improve navigability is declared to be the primary aim of the project (Ministry of Economy and Transport, VITUKI 2007). Waterway class VI/B shall be achieved between rkm 1811 and 1641 and waterway class VI/C is envisaged between rkm 1641 and 1433 (Ministry of Economy and Transport, VITUKI 2007).
VITUKI as the leader of the implementing consortium was commissioned by the Ministry of Economy and Transport to conduct a preliminary study between 2005 and 2007 to present a proposal for achieving the navigational objectives which was co-financed by TEN-T funds. This Baseline Study on the Improvement of the Navigability of the Danube was divided in 6 workpackages:

- proposal on the elimination of shallow fords and bottlenecks,
- studies on the fairway operation,
- analysis of environmental aspects,
- analysis of public interests,
- cost-benefit analysis,

- project management.

The study was delivered by 2007 to the Ministry of Economy and Transport (Ministry of Economy and Transport, VITUKI 2007; Magyarics 2010). It formulates interventions that are necessary for the improvement of the navigability of the Danube. The task of the study was officially restricted to application of traditional river management means which are:

- dredging of the navigational route (involving the removal of marly, rocky riverbed material),
- narrowing of the riverbed with control works (groins, T-works, parallel training walls),
- combined dredging and narrowing solutions,
- new lining and correction of the navigational route and
- individual river control procedures (Ministry of Economy and Transport, VITUKI 2007; website Aquaprofit [13.5.2012]; website Dunahajozhatosag [13.5.2012]).

Therefore the study did not regard alternatives based on new dam construction or alternatives for improvement of the navigation sector as navigation systems, harbor infrastructure or fleet upgrading for example (Gruber et al. 2008).

Concerning environmentalist complains the proposed measures could harm drinking water resources and rivers recreational, tourism and water sports potential and will contribute to deepening of the riverbed and decrease of low water levels. In addition to those direct effects of the planned works, an increase in navigation could result in an increase of harmful impact on species and habitats as fish and bank habitats for instance (Gruber et al. 2008).

The preparation of the necessary licensing documents was expected to be conducted between 2008 and 2010 with the execution of construction works to follow between 2009 and 2013 (Ministry of Economy and Transport, VITUKI 2007).

Due to the location of the entire Hungarian Danube stretch in or next to NATURA 2000 sites an EIA is required for the project. Civil stakeholders as well as the contract on EU subsidy encouraged the conduction of an EIA (Consortium led by VITUKI 2012). The assessment was conducted between 2008 and 2010 as part of the official licensing procedure (Ministry of Economy and Transport, VITUKI 2007). Firstly the EIA has been prepared on basis of the baseline study from 2007 with an integration of more detailed technical design. The outcome of the assessment is that **"**the project aiming at the improvement of the navigability on the Danube will not have significant environmental and ecological impact or risk and will not hinder other utilization of the river"(Consortium led by VITUKI 2012, p.5). The responsible authorities issued permit not for the entire project area but for eight points of intervention and water management only. VITUKI complains that the governmental decision to suspend licensing in 2011 is not sufficiently reasoned. The Ministry of Rural Development decided to stop licensing due to absence of a cost-benefit assessment, absence of real alternatives to development of inland navigation and the absence of alternatives to fairway improvement and asked for the provision of a SEA. VITUKI does not agree with those complains and sees its task as completed correctly. Therefore it expects the licensing authority to grant license (Consortium led by VITUKI 2012). Following the consortium led by VITUKI (2012), SEA Directives requirements are integrated in the work of the technical experts. Yet, it is not clear what this means in detail and environmental NGOs complain that a SEA has not been conducted for the entire Hungarian Danube but only for the common stretch with Slovakia. For the assessment of environmental impact the project area was cut in smaller stretches that were elaborated on separately, which results in a lack of a comprehensive examination of the impact on NATURA 2000 sites (Gruber et al. 2008). Therefore, concerns of ecological integrity seem to be not reflected adequately (Gruber et al. 2008).

VITUKI states that the project could harm the ecology of the main branch (Ministry of Economy and Transport, VITUKI 2007). Other environmental and hydrological issues as problems of drinking water

supply, disappearance of species from protected areas, sinking of ground water level and deterioration of connections between the river and its side branches were just briefly mentioned as possible conflict areas but not further taken into account (Gruber et al. 2008). The rehabilitation of single side branches is regarded as tool for compensating degradation of main branch habitats (Gruber et al. 2008). In addition the desired ecological status has not, as asked by the WFD, been defined (Gruber et al. 2008).

The scope of project planning and coordination of measures is national, due to the division of the Hungarian stretch into two parts, one that forms the border with Slovakia and for which bilateral coordination is unavoidable, and the one elaborated on in this paper that encompasses Hungarian waters only. Serbian and Croatian authorities are not involved or otherwise consulted in the planning process. The relevant experts and authorities directly involved in project planning are:

- the Ministry of Economy and Transport (project initiator and public authority),
- VITUKI Environmental Protection and Water Management Research Center Ltd. (consortium leader that implements the project),
- Aquaprofit (consortium member responsible for compilation of technical licensing, compilation of environmental studies, examinations related with water source protection, conduction of NATURA 2000 impact assessment and public relations,
- Ter-Team Mernök Kft. and
- VTK Innosystem Krt.

Exploration of further interests has been done by a questionnaire that has been compiled to different target groups: nature protection, local governments, associations of local governments, navigation organizations, professional associations (Ministry of Economy and Transport, VITUKI 2007).

As a result of information of the ICPDR, the project is listed as two projects (Szob-Baja Között and Bajatol delre) in the list of future infrastructure projects of Annex 7 of the DRBMP published in 2009. Its status was defined as planning under preparation, expected deterioration of the water body, expected trans-boundary impacts and intended conduction of SEA but no conduction of EIA (ICPDR 2009).

Perceptions on transparency of the planning process are different. Following VITUKI, design works and licensing procedure were transparent for the broader public. Expression of opinion was possible through the project website[8], the civil forums, through consultations with the relevant central and local governmental, professional and non-governmental organizations as well as with the civil organizations. In addition press conferences, open demonstrations of physical modeling and public hearings were organized (Consortium led by VITUKI 2012). The Ministry of Economy and Transport participated in two professional forums that were initiated by WWF Hungary (Ministry of Economy and Transport, VITUKI 2007). In addition three public forums were initiated by the Ministry and VITUKI (Ministry of Economy and Transport, VITUKI 2007).). The Ministry of Economy and Transport published an intermediate report on its website in Hungarian language (Ministry of Economy and Transport, VITUKI 2007).). VITUKI established a website[9] for the provision of general information, proceedings and reports about the project. Most information is available in Hungarian language only (Ministry of Economy and Transport, VITUKI 2007). Following environmental NGOs the outcomes of the public participation process concerning the VITUKI study of 2007 have been incorporated in the final study to a very limited extent. On the final version of the study no further comments were possible (Gruber et al. 2008).

[8] http://dunahajozhatosag.hu/index.php

[9] http://www.dunahajozhatosag.hu/index.php?menu=dokumentumtar

Project 3: "Regulation of the Danube for Transport Purpose in Croatia"

FIGURE 15: "REGULATION OF THE DANUBE FOR TRANSPORT PURPOSE IN CROATIA" (WWF 2012, P.1).

Introduction to the Project: Location, Problem, Initiator, Objective

According to AGN the Croatian stretch of the Danube needs to be developed as Class VII/C waterway on its entire length of 137.5 km. A National Plan for Inland Waterway Maintenance in Croatia, that was prepared by NEWADA support, presents an inventory of the current status of the Croatian Danube as well as of planned measures. Currently the Croatian Danube is meeting the requirements as set out by AGN. Nevertheless, obstacles for navigation exist due to maintenance deficits, resulting in sections with inadequate depth, sections with inadequate width and sections where the waterway is set directly next to the riverbank and therefore causes safety complains. 13 of those bottlenecks are specified in the Mid-term Plan of Inland Waterways and Inland Port Development. Depending on the source of information they are located between rkm 1427 and rkm 1311 (Spaic 2011) or between rkm 1433 and rkm 1380 (mail Vodniputovi [10.4.2012]). The Danube forms the common border with

the Republic of Serbia. The objectives of the river regulation project, initiated by the Croatian waterway agency Vodniputovi, are to eliminate the bottlenecks and to reach a stable draught of 2.5 m for the navigation channel (mail Vodniputovi [10.4.2012]). Management of the shared stretch of the River is characterized by not fully executed river regulation works, state border problems and insufficient founding which results in problems for inland navigation (Presentation Isakovic 2011). On the Croatian side of the river stretch the Natural Park and Ramsar site Kopacki Rit is located as a unique reserve for plants and birds (Presentation Isakovic 2011).

Croatian Legislation concerning International Policy, Conventions and Directives

Among the Croatian priorities towards the EU Strategy for the Danube Region are:

- "Development of intermodal transport and effective connecting of the Danube region with the Adriatic coast
- Environmental protection, risk prevention, and renewable energy resources development

One strategic option is of special relevance to this papers´ topic: The Reconstruction and development of inland waterways, passenger ports and cargo ports on the rivers Danube, Drava and Sava".

Croatia is bound to commitments it made in the light of several international conventions. The Ramsar Convention came into force for the country in 1991. Since then it designated 4 sites as wetlands of international importance. They cover a total area of 86,579 ha. At the Danube Nature Park Kopacki Rit forms the Croatian representative of floodplain habitats (website Ramsar Convention (b) [21.5.2012]). Croatia has been a signatory to the DRPC since 1994 (website ICPDR (e) [23.4.2012]) and it has ratified the Espoo Convention in 1996 (website UN [21.5.2012]). The country is a member state of the DC (website Danube International Commission (b) [10.4.2012]) and a contracting party of the AGN since 1999 (UNECE 2012).

Since Croatia has submitted its membership application to the EU in 2003, the country committed itself to adopt and implement EU legislation. The Environmental Protection Act[10] sets out objectives and principles and defines the environmental liability and inspection systems. It enables SEA and EIA in Croatia. The By-law on Environmental Impact Assessment from 1997 and the Rule Book on EIA from 2000 form the more detailed legislation about EIA (website worldbank [13.4.2012]). SEA provisions are only set out in Article 34 of the Environmental Protection Act. Responsibility for granting EIA and SEA consent lies with the Ministry of Environmental Protection and Construction (MEPPPC) and the provincial administrations. In 2002 the country published the National Strategy on Environmental Protection[11] and the National Action Plan on the Environment. The following Law on Nature Protection[12] was harmonized with EU legislation (website SEA [3.5.2012]).

Currently it is planned to implement the Birds and Habitats Directives in Croatia when the country becomes a full member of the EU. The Nature Protection Act[13] will form the legal basis for the two European directives. A baseline study for site designation has already been carried out by the State Institute for Nature Protection (SNIP). About 1000 sites were identified that should be proposed to

[10] NN82/94, 128/99
[11] NN46/02
[12] NN162/03
[13] OG 70/05

form part of the NATURA 2000 network. The site proposal is currently under public consultation (website NATURA 2000 [23.2.2012]).
Croatian legislation provides no specific regulation for the protection of waters. Therefore the issues dealt with in the European WFD are dispersed among different regulations. The most important are the Act on Waters[14], the Nature Protection Act, the Environmental Protection Act and Act on Water management financing[15] (Szilagy et al. 2010). The water sector as each sector of Croatian law seems to follow only its main regulation without integration of other sectors. Since the regulations often conflict with each other and the WFD asks for an integrative approach, one can state that it is not yet accomplished in Croatia. Originally it was expected that the WFD would be transposed to Croatian legislation by 2007. Although initiated in order to implement the WFD, the new Act on Waters from 2009 lacks some of the goals of the WFD. Technical measures are still primarily used for water management and a sustainable approach is absent. Nevertheless the new Act on Waters is an important step to implement the WFD in Croatia. It's coming into force was only possible because of huge lobbying and EU interference. The act faced strong opposition from old fashioned water management officials (Szilagy et al. 2010). With the Act on Waters two river basin districts are determined instead of the former four: the Danube River Basin District and Adriatic River Basin District. Yet, this is determined in the Act on Waters but not in the practice. The first draft national RBMP was finalized in 2011 with the Sava River Basin Management Plan (Szilagy et al. 2010).

Compliance of the Project to International Policy, Conventions and Directives

The main objective of the project is to ensure minimal requirements for safe navigation which is connected with the objected draught for the project area of 2.5 m and the elimination of bottlenecks on the stretch between rkm 1427 and rkm 1311 (Spaic 2011) or between rkm 1433 and rkm 1380 (mail Vodniputovi [10.4.2012]) depending on the source of information.
Croatia and Serbia have signed a bilateral Agreement on navigation on inland waterways and their technical maintenance in October 2009. In 2010 a bilateral commission was founded between the two states in order to implement the agreement (Presentation Isakovic 2011). Within this commission, an Expert Group for technical maintenance and monitoring of inland waterways, comprising experts from both Serbia and Croatia, is expected to meet twice a year (Mitrovic et al. 2011; mail Vodniputovi [10.4.2012]). Yet, the Serbian Ministry of Environment is not directly involved (mail WWF Croatia [3.5.2012]). On the Croatian side experts from navigation authorities, Vodniputovi and Nature Park Kopački Rit have been continuously involved and consulted in planning of the project. In addition the EIA was produced by a team of experts to cover all aspects of the project (mail Vodniputovi [10.4.2012]). The involvement of Nature Park Kopački Rit in the planning process resulted in a reduction of the project due to potential environmental harm.
The most important stage of communicating with stakeholders was the EIA public hearing process which included communication through websites, local newspapers and open meeting. (mail Vodniputovi [10.4.2012]). During the public hearing process, the EIA was available online for one month, and NGOs were invited for the meeting where the EIA was presented (mail WWF Croatia [3.5.2012]). NGOs and local communities were involved by information and consultation only in the public participation period at the end of the planning process (mail WWF Croatia [3.5.2012]; mail

[14] OG 153/09
[15] OG 153/09

Vodniputovi [10.4.2012]). Hungary or other Danube countries are not involved in the project planning (mail WWF Croatia [3.5.2012]).
According to Vodniputovi, presentation to all relevant river commissions including ICPDR has been done by Croatian and Serbian authorities. As a result of the consultations, the project should have been added to Annex 7 of the DRBMP as planned infrastructure projects (mail Vodniputovi [10.4.2012]). Yet, the project does not appear as a Croatian project in the list of future infrastructure projects in Annex 7 of the DRBMP published in 2009. Only the Serbian part for the Apatin section can be found (ICPDR 2009).
While it is undoubted that IWT interests are respected in the plans for this project, perceptions concerning respect of ecological integrity are differing. Vodniputovi states that **"**The ecological integrity is taken into the consideration through EIA procedure" (mail Vodniputovi [10.4.2012]). On the other side WWF states that the project is not in compliance with EU-WFD, EU-Birds Directive, EU-Habitats Directive and Ramsar Convention (mail WWF Croatia 3.5.2012]).
Although a feasibility assessment is not required by Croatian law it is planned to be conducted if the project is to be financed by the EU funds (mail Vodniputovi [10.4.2012]). WWF complains that there has no cost-benefit analysis been conducted for the project (mail WWF Croatia [3.5.2012]).
The design of the project bases on the 1987 Yugoslavian regulation project by Jaroslav Cerni Institute for Water Management which promotes a river width of 300 to 450 m, a minimal curve radius of 1600 m and a height of regulation structures on 1 m above average low water level (Presentation Isakovic 2011).
Advised measures at critical sections are set out in Spaic (2011) and include construction of safety objects, excavation works, bank revetment and mood cleaning. According to the project study from April 2010, 72 T groins, 15,5 km of new embankments, 2 parallel structures and dredging of material were planned (Presentation Hidroing 2010). Due to the mentioned intervention of Nature Park Kopački Rit those plans were revised. Currently the project proposes a minimum set of measures required for maintenance of the existing inland waterway which would eliminate bottlenecks and ensure safe transportation at 7 sections. These measures include construction of 21 new regulation structures, 5 reconstructions of existing structures and 2 alternative structures (mail Vodniputovi [10.4.2012]). However, the source does not provide any information about what kind of structures remain in the plans. It only gives the statement that the "proposed project measures are in accordance with the manual on good practice in sustainable waterway planning of the PLATINA project" (mail Vodniputovi [10.4.2012]). Another source from 2011 speaks of completely different numbers. Following the presentation of Isakovic (2011) originally 57 river training structures were planned to construct. The latest design, following this source shows the planned execution of only 19 river engineering structures in order to contribute to preservation of natural values. For example no T-groins shall be constructed between rkm 1401 and rkm 1404 due to protection of ornitofauna. Nevertheless, "large scale river training works with joint forces from both countries" is presented as a solution for river transport problems at the Danube between Croatia and Serbia (Presentation Isakovic 2011). At least both sources agree in a reduction of planned interventions due to ecological reasons. In addition to the planned physical measures, because of the danger of lowering of the ground water table, the location of Nature Park Kopacki Rit and high costs of training works, an orientation towards new approaches as the implementation of River Information Service technology and new dredging technologies for instance is regarded as being appropriate (Presentation Hidroing 2010).
The project area is located within protected natural areas including Ramsar Sites and national ecological network sites which will become NATURA 2000 sites once Croatia becomes full member of

EU (mail Vodniputovi [10.4.2012]). Therefore Croatian law asks for the conduction of an EIA. An SEA is not required under Croatian law since the Danube already is a waterway (mail Vodniputovi [10.4.2012]; mail WWF Croatia [3.5.2012]).

In early 2011 the project status was in a stage that the EIA process could get started. For the most sections a preliminary design was prepared between 2004 and 2007 and for some sections even expert foundations for location permit have been finished within the same time frame (Spaic 2011).

Preliminary design studies were prepared for:

- conceptual design and feasibility study for the river channel engineering and rehabilitation of bank at the sector Apatin by the Serbian Directorate for Inland Waterways and the Faculty of Civil Engineering of the University of Belgrade in 2006,
- conceptual design – rehabilitation of the channel and right bank of the Danube river from rkm 1410 to rkm 1433 with the aim of technical and economic maintenance of the river and international waterway by Hidroing in 2007,
- conceptual design – rehabilitation of the channel and right bank of the Danube river at rkm 1400 by Hidroing in 2004 and
- conceptual design – rehabilitation of the channel and right bank of the Danube river from rkm 1380 to rkm 1400 with the aim of technical and economic maintenance of the river and international waterway by Hidroing in 2006 (Presentation Isakovic 2011).

Although communication with Serbia has been done in accordance with the Espoo Convention, it is not clear in how far possible trans-boundary effects of the planned project have been taken into account within EIA procedure. Vodniputovi says that it has been taken into account while WWF says the opposite (mail Vodniputovi [10.4.2012]; mail WWF Croatia [3.5.2012]).

The authors of the EIA have analysed three different alternatives in order to find the most acceptable solution for the environment. The analysis also included consultation with the relevant authorities which resulted in withdrawal of a number of structures which deemed environmentally unacceptable in any alternative (mail Vodniputovi [10.4.2012]). WWF complains that the alternatives did not contain “real alternative measures” and no cost-benefit assessment of the certain measures has been provided (mail WWF Croatia [3.5.2012]); Potocnik et al. 2011).

Following Vodniputovi the EIA has gone through a screening stage in which all relevant bodies have been contacted in order to define the contents for the EIA. This procedure should have ensured that all relevant environmental aspects that may be affected by the project are taken into account (mail Vodniputovi [10.4.2012]). On the website of the Vodniputovi the description of possible effects is available in Croatian language. In the current state it is no final version. After comments from the public hearing procedure the final version will be produced (mail Vodniputovi [10.4.2012]). Environmental NGOs complain that the description of environmental impacts within the EIA is missing some aspects (mail WWF Croatia [3.5.2012]). The list includes: future navigability (actual benefits), Danube ecosystems and their functions, water bodies, hydro morphology, existing sediment deficit and balance, the European importance of the affected protected areas with their key species and habitats, cumulative effects of existing and planned IWT projects in the wider area, trans-boundary impacts, drinking water supply, agricultural water uses, flood retention, forestry, fisheries, local development plans and climate change (Potocnik et al. 2011). Climate change effects have been considered only as a need for reduction of road traffic (mail WWF Croatia [3.5.2012]).

The perceptions of the effects of the project differ to a great extent between environmental NGOs and Vodniputovi. While Vodniputovi states that the project will not have any negative effects on the ecological status of the water body, WWF Croatia answers by complaining about possible faster

deepening of the river bed with connected lowering of the groundwater table in the adjacent floodplains (mail WWF Croatia [3.5.2012]).

The project proposes restoration measures for former side branches of the Danube which will improve ecological conditions of the related wetland habitats. In addition, the removal of old training structures and cleaning of sediment from clogged channels are planned. These measures are aimed to increase the ecological potential of the river are in accordance with DRBMP and EU directives (mail Vodniputovi [10.4.2012]). WWF Croatia states that those measures are not enough to compensate for habitat loss (mail WWF Croatia [3.5.2012]).

At this stage it is not known if the project will be approved or not since the EIA is still in the process of approval. The new Croatian government hired independent experts to evaluate the project and its documentation. The report is still not ready (mail WWF Croatia [3.5.2012]). The timeline presented in Spaic (2011) indicates that most river training works are planned to get started in 2014 and therefore all preparations including the EIA need to be completed until 2013.

The construction of river training structures and the conduction of sediment extraction will most likely disturb one of the last free flowing stretches of the Danube. Because the project aims to disconnect the river from its floodplain, Potocnik et al. (2011) complain that the project is not in line with the DRBMP. Although the EIA is still in process parts of the project have already been consented before any conduction of EIA or SEA (Potocnik et al. 2011). At this moment some works have already been executed at the Croatian side of the river:

- 2 T-groins at rkm 1405,57 and 1406,17
- training works for bank protection between rkm 1406,68 and 1406,8
- baffle pier between rkm 1406,637 and rkm 1406,680 (Presentation Isakovic 2011; Presentation Hidroing 2010).
- rehabilitation of a damaged right bank at rkm 1393 (Spaic 2011).

It is planned to start a monitoring process once the project is implemented. It shall include experts from the relevant public bodies (mail Vodniputovi [10.4.2012]).

Project 4 "Improvement of River Navigation at the Serbian Stretch of the Danube"

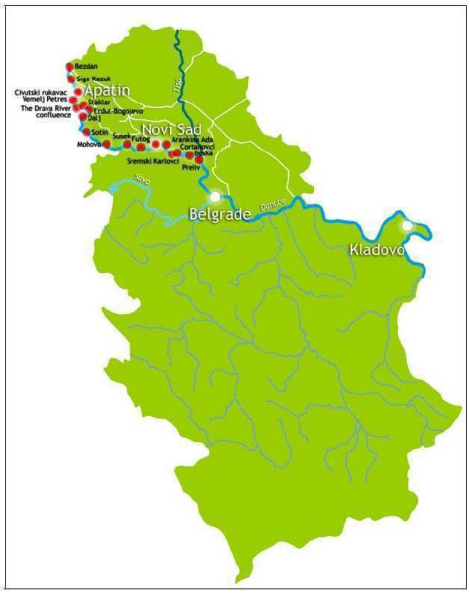

FIGURE 16: "IMPROVEMENT OF RIVER NAVIGATION AT THE SERBIAN STRETCH OF THE DANUBE" (MITROVIC ET AL. 2011).

Introduction to the Project: Location, Problem, Initiator, Objective

The Serbian stretch of the Danube accounts for 588 km of the European Corridor VII and contains 9 international ports. In addition to the European Road Corridor X, the waterway forms one of the most important international connections of Serbia to other European countries. 137.6 km of the Serbian Danube form the border to Croatia (IPA 2010).
Because of lack of investment in infrastructure during the past two decades the Danube waterway between the Hungarian border and Belgrade does not meet DC requirements in width, depth and bend radius at 18 locations (Mitrovic et al. 2011) between rkm 1433 and 1170 (website SECI (c) [2.4.2012]). The critical sections and development projects are analyzed in the Master Plan for Inland Waterway Transport in Serbia from 2006 and confirmed in the General Master Plan for Transport in Serbia from 2009 which give special attention to the importance of the waterway sector within the process of Serbian economic development and the process of Serbian integration in the EU (IPA 2010). Most of the critical sections on the Danube River in Serbia are located at the section that forms the joint border with Croatia. Therefore elimination of these bottlenecks needs to be coordinated between the two countries (follow part on Croatia above). A Steering Committee, consisting of representatives from the Directorate for Inland Waterways (Plovput) and the Ministry of Infrastructure will be responsible for project implementation (IPA 2010).

Serbian Legislation concerning International Policy, Conventions and Directives

The responsibility in the water sector in Serbia lies with the Ministry of Environment and Spatial Planning, the Ministry of Agriculture, Forestry and Water Management, the Ministry of Health and the Ministry of Infrastructure. The Ministry of Environment and Spatial Planning prepares strategic documents, plans and programs concerning research in sustainable use of water, is responsible for the balance of groundwater and performs the system of environmental protection. The Agency for Environmental Protection carries out professional tasks related to development, coordination and management of the national information system on quality and quantity of water and ground water.
Plovput is legally constituted to perform professional works and activities of state administration in connection with maintaining navigability and marking of inland waterways, research and design documentation, survey of construction works, establishing of river information services and other activities as a special organization of the government (IPA 2010).
Serbia has committed itself to a number of objectives of international conventions. Being a successor state of the Socialist Federal Republic of Yugoslavia for which the Ramsar Convention came into force in 1977, in 2001 the Federal Republic of Yugoslavia accepted the Ramsar Convention. Having changed the country`s name in 2003 to Serbia and Montenegro and altering the constitutional arrangements with Montenegro in 2006, the Republic of Serbia continues to exercise its international commitments. Currently 10 sites in Serbia are designated as Wetlands of International Importance among which Gornje Podunavlje and Labudovo okno are located at the Danube River (website Ramsar Convention (c) [21.5.2012]). The Republic of Serbia enjoys full membership to the ICPDR since 2003 (Szilagy et al. 2010). It ratified the Espoo Convention in 2007 (website UN [21.5.2012]). Serbia is a member state of the DC (website Danube International Commission (b) [10.4.2012]) but it is not a contracting party to the AGN (UNECE 2012).

Because Serbia is not a member of the European Union, the country is not bound by EU directives. In Serbia the Law on Environmental Impact Assessment[16] regulates the application of EIA to certain infrastructure projects. The responsible authorities are the Ministry of Environment and Spatial Planning, the provincial authorities that are responsible for environmental protection maters and the local self-government authority of Vojvodnia.

The Republic of Serbia formally has not coordinated the Water Framework Directive with existing laws and it has not begun its implementation (Szilagy et al. 2010). The Water Law[17] regulates the protection of water resources. Also, article 23 of the Law on Environmental Protection[18] regulates the protection of water in general. In addition there is a large number of bylaws that have the aim to protect water from pollution, categorize water courses and regulate water use (Szilagy et al. 2010). Although EU directives as the WFD are not binding to Serbia it is engaged in following some of the objectives of the WFD. One reason for this is the commitment to objectives of the ICPDR. Serbia´s main document for implementation of WFD is the not binding Guidelines for the analysis of pressures and impacts which provides a general framework for the analysis of water bodies. Its aim is to facilitate the implementation of the WFD (Stojanovic et al. 2010). Therefore, we can state that WFD implementation in Serbia is not based on national legislative but on the DRPC and membership in the ICPDR (Presentation Ninkovic et al. 2008).

Compliance of the Project to International Policy, Conventions and Directives

By eliminating the critical sections it is objected to meet the AGN and DC recommendations for IWT. Because of lack of financial resources an interim target is to cut the number of critical sections by half. Until 2016 five priority critical sections shall be eliminated by help of river training works. Project documentation therefore needs to be prepared by end of 2012 (Mitrovic et al. 2011). As a result of information of the ICPDR the project is listed in the list of future infrastructure projects of Annex 7 of the DRBMP published in 2009 (ICPDR 2009).

A contract for the preparation for river training and dredging works at the Danube River was signed by the European Commission under the IPA Programme 2010. The aim of the contract is to support the Serbian Ministry of Infrastructure and Plovput between 2011 and 2012 with the preparation of a feasibility study and EIA in order to gain the necessary permissions, preparation of detailed design of measures for 5 of the identified sections, preparation of financial and economic analysis, preparation of supporting studies and preparation of tender documentation (TED 2010; Mitrovic et al. 2011; Presentation Isakovic 2011). By preparing documentation of dredging and training works on critical sections of the Serbian Danube, as identified in the Master Plan of 2006, it is objected to achieve contribution to DC requirements, EU standards and Serbian legislation in terms of safe and swift navigation (IPA 2010). As a follow up of the preparation project, the project river training works on the 5 critical sections on the Danube River in Serbia is planned under the IPA programme 2012-2013. It is objected to be realized between 2013 and 2016 (Presentation Isakovic 2011). Planned works for the elimination of bottlenecks include removal of unexploded ordinates, dredging, groyne construction, bank excavation and bank protection (Mitrovic et al. 2011). It is expected that the project will have negative effects on the environment but due to improvement of safety the risk of

[16] OG 135/04 and OG 36/09
[17] OG 46/91
[18] OG 35/04, 36/09

accidents with negative environmental effects as well as congestions will be reduced. Therefore positive effects on environment are expected from the project as well (IPA 2010).

4.3. Conclusion

The aim of this research is to compare implementation of international environmental regulations at the project level. The Danube River Basin has been chosen as object of study due to its international setting within EU and non-EU countries and the currently occurring conflict of interest between the sector of navigation development and the sector of environmental protection which are represented in the two opposing interests to develop the Danube as major transport corridor at the one side and to protect natural values and ecosystem services at the other hand.

The international setting offers the possibility to compare projects at different levels of system consolidation. Four projects are chosen, realized at different levels of system consolidation. Project 1, "Integrated River Engineering East of Vienna" is realized at the highest state of system consolidation, as both the project country and the possibly affected countries belong to the EU. Project 2 "Improvement of navigability of the Hungarian section of the Danube between Szob and the southern state border" is realized at the low level of system consolidation due to the project country belonging to the EU and both possibly affected countries not belonging to the EU. Project 3, "Regulation of the Danube for transport purpose in Croatia", is realized at the lowest level of system consolidation due to both countries not belonging to the EU. Project 4, "Improvement of river navigation at the Serbian stretch of the Danube", is realized at the medium level of system consolidation due to the project country and one possibly affected country belonging not to the EU and two possibly affected countries enjoying EU membership. Despite the different levels of system consolidation, for each project country a number of international arrangements is binding. The most relevant to the research question are: DC, AGN, DRPC, WFD, Habitats Directive, Birds Directive, DRBMP, EIA Directive, SEA Directive, Ramsar Convention and Espoo Convention. From the objectives of these arrangements a list of indicators has been derived in Chapter 3.2 by help of which the projects are tested on their compliance to international arrangements.

Chapter 4.2 presents four river engineering projects along the Danube concerning their compliance to international environmental regulations. Although a preferably high level of comparability is envisaged within this study, the chosen projects show some differences.

Each one of the projects has the aim to improve conditions for navigation along the Danube. The background therefore is the European policy to develop the Danube as Transport Corridor VII. While the navigational aims of the projects are equal, the ecological objectives are different. The Austrian project promotes a strong ecological intention while the other projects reduce ecologic objectives to compensational measures.

The Austrian project represents a project that is realized at the highest defined level of system consolidation. The Hungarian project represents a project that is realized at a low level of system consolidation. The Croatian project represents a project that currently is realized at the lowest level of system consolidation but in future will be realized at the medium level. The Serbian project represents a project that is realized at the medium level of system consolidation.

The geographical scope of the projects is different. While the Austrian project covers 50 km of the Danube, the Hungarian project covers 378 km, the Croatian project accounts for 137 km and the Serbian project shall be realized at a length of 253 km.

The Croatian as well as the Serbian project does not fulfill the requirement to be a single national project as set in chapter 3.1. This is due to the border situation of the Danube in both countries. Nevertheless, because the two countries are the only major Danube countries that currently are not member to the EU it is necessary to regard them as well. In addition to lack of alternative projects, the projects are realized as national projects that more directly require formal international coordination.

Each of the projects is located at least in one protected natural site.

The time frame and planning stage of the projects are different. For the Austrian project an EIA was already prepared and the project is in the consenting stage. Nevertheless the original time frame to start with the construction works in 2007 has not been met. For the Hungarian project a first preliminary study was finalized in 2007. The Croatian as well as the Serbian project is in a very early stage.

The data collected in this chapter provides information about how the four projects comply with international regulations in form of policy, conventions and EU directives. In order to collect these data I have made use of several sources:

- project websites and websites of relevant ministries and developers,
- project related documents (feasibility studies, EIAs),
- policy documents (plans, strategies),
- scientific literature,
- websites and published comments from environmental NGOs
- E-mail contact with NGOs and developers.

Due to the fact that lots of information is drawn from interest groups as IWT project developers and environmental NGOs, it is necessary to make some statements less absolute. When comparing the projects in the next step I have to be aware that some information might be biased from one side or the other. A reasonable way to address this is to show up both perceptions or to compare them to scientific literature.

The availability of sufficient and satisfying data differs from project to project. One important reason may be found in the different stages of realization, that the projects are in. Scientific literature on the Croatian and Serbian projects is very scarce. Another reason is language. Lots of information, especially project related documents and websites are available in the languages of the project country only. Due to my inability to understand Hungarian and Serbo-Croatian languages and lack of time and funds to ask for translation, documents in one of those languages are not useful for my research. I tried to fill gaps that were left open by literature research by means of phone and E-mail contact with involved and interested persons. Although each phoned person agreed to answer a prepared questionnaire by E-mail, I got only one response from the first trial and one additional after reminding. Other also helpful contacts provided me with additional English literature. Some rejected answering due to project intern hierarchy that they need to follow.

An important result to discuss at this point is that the research for the Serbian project did not come up with sufficient data to compare them to the other three projects. As mentioned above, the lack of data appears due to the early stage of the project and due to free available information that is in Serbian language only. In addition, accidentally the time frame of data collecting crossed with the time of Serbian elections. The Serbian project will not be taken into consideration within chapter 5 which provides a comparison and discussion on the results of the research. The discussion is based on the data about national legislation and compliance to international regulations at project level as presented in Chapter 4.2.

5. Discussion

The research question of this paper is: **If international environmental rules are created for management of river basins that are shared by many countries, are they translated to the project level and is this translation influenced by the difference in the level of system consolidation? Does a variation in the level of system consolidation imply or allow a difference in the intenseness of implementation of international rules or are the rules implemented evenly throughout the system?** Having collected relevant data in chapter 4, the intent of chapter 5 is to draw conclusions from those data and relate them to the research question and theoretical background. As mentioned at the end of chapter 4, the Serbian project will not be taken into account due to unsatisfying data availability. The three projects to compare are the Austrian, Hungarian and Croatian project. They represent projects to be realized at the highest level of system consolidation, at a low level of system consolidation and at the lowest level of system consolidation.

5.1. Comparison of Translation of International Environmental Regulations to the Project Level

Chapter 4 presented data from which I can draw conclusions how each project performs in implementation of international environmental regulations. Relevant regulations are agreed upon in form of guiding international policy, binding international conventions, and (partly) binding EU directives.

Implementation of International Regulations in National Legislation

Each of the project countries has send contributions to the EU Strategy for the Danube Region to the European Commission. Among the national priorities are similar issues that address IWT, Sustainable Development and Regional Cooperation. The most relevant in providing guidance to waterway development along the Danube are:

Austria:

- Implementation TEN-T Priority Project 18 on time and in an environmentally sustainable way,
- Coordination of national transport policies in order to promote Danube navigation,
- Development of Danube ports into multimodal logistics centres,
- Improvement of the environmental performance of Danube navigation,
- Implementation of harmonised River Information Services on the Danube,
- Investment in jobs and qualifications in the Danube navigation sector,
- Improvement of comprehensive waterway management of the Danube,
- Examination of potential effects of climate change on Danube navigation.

Hungary:

- Protection of natural values,
- Improvement of the Danube-region transport,
- Cooperation and partnership

Croatia:

- Development of intermodal transport and effective connecting of the Danube region with the Adriatic coast
- Reconstruction and development of inland waterways, passenger ports and cargo ports on the rivers Danube, Drava and Sava
- Environmental protection, risk prevention, and renewable energy resources development.

Due to signatory of the Belgrade Convention, each of the three countries is member to the Danube International Commission (DC), which obliges them to enable safe navigation at the River Danube. This general aim is specified within the European Agreement on Main Inland Waterways of International Importance (AGN) with the definition of the Danube as E-waterway that needs to allow navigation for vessels with a draught of 2.5 m. Austria, Hungary and Croatia are signatory states to the agreement since 1999.

The Danube River Protection Convention (DRPC) was ratified by the three countries in 1994, which makes them member states of the International Commission for the Protection of the Danube River (ICPDR). The commitments made in this respect bind the member states to implement the WFD and to guarantee sustainable use of the river by application of an ecosystem based management approach. Implementation of the WFD differs between the countries. Also without commitment to the DRPC the WFD would be binding to Austria and Hungary due to their membership of the European Union. For Croatia the WFD needs to be implemented due to the status of an EU accession country. While in Austria one major national law (Water Act 2003) regulates the implementation of the directive, Hungary implemented the directive into its legislation by three governmental decrees that harmonize the existing Act on Water Management with the WFD. Due to lack of a major law for the protection of water, issues relating to the WFD are dispersed among different legislative sectors in Croatia. The aims of the Act on Waters, the Nature Protection Act, the Environmental Protection Act and the Act on Water management Financing are often in conflict with each other. Therefore one primary aim of the WFD, sectoral integration is not yet implemented in Croatia. Although the new Croatian Act on Waters misses some goals of the WFD and a sustainable approach is absent, it is an important step towards implementation of the directive due to the formal definition of two river basin districts instead of the former four. This achievement may be seen as the result of EU interference and lobbying against old fashioned water management officials. Croatia presented its first draft national RBMP for the Sava River in 2011. Hungary has presented a final version of a national RBMP in 2010. Austria presented a National Water Management Plan in 2009.

The Ramsar Convention was ratified by each of the three countries. Hungary was the first among the three countries to ratify it in 1979. The country has designated 29 sites as wetland ecosystems of international importance with three sites located at the Danube River. Austria, which ratified the convention in 1983, has since then designated 20 sites with one site located at the Danube. Croatia was the last of the mentioned countries to ratify the convention in 1991. It has designated only four sites with one located at the Danube River.

The EU Birds Directive and Habitats Directive are binding to Austria and Hungary due to their membership of the European Union. To Croatia the two directives are not legally binding yet but due to the submission of EU application the country needs to implement the directives as well. While in Austria nature protection is a provincial responsibility and therefore implementation of the two directives differs from province to province, in Hungary a large number of central governmental decrees regulate implementation of the two directives. For Croatia it is planned that a single national

Nature Protection Act will form the legal basis for implementation of the two directives. Austria and Hungary both designated NATURA 2000 sites on their territory. In Hungary NATURA 2000 sites account for about 21 % of the territory (1.96 billion ha). The 217 Austrian designated sites account for about 16% of its territory. In Croatia the conduction of a baseline study has been finalized and resulted in the identification of about 1000 sites that will be proposed as part of the NATURA 2000 network.

Each of the three countries has signed the Espoo Convention (Austria in 1994, Croatia in 1996 and Hungary in 1997) which obliges them to trans-border cooperation in case of infrastructure projects that may cause trans-border effects. Austria and Slovakia signed a bi-lateral agreement to regulate trans-border EIAs in 2005. Croatia and Serbia formed a bi-lateral commission to coordinate Danube navigation projects.

The EIA Directive and the SEA Directive are binding to Austria and Hungary due to their EU membership. Croatia needs to implement the directives due to its submission of EU application. In Austria there exists no federal law on EIA. EIA legislation is a task of the provinces which amended the new regulations to existing regulations or created new EIA laws. For SEA implementation, the country amended several federal material laws. Provinces issued new SEA laws or amended existing laws as well. Hungary and Croatia issued central legislation concerning EIA. While Hungary issued a small number of special EIA and SEA laws, Croatia amended its Environmental Protection Act to enable EIA and SEA but issued only two by-laws to form more detailed EIA regulation. Detailed SEA regulation is missing. The Austrian model is regarded as being pro-active due to broad participation in a round table procedure throughout the entire SEA.

International arrangement	Austrian national contribution	Hungarian national contribution	Croatian national contribution
EU Strategy fort he Danube Region	-Implementation of TEN-T Priority Project 18 on time and in an environmentally sustainable way, -Coordination of national transport policies in order to promote Danube navigation, -Development of Danube ports into multimodal logistics centres, -Improvement of the environmental performance of Danube navigation, -Implementation of harmonised River Information Services	-Protection of natural values, -Improvement of the Danube-region transport, -Cooperation and partnership	-Development of intermodal transport and effective connecting of the Danube region with the Adriatic coast -Reconstruction and development of inland waterways, passenger ports and cargo ports on the rivers Danube, Drava and Sava -Environmental protection, risk prevention, and renewable energy resources development.

	on the Danube, -Investment in jobs and qualifications in the Danube navigation sector, -Improvement of comprehensive waterway management of the Danube, -Examination of potential effects of climate change on Danube navigation		
Belgrade Convention / Danube International Commission (DC)	Ratified, -commitment to enable safe navigation	Ratified, -commitment to enable safe navigation	Ratified, -commitment to enable safe navigation
European Agreement on Main Inland Waterways of International Importance (AGN)	Since 1999, -commitment to guarantee 2.5 m draught	Since 1999, -commitment to guarantee 2.5 m draught	Since 1999, -commitment to guarantee 2.5 m draught
Danube River Protection Convention (DRPC) / International Commission for the Protection of the Danube River (ICPDR)	1994, -Commitment to implement WFD	1994, -Commitment to implement WFD	1994, -Commitment to implement WFD
Water Framework Directive (WFD)	EU member, ICPDR member, -one national law (Water Act 2003) -National Water Management Plan (2009)	EU member, ICPDR member, -one national law (Act on Water Management) and three harmonizing by laws -national RBMP (2009)	EU accession country, ICPDR member, -dispersed legislation among different sectors (Act on Waters, Nature Protection Act, Environmental Protection Act, Act on Water Management Financing) -national RBMP for Sava river
Ramsar Convention	1983, -20 wetland sites of international importance	1979, -29 wetland sites of international importance	1991, -4 wetland sites of international importance
Birds and Habitats	EU member,	EU member,	EU accession country,

Directives	-Provincial regulations -16% of territory protected sites (217 sites)	-large number of central laws -21% of territory protected sites (1.96 billion ha)	-single Nature Protection Act in planning -1000 sites proposed
Espoo Convention	1994, -bi-lateral agreement about the Danube with Slovakia	1997	1996, -bi-lateral commission about the Danube with Serbia
EIA Directive	EU member, -Provincial amendment in existing legislation and creation of new provincial EIA laws	EU member, -Small number of central EIA laws	EU accession country, -amendment of Environmental Protection Act and production of by-laws
SEA Directive	EU member, -amendment of federal laws, Provincial amendment or creation of new SEA law -SEA round table procedure	EU member, -small number of central SEA laws	EU accession country, -Article 24 of Environmental Protection Act -no concrete regulation in by-laws

TABLE 4: INTERNATIONAL ARRANGEMENTS AND NATIONAL IMPLEMENTATION IN AUSTRIA, HUNGARY AND CROATIA.

Comparison of the Projects` Compliance to International Environmental Regulations

Each of the three projects aims to achieve AGN objectives in terms of a **fairway draught of 2.5 m** and the **elimination of bottlenecks and missing links**. Hungary has the most ambitious plans with the elimination of 50 critical sections on a project area of 378 km length. The Austrian project covers the shortest Danube stretch with 50 km. For the Croatian project different data on project area is available. Relying on the waterway agency Vodniputovi the project area is 53 km long.

The objective of WFD to **carry out management along hydrological boundaries** and the objective of the Espoo Convention to **coordinate measures internationally** are implemented at a low level and unevenly throughout the three projects which means that the concept of ICM and its main request to implement a basin wide approach has not or insufficiently been translated from the policy level to the project level. The Hungarian project has a pure national scope without any coordination with other countries. The division of the two Hungarian Danube projects in a bi-national Slovak-Hungarian stretch and a pure national stretch allows the perception of the latter to be developed without even the aim to take potential cumulative effects with other projects along the Danube into account. For the national stretch between Szob and the southern state border potential cumulative effects with projects in other countries may at least be expected with Serbian and Croatian projects. Both neither Croatian, nor Serbian authorities and interest groups are involved or consulted at any stage of the project. The scope of the two other projects is basically national as well. Yet, international communication is performed at least at a low level. The Austrian project consulted and involved

Slovak authorities in planning already at an early stage of planning by various means of communication. This was realized by creation of a bi-lateral border waters commission. Although the Slovakian side could made comments on the EIA, their request for further negotiations was not granted by the Austrian side. For the Croatian project which will be realized along the border to Serbia, a bi-lateral commission was installed to coordinate measures with the Serbian side. One baseline study about a part of the common Danube stretch was conducted by a Serbian institution. Potential Hungarian interests are not respected. ICPDR has been informed of the Austrian and the Hungarian project and they are listed in the list of future infrastructure projects in Annex 7 of the DRBMP published in 2009. For the Croatian project this issue is not quite clear. Following the Croatian waterway agency, the project has been reported to the ICPDR and is listed in the mentioned Annex 7. Yet, it does not appear there. Only the Serbian project at the other bank of the river appears.

The trans sectoral management approach which is presented at the policy level by the ICPDR and DC objectives of **interdisciplinary planning teams** and **ensuring the prerequisites of IWT as well as ecologic integrity** has been incorporated differently throughout the three projects. In each case the ministries that are responsible for transport and infrastructure as well as a project developer are the main actors involved in planning. In the Austrian and Croatian cases the project developer is a public waterway agency (Via Donau resp. Vodniputovi), while in Hungary it is a consortium of four institutions with a public research institute (VITUKI) being the consortium leader and three private water management consulting companies (Aquaprofit, Ter-Team and Innosystem) being the consortium members. For the Hungarian case these are also the main stakeholders involved in planning. Exploration of interests of other stakeholders has been done by means of a questionnaire that has been send to the different groups. Environmental NGOs complain that concerns of ecological integrity are not reflected adequately in planning of the project. The Croatian approach of involvement of different sectors is more pro-active due to the creation of the bi-lateral commission with Serbia and the direct involvement of Nature Park Kopački Rit in planning. Nevertheless, communication within the Croatian-Serbian commission did involve water management and transport authorities from the Serbian side only. The Serbian Ministry of Environmental Protection for example was not involved. Croatian NGOs were involved very late at the public participation stage of commenting to the EIS that was available for one month. Although WWF Croatia complains that ecological integrity is not respected, comments of the National Park authority achieved a reduction of the originally planned measures due to ecological considerations. The most pro-active approach seems to be the Austrian one. By means of a project accompanying conflict moderation throughout the entire project a relatively broad representation of different stakeholders from relevant central, provincial and local authorities to expert groups and NGOs within the planning process is achieved. The issue of ecological integrity is intensely discussed throughout the whole planning process.

The ICPDR requirement of a **transparent planning process** has been realized differently in the three countries. Public information and participation has been realized to a very different extent in the three countries. As mentioned above, the Austrian approach includes public interest groups at an early stage. In addition a public hearing was organized in order to comment on the EIS. Still, complains concerning the public participation process are not absent in the Austrian case. The EIS that was published seems to have been too extensive to comment on it within the short time frame given. In Hungary even three public hearings were organized to comment on the VITUKI study from 2007 but no further comments were possible on the final version. The comments were taken into account to a limited extent only. In Croatia the draft version of the EIA was available online for public

comment. One public hearing was organized to present the EIA as well. Environmental NGOs complain that comments were not further taken into account. Besides the mentioned participation of stakeholders at different stages of the planning process, Hungary and Austria have installed project websites for public information. While the Austrian website contains detailed information in German and English language the Hungarian website seems to be detailed in Hungarian language, but sufficient English information is not available. The Croatian waterway agency published only scarce information about the project on its website. An English part is completely missing here.

The ICPDR requirement of **conduction of a feasibility study** is implemented relatively evenly by the three countries. Austria and Hungary have conducted baseline studies to assess which alternatives are appropriate. Although the Croatian waterway agency says a feasibility study will only be prepared if EU funds are available, they have carried out similar baseline studies for four sections of the project area.

At the policy level the concept of an ecosystem based approach is implemented by the request to **conduct an EIA and/or SEA** as required by the EIA Directive, SEA Directive, WFD, Birds and Habitats Directives as well as by the DRBMP. For the three projects it is obligatory due to the location of Ramsar sites, Natura 2000 sites and other protected areas in each of the project areas. For none of the projects a comprehensive SEA has been conducted although VITUKI states that SEA requirements have been incorporated in the Hungarian project. Yet, it remains unclear what this means. A Hungarian SEA has only been conducted for the stretch at the Slovakian border. For each project an EIA has been conducted. In Hungary consent to the project has already been given partly. In 2011 licensing was suspended and the conduction of a SEA for the whole area was asked. In Croatia as well as in Austria no final decision on the EIA has been taken yet. Nevertheless constructions for the two projects were already carried out partly. In Austria this was reasoned with the conduction of in situ experiments. In Croatia construction was started without EIA permit due to urgency reasons. Thus, the ecosystem based approach has been translated to the project level to a certain degree but the conduction of the EIA seems to be done only formally as another permission that needs to be granted.

The EIA Directive asks for an **assessment of basin wide trans-boundary impact**. This has not been assessed in any case, which again shows that the basin wide approach of ICM has not been incorporated to the projects. The Croatian waterway agency states that it has been assessed for the border between Croatia and Serbia while WWF Croatia does state the opposite. Due to the data availability in Croatian language only I am not able to verify the two opposing statements. Even in the case that trans-boundary effects have been assessed it has only been assessed for the direct border region and not basin wide. Therefore in each case I can state that potential cumulative effects with other river engineering works have not been assessed.

The EIA Directive and the DRBMP ask for an **outline of alternatives**. An extensive assessment on 16 alternatives has been conducted at the beginning of the Austrian project, with even all alternatives rejected and a compromise created. For the other two projects much less alternatives were taken into account (2 in Hungary and 3 in Croatia). The authors of the VITUKI study of 2007 were asked to look at traditional alternatives only which excludes innovative sustainable approaches completely and does represent an assessment of alternatives for formal reasons only. For the Croatian project it is not clear which kind of alternatives were taken into account. Yet, the preferred set of measures does contain mainly traditional measures as well and environmental NGOs complain that no cost-benefit assessment justifies the selection.

The EIA directive asks for **description of environmental aspects that are likely to be affected** as well as for a **description of potential effects of measures**. The Austrian EIA presented an extensive

description of environmental aspects that are likely to be affected by the project and also the description of effects is almost complete. Environmental NGOs complain that the paper is too extensive to comment on it within the given timeframe and that groundwater ecosystems and deep ground water tables are not taken into account. In addition the potential mobilization of pollutants is taken into account only locally and not for the whole project area. Yet, the Croatian and Hungarian reports lack much more descriptions. For the Hungarian case a lot of important issues are only briefly mentioned as potential conflict areas but not further taken into consideration. In the Croatian case the waterway agency states that the table of content for the EIA covers all relevant issues due to previous contact of all relevant bodies in order to define the content of the EIA although WWF Croatia complains that a lot of issues are missing.

The DRBMP asks for **application of best environmental practices and techniques**. For each project traditional river training measures are planned that are expected to have negative effects on the ecosystem. For the Austrian project it is expected that river training measures and ecological rehabilitation measures will serve both the two objectives to increase navigability as well as the ecological status. For the Hungarian as well as for the Croatian project mainly negative effects on ecology are expected although the Croatian waterway agency states that the proposed measures are in compliance with the PLATINA Manual of Good Practices. Thus at least for the Croatian and Hungarian project again an ecosystem based approach is absent.

According to the WFD and the DRBMP an **improvement of the ecological status of inland water and groundwater and an achievement of the good status by 2015** are objected. Regarding the expected effects on ecology, the only project that may be able to serve this goal is the Austrian project. The reduction of bed degradation in connection with side arm reconnection may increase habitats of the river and its adjacent wetlands. Still, it is questionable if the Austrian stretch of the Danube will achieve the good status by 2015. The opposite effects are expected for both the Croatian and the Hungarian project. For Hungary, due to lack of detailed investigation, one can only expect a degradation of the main branch ecology. In Croatia, again perceptions are differing between the waterway agency and environmental NGOs. While Vodniputovi states that the project will have no negative impact on the water body, WWF complains that a faster deepening of the Danube will be expected with all the connected negative consequences for adjacent wetlands. In addition to these expected developments the Austrian project is the only one for which an objected reference status of the ecosystem is defined. Due to functioning ecosystems being regarded as more appropriate to reduce vulnerability of a river system to certain risks and to create a higher adaptive capacity of the system to possible future changes only the Austrian project seems to address those two issues of river basin management.

Deeply connected with the above mentioned goals are the objectives of the DRBMP to **conserve and improve habitats for certain migratory species and to protect and restore wetlands and floodplains**. Each of the projects tries to achieve this goal by reconnection of old side branches to the river. Nevertheless, the Austrian project is the only one that does not only try to compensate habitat loss in the main branch by reconnection of side branches but also aims to stop degradation of the main branch. The extent of restoration measures also differs between the projects. The Austrian project aims to reconnect a relatively large number of side branches on a relatively short river stretch which as mentioned above positively affects the adaptive capacity of the river system and reduces vulnerability.

For the Austrian project a concrete outline of project **monitoring,** as asked by ICPDR and DC, from the test phase to post-restoration phase up to 2020 is planned. For the Croatian project it is aimed to

implement monitoring procedures, but up to now it is not concretized. For Hungary no data on this issue is available.

Conclusion

At the policy level in the light of the EU Strategy for the Danube Region and various international conventions each of the three countries declared development of Danube navigation, environmental protection and sustainable development as important objectives. Besides their commitment to assure save Danube navigation and the development of E-waterways in the frame of DC and AGN, each of the countries signed the DRPC, the Ramsar Convention and the Espoo Convention, which obliges them to implement environmental protection, sustainable use of rivers and international coordination of measures. In addition for the two EU countries Austria and Hungary the WFD, the Birds Directive, the Habitats Directive, the EIA Directive as well as the SEA Directive are binding. Although not yet legally binding to Croatia the country committed itself to implement the mentioned directives in Croatian legislation due to its application of EU membership. The WFD is already binding to Croatia due to the commitment of DRPC member states to implement the directive.
These international commitments include the following objectives and requirements for river engineering projects:

- **Fairway draught of 2.5 m**
- **Elimination of bottlenecks and missing links**
- **carry out management along hydrological boundaries,**
- **coordinate measures internationally,**
- **interdisciplinary planning teams,**
- **transparent planning process**,
- **conduction of a feasibility study**,
- **conduction of an EIA and/or SEA**,
- **assessment of basin wide trans-boundary impact**,
- **outline of alternatives**,
- **description of environmental aspects that are likely to be affected**,
- **description of potential effects of measures**,
- **application of best environmental practices and techniques**,
- **improvement of the ecological status of inland water and groundwater and an achievement of the good status by 2015**,
- **conserve and improve habitats for certain migratory species and to protect and restore wetlands and floodplains,**
- **ensure the prerequisites of IWT as well as ecologic integrity and**
- **monitoring and adaptation of the effects of measures**

While each project respects the goals of IWT in terms of an objected fairway depth of 2.5 m and the elimination of bottlenecks and missing links, respecting of ecological integrity is more often than not done formally instead of satisfying.
Each project has a primarily national scope. The Hungarian project performs at the lowest level of management along hydrological boundaries due to not even taking cumulative effects within national borders into account. The two other projects perform a bit better due to installation of bi-

lateral commissions with their direct neighbor to coordinate measures. A true basin wide approach is missing for the Austrian and the Croatian project as well.

In terms of interdisciplinary planning teams and transparent planning process, the Hungarian project again performs at a low level due to late stakeholder involvement, little incorporation of comments to the project plans and scarce English information. The Croatian project at least shows relatively early involvement of National Park authorities and Serbian navigation authorities which led to a reduction of planned measures. The approach could have performed better in terms of early involvement of interest groups and Serbian environmental authorities as well as in provision of better information at the website in both Croatian and English languages. The Austrian approach seems to perform very good, due to early involvement of interest groups in accompanying conflict moderation, free available English information and the only complain being the too extensive EIS and the too short time to comment on it.

For each of the project a feasibility study in form of a comprehensive baseline study or baseline studies for smaller stretches have been carried out. EIAs have been carried out for each project. Final decisions have not been taken yet. One can discuss if the projects perform well in waiting for EIA consent. Each project seems to have found a way to start at least with parts of the construction works. In Hungary it is legal consent in spite of EIA shortfalls due to which the remaining parts did not get consent by now. In Austria it is legal consent in form of test reaches, which might be helpful to discover the new method. Yet, six in situ experiments already cover a remarkable stretch of the project area. The worst performance in this respect shows the Croatian project which got the permission to already conduct river training works simply due to urgency reasons.

In terms of assessment of trans-border effects each one of the three projects scores low. Cumulative effects with other major river engineering projects within the Danube River Basin have not been assessed. Therefore each project misses one of the most important issues asked by international policy.

The most intense assessment of potential alternatives has been carried out in Austria, while in Hungary no real alternatives were discussed due to the demand to assess traditional river training measure only.

Again the Austrian EIS performs best in the description of environmental aspects and potential effects with only a few comments by environmental NGOs. The Croatian and Hungarian assessments seem to miss a lot of important issues and therefore cannot be described as comprehensive assessments.

Due to the mentioned request to only take traditional river engineering measures into consideration, the Hungarian project cannot be described as using best environmental practices. Similarly, for the Croatian project mainly negative effects on environment are expected. The only project that performs well is the Austrian project that tries to achieve a good balance between IWT and ecological objectives throughout the entire project area. The other two projects aim to implement compensational measures that will not be able to really compensate for habitat loss due to different habitat types. In addition, the Austrian project is the only one that is oriented at an objected reference status which will make monitoring more easy and efficient.

5.2. The Influence of System Consolidation on Compliance to International Environmental Regulations

The aims of this study are to assess if international environmental rules for management of river basins are translated to the project level and if this translation is influenced by the difference in the level of system consolidation. Because the Danube River Basin as an international system contains some more consolidated and some more fragmented parts, it is reasonable to define sub-systems of international system consolidation in order to be able to compare the different sub-systems´ performance in terms of compliance to international regulations. This definition has been done in chapter 3. The defined sub-systems are represented by the following river engineering projects within this research:

- "Integrated River Engineering East of Vienna" represents the highest level (level 1) of system consolidation, as both the project country and the possibly affected countries belong to the EU.
- "Improvement of navigability of the Hungarian section of the Danube between Szob and the southern state border" represents the low level (level 2) of system consolidation due to the project country belonging to the EU and both possibly affected countries not belonging to the EU.
- "Regulation of the Danube for transport purpose in Croatia" represents the lowest level (level 3) of system consolidation due to both countries not belonging to the EU.

Having examined if the projects comply with relevant international environmental regulations, I am able to conclude if there is a difference in compliance to those regulations between the three levels of system consolidation. Table 5 shows the degree of compliance for the levels of system consolidation as can be drawn from the information collected in chapter 4.2. To make the data easy readable the simple scores "yes", "partly" and "no" have been chosen. To choose for a scoring system consisting of numbers would allow more levels of score but it would create an illusion of exactness which cannot be justified by the data due to their qualitative nature. The score "Yes" means that more or less complete compliance with the particular regulation has been achieved. In four cases extensions to the score are given in brackets due to formal compliance of the project but additional information that are relevant for a conclusion. The score "Partly" means that formally compliance with the particular regulation has been achieved but either differing perceptions exist to the matter or compliance has not to the full extent been achieved. "No" means that the project does fail to achieve compliance with the particular regulation. I cleared the AGN regulations from the table because of the research question referring to environmental regulations only.

When regarding absolute numbers of the types of scores per level of system consolidation, Table 5 shows, level 1 scores 11 times "Yes", 3 times "Partly" and 2 times "No"; level 2 scores 3 times "Yes", 6 times "Partly" and 7 times "No"; level 3 scores 3 times "Yes", 9 times "Partly" and 4 times "No". This ranking indicates that level 1 performs best in compliance of international environmental regulations. Level 3 scores somewhat better than level 2 due to less scores "No" and more scores "Partly".

When comparing only compliance to international policies and regulations that are binding to each of the three projects (Espoo Convention, DRPC, Belgrade Convention, DRBMP) the picture does not change significantly. Level 1 scores best, while level 2 scores worst.

Comparing compliance to EU directives again shows the picture of level 1 scoring best and level 2 scoring worst, which is amazing due to EU directives being not legally binding to the Croatian project at level 3. It may possibly be explained with the expected accession of Croatia to the European Union

in the near future and Croatias´ effort to achieve European standards in order to become a member country.

Objective	Regulation	Compliance at Level 1	Compliance at Level 2	Compliance at Level 3
carry out management along hydrological boundaries	WFD	Partly	No	Partly
coordinate measures internationally	Espoo Convention	Partly	No	Partly
interdisciplinary planning teams	ICPDR (Danube River Protection Convention), DC (Belgrade Convention)	Yes	Partly	Partly
ensure the prerequisites of IWT as well as ecologic integrity	ICPDR (Danube River protection Convention), DC (Belgrade Convention)	Yes	No	Partly
transparent planning process	ICPDR (Danube River Protection Convention)	Yes	Partly	Partly
conduction of a feasibility study	ICPDR (Danube River Protection Convention)	Yes	Yes	Yes
Conduction of SEA	SEA Directive, WFD, Birds and Habitats Directives, DRBMP	No	No	No
conduction of EIA	EIA Directive, WFD, Birds and Habitats Directives, DRBMP	Yes (but start without EIA consent)	Yes	Yes (but start without EIA consent)
assessment of basin wide trans-boundary impact	EIA Directive	No	No	No
outline of alternatives	EIA Directive, DRBMP	Yes	Partly	Partly
description of environmental aspects that are	EIA Directive	Yes	Partly	Partly

likely to be affected				
description of potential effects of measures	EIA Directive	Yes	Partly	Partly
application of best environmental practices and techniques	DRBMP	Yes	No	No
improvement of the ecological status of inland water and groundwater and an achievement of the good status by 2015	WFD, DRBMP	Partly	No	No
conserve and improve habitats for certain migratory species and to protect and restore wetlands and floodplains	DRBMP	Yes	Partly	Partly
monitoring and adaptation of the effects of measures	ICPDR (Danube River Protection Convention), DC (Belgrade Convention)	Yes	Yes (Expected)	Yes (Expected)

TABLE 5: COMPLIANCE TO INTERNATIONAL ARRANGEMENTS AT THE DIFFERENT DEFINED LEVELS OF SYSTEM CONSOLIDATION.

In each case level 1 shows the best performance in compliance to international environmental regulations at the project level. Standing alone, this result could be taken as argument for a relationship between compliance to international environmental regulations and the level of system consolidation. The answer to the research question would be: If international environmental regulations for river basin management are created the implementation at the project level is influenced by the level of system consolidation. The highest level of system consolidation performs best in compliance to these regulations (Figure 17).

The result that level 3 performs better than level 2 in many cases is surprising and indicates that if a relationship between the level of system consolidation and the compliance to international regulations exists it is not linear from the highest to the lowest level. Thus, the answer would rather be: The implementation of international environmental regulations is influenced by the level of system consolidation. The highest level performs best but at the lower levels performance is not that clear and depends on the nature of environmental regulations (Figure 17).

Another surprising result is that each level of system consolidation scores “no” or “partly” in the categories of international issues: “international coordination of measures”, “application of basin wide approach” and “assessment of trans-boundary effects”. Again not level 3 scores worst, but level 2. At the highest and at the lowest level of system consolidation, bi-lateral commissions are created to coordinate measures. In no case more than one neighboring country or other country within the

river basin is involved in planning and coordination of measures (Figure 17). Even in the cases where bi-lateral commissions are created to coordinate measures, communication does not take place in the same intenseness as within national borders. In the Austrian case Slovakian comments are heard in beginning but at a certain point the Austrian side regards communication as fulfilled. In the Croatian case involvement of Serbian authorities is restricted to navigation authorities. It seems to be a decision taken by project developers, to coordinate measures at the project level with neighboring countries or not.

Conclusion

To conclude, the level of system consolidation seems to have an impact on compliance to international regulations at least at the highest defined level which is EU membership of all directly affected countries. The study indicates that high levels of system consolidation show high compliance with international arrangements. Yet, at the lower levels this impact could not be shown by the study (Figure 17).

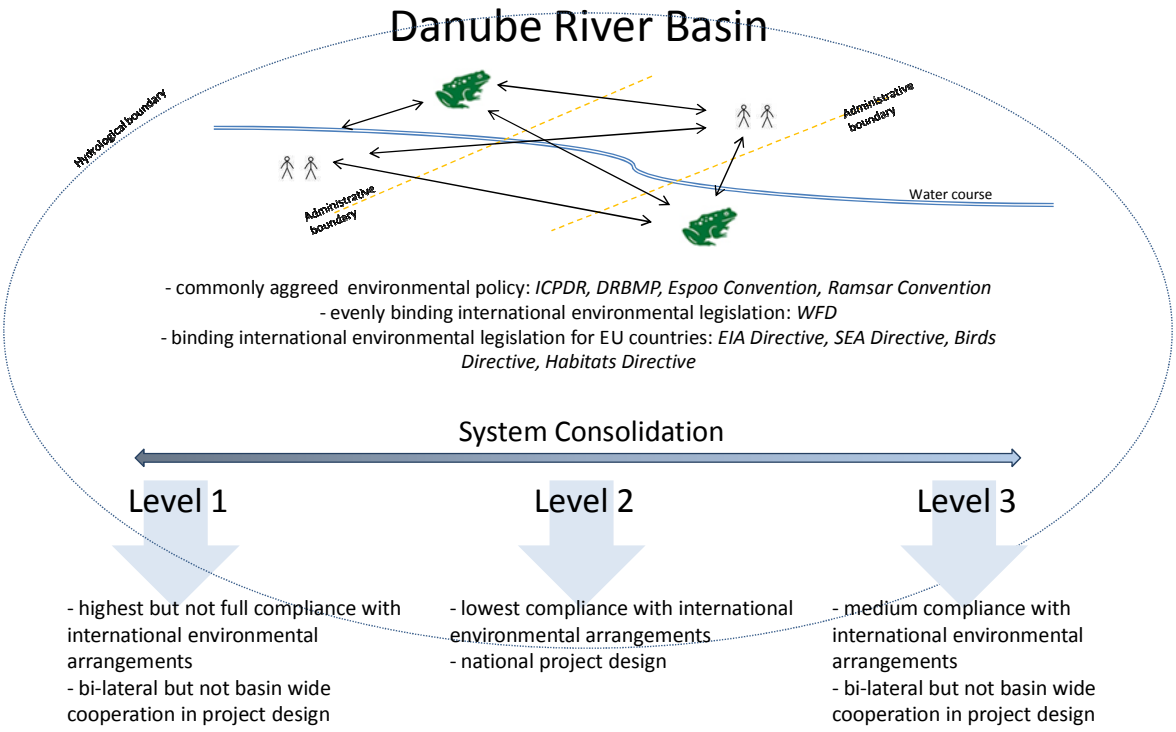

FIGURE 17: COMPLIANCE TO INTERNATIONAL ENVIRONMENTAL REGULATIONS AT DIFFERENT LEVELS OF SYSTEM CONSOLIDATION WITHIN THE DANUBE RIVER BASIN (DESIGNED BY AUTHOR).

Regarding data on international cooperation only, indicates that not even at the highest defined level joint action, as could be expected for a consolidated system, is in state (Figure 17). This might lead to two conclusions. First, one might argue that true system consolidation is not even achieved at the highest defined level. International cooperation remains a choice taken by project developers. In the Austrian case the more advantageous position within the upstream-downstream relations might influence the Austrian decision to involve Slovak authorities only to a certain degree and leave potential Hungarian interests behind. Second, the definition of system consolidation on the basis of EU membership might not be appropriate. A definition of system consolidation on a thematic basis as

the existence of international treaties or commissions on the issue of IWT development between the most directly affected countries could have created another picture. The Croatian project then would be realized at a higher level of system consolidation than the Hungarian due to the existence of the bi-national commission with Serbia. Still, I regard my definition as not absolutely false. EU legislation and policy is a major promoter of system consolidation within the region. It is to expect that countries that enjoy EU membership comply with its regulations. For a river system that consists out of both EU and non-EU member states but for which EU environmental regulations are besides other international regulations the main promoter of environmental protection, it is interesting to investigate if EU members and non EU members comply with those regulations. The study indicates that compliance with international environmental regulations works best within EU borders, works not that good outside EU borders and works worst at EU borders but additional research is necessary to verify this indication.

5.3. Outlook and Remarks

What results from the part above is that a binding legal environmental framework for development of the Danube waterway is created in terms of international conventions and EU directives. Although some of the requirements are equally binding to all the three countries and the EU directives are binding to at least Austria and Hungary, and will become legally binding to Croatia in the near future, they are not equally implemented within the three countries´ transport projects for the Danube waterway. Reflecting to the theoretical framework presented in chapter 2, within this part I try to find some explanations to this unequal implementation and give advice to project developers to enhance their performance to respect international environmental regulations.

Geographical Setting

A first explanation might be found within the geographical setting of the projects. Two of the three cases that are subject to this study represent a classical upstream downstream relation. The third case represents a mixture of a border river situation and an upstream downstream relation. Apart from the result discussed previously, that no case shows basin wide cooperation, bi-lateral cooperation with the direct neighbors is done differently from case to case. In case of the border river between Croatia and Serbia a bi-lateral commission is created which seems to verify the findings of Le Marquand (1977), Toset et al. (2000) and Shlomi (2008) that a border situation creates a sense for mutual interdependency and therefore creates incentives for cooperation. This might serve as an explanation why this case scores better in terms of international coordination than the Hungarian case that following my definition represents a higher level of system consolidation. The upstream-downstream situation of the Hungarian case does not provide many incentives for Hungary to take care of Croatian or Serbian interests although the country is more strictly bound to international regulations than Croatia due to its membership of the European Union. The trans-boundary principle then seems not to be implemented successfully in Hungarian water management. It may be that for the Austrian case which again shows more effort for trans-boundary cooperation, the higher level of system consolidation plays a major role to balance the effect of the upstream-downstream situation. Both neighboring countries are organized within the EU which changes power relations from the classical upstream-downstream situation to a higher level of mutual respect of

interests. Future research on other transport projects for example the border situations between Hungary and Slovakia or between Romania and Bulgaria could help to get a more complete picture about these findings.

Institutional Framework

Due to the low performance of the Hungarian case in compliance to EU environmental regulations, pure EU membership does not explain a higher or lower performance. Possibly in accordance with the findings of Le Marquand (1977), Toset et al. (2000) and Shlomi (2008) due to the mostly classical upstream-downstream constellation of the Danube River System a number of equally binding institutional arrangements have been developed for regulation of various activities. For example a DRBMP has been developed in accordance to the WFD. This practice transports EU legislation to the basin wide level. Although it is expected that the production of a RBMP helps to assess the actual and desired situations, to develop a set of measures to achieve the desired situation, to streamline the participation process, to increase transparency and to enforce vertical and horizontal co-ordination, it is remarkable how little the advices of the DRBMP are translated to the project level of river engineering projects especially at the lower levels of system consolidation which are the cases of Hungary and Croatia. Maybe the low level of DRBMP implementation at the navigation project level appears due to the ICPDR as the main coordination and implementation body of the WFD in the Danube Basin being not equipped with enough decision making and enforcement powers. In the definition of Savenije and Zaag (2000) the ICPDR could be described as a regulatory institution that defines general objectives. What lacks is a developmental institution that obtains a full operation and delegation status.

For promotion of waterway transport, regulatory institutions are in state in form of AGN and DC. Yet, more appropriate for actual implementation and development are actor networks as the transport administration network NEWADA and EU supported programs as NAIADES and PLATINA due to their ability to fund projects or assist in production of related studies and thereby to contribute to cost sharing and information management between the partners. The Hungarian and Austrian projects are partly funded by TEN-T funds which are coordinated by NAIADES and PLATINA. In Croatia the decision to conduct a feasibility study for instance is dependent on potential provision of future EU funds. Croatia and Hungary got NEWADA support in preparation of national plans and strategies including inventory of waterways and proposal of measures. The existence of such efficient actor networks and programs shows that international inland waterway transport policy and economic development are high at the political agenda. They provide measurable benefits for the countries that engage in development of their transport system. Being defined as the major Trans-European waterway, an efficient transport connection via the Danube is economically very important for Croatia but much more for land locked countries as Hungary and Austria. In Austria the Danube has already been regulated intensively during the past century, so that only a small stretch of it remains nearly free flowing. In Hungary the Danube is much more in its near natural state so that more effort is needed to transform it in an E-waterway as defined by AGN policy.

As shown above, AGN, DC, NEWADA, NAIADES and PLATINA play an important role in promotion of waterway transport. ICPDR on the other side is a major promoter of sustainable development and nature protection. Transport promotion is more effectively supported by actor networks than environmental protection. As Jaspers (2003) advices, a trans-sectoral platform should be created to negotiate different interests. On a national scale the Austrian approach of conflict moderation seems

to be appropriate to achieve this goal. On a basin-wide scale the mentioned organizations, programs and actor networks cannot fulfill that task due to their sectoral background. Maybe the EU Strategy for the Danube Region is a first step towards a future integrated River Basin organization that tries to balance conflicts of interests between sectors basin wide.

Translation of Scientific Ideals of Ecosystem Based Approach, Trans-Sectoral Management and Trans-Boundary Catchment Management to the Project Level

The scientifically and politically broad acceptance of concepts as sustainable development, ecosystem based approach, trans-sectoral management and trans-boundary catchment management which together form the basis for ICM, may lead to the expectation that the concepts are implemented at the project level as well. Yet, the present study results in a picture of implementation being not completely achieved. One of three cases shows a relatively high level of implementation while the other two show much less efforts in implementation of international environmental regulations concerning the mentioned concepts.

Partly the low performance in compliance to international environmental regulations might be explained with waterway transport being high at the political agenda. The EU White Paper from 2001 defines waterway transport as an environmental friendly transport mode. The general perception of water transport as being the most environmental friendly transport mode seems to create an overriding public interest for the development of the Danube water way. Nevertheless this perception is questionable due to its major impacts on ecosystems and the potential negative effect on provision of important ecosystem services, reduction of the river basins adaptive capacity and increase of its vulnerability to certain risks. Definitely the Hungarian and partly the Croatian approach to focus on traditional river engineering measures does not serve the concept of sustainability in terms of reduction of the systems vulnerability or the enhancement of its adaptive capacity due to those measures being percepted as being unable to adapt to uncertain potential system changes. The statement of Pahl-Wostl et al. (2007) that it is because of the surrounding mental models of following the paradigm of `command and control` that integrated approaches fail to get fully implemented seems to be true for the two projects. Yet, river systems are characterized by high complexity and therefore by a high level of uncertainty in respect to future circumstances. The Austrian approach may be the only one appropriate to buffer uncertain future changes as Pahl-Wostl et al. (2007) ask for.

A coordinated approach for water organized within catchment areas is reasonable due to the high interdependency of human water-related systems and water-related ecosystems. Although a RBMP for the Danube was produced in 2009 coordination of the planned measures along hydrological boundaries has been incorporated to the projects only to a very limited extent and an assessment of trans-boundary impacts has not been realized at all. How can basin-wide coordination of measures get realized in a competent manner if the effects of the measures are not known? Being a major element of ICM the fail to implement the basin wide scope in all cases brings the Danube River System at risk to fail the objectives of ICM among which is the implementation of sustainable development in order to enable the river system to provide essential ecosystem services to humankind. An advice for project developers that results from this analysis is to carry out assessments of trans-boundary effects and cumulative effects in order to be able to effectively coordinate measures basin-wide. Environmental NGOs urgently ask for the conduction of a trans-boundary SEA to cover all transport projects along the Danube Basin (WWF 2009). It might be wise to

add the findings of such a basin wide SEA into a future adopted DRBMP. The contemporary DRBMP does advice a lot of measures for the protection of the natural environment but it does not give any advice of appropriate measures for sustainable transport development.
A trans-sectoral planning approach is necessary in order to address the complexity of the river system. The ideal to negotiate partly incompatible objectives in a multi stakeholder dialogue in order to make trade-off solutions between human activities and ecosystems acceptable has been realized sufficiently only in the Austrian case. The approach of accompanying conflict moderation created a platform under governmental supervision that enabled negotiation of opposing interests which makes planning more transparent and democratic. Hungary and Croatia only partly fulfilled this objective. The approaches of Hungary and Croatia therefore run the risk of continuing planning by segregation of interests of different stakeholders and thereby failing to regard problems in a holistic way and to get information from different professional perspectives. In addition the projects run at risk being not broadly accepted by the public, which Falkenmark (2004) regards as an essential issue of sustainable development. The advice of this research to Hungarian and Croatian developers is to incorporate all relevant societal consumptive and non-consumptive users of the river in planning as has been requested by Jaspers (2003). Preferably this trans-sectoral approach should be realized basin wide. In no case a trans-sectoral basin wide planning approach has been realized, but in the cases of Austria and Croatia at least a sparse number of foreign stakeholders from neighboring countries is involved in planning.
A last advice to project developers is to implement the principles of international cooperation in development of the projects. For example for the obligation to not cause any significant harm and the precautionary principle, first it needs to be assessed if basin wide harm may be expected or not. The duty to cooperate needs to be implemented in Hungary where at present it is implemented only at a low level in form of information of international river basin organizations. The same counts for the trans-boundary principle. As I read the equity principle no potential user should be excluded from utilization of the river and therefore needs to be involved in planning. This is done well in Austria, but not sufficiently in Croatia and Hungary. The reason for not completely implement the mentioned principles may be insufficient technical, regulatory and economic capacity. For Croatia one might expect this to be the case. Due to its EU accession status the regulatory capacity is still developing and needs to gat harmonized with EU legislation.

Conclusion

Explanations for uneven implementation of international environmental regulations might be found in the geographical setting, in the institutional framework and in different perceptions towards scientific ideals.
First, the geographical setting of a border river in the Croatian case does provide more incentives to international cooperation than the upstream-downstream situation in the Hungarian case. An explanation why the other upstream-downstream situation in Austria leads to a higher degree of cooperation might be explained by the changed power relations due to an EU intern setting. In this case the influence of system consolidation is significant.
Second, the institutional framework of EU membership and non EU membership does not provide a sufficient explanation why the Hungarian case scores very low. An explanation might be that international waterway transport is high at the political agenda and is supported by efficient international actor networks and programs. The Hungarian Danube stretch represents one of the

longest bottlenecks for navigation along the Danube and plays a crucial role in completion of the E-waterway. Environmental protection on the other side is high at the political agenda too, but efficient international actor networks are not in place. An important advice for development of the institutional framework is to enhance trans-sectoral management by the realization of a basin wide trans-sectoral actor platform in order to balance interests of transport development and environmental protection.
A third explanation for low compliance with international environmental regulations at least in two cases might be the insufficient translation of scientific ideals to the project level. For example the remaining paradigm of `command and control` leads to mostly traditional river engineering measures being applied in Hungary and Croatia. A major concern of this study is that no case complies with the implementation of a basin wide approach. The objectives of ICM might not be achieved if no basin wide assessment of trans-boundary and cumulative effects of planned measures is carried out.
Last but not least the mentioned lacks in compliance to international environmental regulations hint at an urgent need to fully implement general principles of international cooperation in development of the investigated river transport projects.

5.4. Conclusion

The aim of this thesis to conduct a comparative research on compliance of IWT projects to international environmental regulations and to test the impact of system consolidation on this compliance has been achieved partly. Three projects have been compared. Compliance of these projects to international environmental regulations has been evaluated but the outcome in respect to the impact of system consolidation is not as clear as expected. The findings of this research are:
1. An international framework of environmental regulations has been developed for the Danube River in the light of DC and AGN, DRPC, Ramsar Convention, Espoo Convention, WFD, Birds Directive, Habitats Directive, EIA Directive and SEA Directive. Although EU regulations are not yet legally binding to Croatia the country committed itself to implement the mentioned directives in Croatian legislation due to its application of EU membership. The WFD is already binding to Croatia due to the commitment of DRPC member states to implement the directive. Thus, the mentioned **international commitments are more or less equally binding or will become binding to each of the three investigated cases.**
2. Despite this equal commitment to international regulations, **compliance to those regulations differs between the projects**. While each project respects the goals of IWT, respecting of objectives of ecological integrity is more often than not done formally instead of satisfying. The Austrian project which represents a project realized at the highest defined level of system consolidation scores best in compliance to international environmental regulations. Surprisingly the Croatian project, which is realized at the lowest defined level of system consolidation scores better than the Hungarian project, which is realized at a slightly higher level of system consolidation than the Croatian project.
3. This finding leads to the suggestion that the level of system consolidation seems to have an impact on compliance to international regulations at least at the highest defined level which is EU membership of all directly affected countries. A statement as, the more consolidated the system is the more do the projects comply with international environmental regulations, can nevertheless not be given due to the lower levels of system consolidation showing the opposite. So, I can only state, **the highest defined level of system consolidation complies best with international environmental regulations.** Possibly the definition of system consolidation on the basis of EU-membership is one

reason for the mentioned results. If applying another definition on basis of existence of international treaties on IWT development for example, results could be different but to define system consolidation on a sectoral basis seems not to be a just decision to me. EU membership does provide more incentives to cooperation than non-EU membership and therefore is a crucial issue to be taken into account. **A possible general conclusion of compliance to international regulations being highest within EU borders, being lower with no EU country involved and being lowest at EU borders can only be indicated by this research**. Further examination on other cases within the same river basin and other international river basins would be necessary to support this finding.

4. An explanation for the low performance of the Hungarian case might be that the Hungarian Danube stretch represents one of the longest bottlenecks for navigation along the Danube which plays a crucial role in completion of the E-waterway. IWT seems to be supported more efficient by actor networks and programs than environmental protection. An important advice, which is taken from this finding is that **trans-sectoral management should be enhanced by the realization of a basin wide trans-sectoral actor platform in order to balance interests of transport development and environmental protection.**

5. In terms of creation of international or basin wide cooperation all projects do not score in a satisfying way. **Even the highest defined level of system consolidation seems not to provide a basis for true joint action**. An explanation why the lowest defined level scores evenly with the highest level might be found in the geographical setting of a border river providing more incentives for international cooperation than the upstream-downstream situation of the other two cases.

6. **A major concern of this study is that no case complies with the implementation of a basin wide approach**. The objectives of ICM might not be achieved if no basin wide assessment of trans-boundary and cumulative effects of planned measures is carried out. Scientific findings that are incorporated in international policy and legislation need to be implemented more efficiently at the project level which may be supported by respecting the general principles of international cooperation in development of river transport projects.

Although the findings of this thesis are justified by the data, a major problem in conducting this research was to collect sufficient and reliable data. For the Croatian case for example most data that was collected needs to be taken with care because it may be biased by either the transport developer or the environmental NGO. From the transport developer no critical remark on their own project is to expect while the opposite might be true for the environmental NGO.

Another obstacle was the scarce number of transport projects that could be taken into account due to both scope of this thesis and limited availability. For the scope of this thesis more than four projects to compare would have meant to reduce the number of environmental regulations to be taken into account. The intermediate result of one project not providing sufficient data for a comparison again reduced the number of projects to compare to three, which results in a reduction of presented levels of system consolidation. Therefore a statement about the impact of system consolidation on compliance to international environmental regulations can be indicated by this thesis but further research on similar projects and river basins is necessary to strengthen the results.

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e-mail contact:

mail Vodniputovi [10.4.2012]

mail WWF Croatia [3.5.2012]

Appendix I

mail Vodniputovi [10.4.2012]:

Dear Mr. Daniel,

I send you the answers to your questions. [redacted]

[redacted]

1) What is the objected draught for the fairway? Is there a short term and a long term objective?

1) Planned objected draught for the fairway is 2,5 m in accordance with AGN agreement, which also defines other specifications for the inland water corridors. Short and long term objectives regarding the fairway depth is to be incompliance with national and international regulations and agreements.

2) What is the objected maximum load of vessels for the section?

2) The objected maximum load is also in accordance with AGN agreement.

3) How many bottlenecks and/or missing links are objected to eliminate with the project?

3) Bottlenecks on this section of River Danube are defined within local strategic documents and are coordinated with the Republic of Serbia, and these include 7 sections. These are also translated to International bodies such as ICPDR.

4) Are the plans coordinated with other countries? How is international coordination of the planned measures carried out?

4) The plans are coordinated with Republic of Serbia. The meetings with relevant institutions are being organized on a regular basis.

5) Which authorities and experts (relevant disciplines as navigation experts, water engineers, ecologists, …) are involved in planning of the project? At which stage of the project are they involved?

5) Experts from the relevant institutions(Ministries, Croatian Waters, Inland waterway agency, Nature Park KopačkiRit, etc.) have been continuously involved in planning of the project.EIA was also produced by team of experts to cover all aspects of the project.

6) Are the relevant river commissions (Danube Commission, ICPDR) informed and consulted about the project? When and how?

6) The project is presented by Croatian and Serbian authorities to all relevant commissions including ICPDR, and as a result of the consultations the DRBMP includes this project within "Annex 7. Planned infrastructure projects".

7) Are the goals of International Water Transport respected? (Goals of AGN, TEN-T, Danube Commission)

7) The goals of International Water Transport are being respected.

8) Is ecological integrity respected? (Goals of EU-WFD, EU-Birds Directive, EU-Habitats Directive, ICPDR, RAMSAR,…)

8)The ecological integrity is taken into the consideration through EIA procedure, which covered all aspects of above mentioned Directives, Conventions, National and International laws.

9) Which stakeholders are informed about the project plans? (authorities, communities, NGO´s, public, …)

9) Stakeholders including relevant Ministries, local communities, NGO's, National Park Authority KopačkiRit have been informed and consulted at the corresponding stages of project implementation.

10) Which stakeholders are consulted about the project plans? (authorities, communities, NGO´s, public, …)

10) See the answer nr. 9.

11) How is communication with the relevant stakeholders carried out and which media is used for communication? (informationplatform, website, meetings,…)

11) The communication with relevant stakeholders is being carried out through different stages of project planning. The most important stage of communicating with stakeholders was the EIA public hearing process which included communication through websites, local newspapers and open meeting.

12) Is public participation possible within the planning procedure? Are statements of stakeholders taken into account? (Involvement of interested parties)

12)Statements of the stakeholder are taken into account. It is the objective of this project to ensure safe navigation on the inland waterway without compromising the needs and objectives of other relevant parties.

13) Has a feasibility assessment been conducted for the project?

13) Feasibility assessment is not required by Croatian Law. But it is important to emphasise that the full feasibility assessment will be possible only after the most environmentally acceptable solution is agreed upon with all stakeholders. If the project is to be financed by the EU funds then the feasibility study will be produced.

14) What are the results of the feasibility assessment and which decision derived from it?

14) See the answer nr. 13.

15) Are parts of the project area located in protected natural areas (NATURA 2000,RAMSAR, …)?

15) Project area is located within protected natural areas including Ramsar Site and National ecological network sites which will become Natura 2000 once Croatia becomes full member of EU.

16) Is an EIA or an SEA required for the project? What are the reasons for the requirement?

16) Only EIA is required forthis project under Croatian regulations, and adoption of EIA is under way. SEA is not obligatory since inland waterway on Danube River already exists.

17) Has a SEA and/or an EIA been conducted or is it planned to be conducted?

17) EIA is currently in the procedure of adoption.

18) If SEA or EIA has been conducted, what is the result of it and what is the decision based on the results? Have changes to the plans been taken for instance?

18) See the answer nr. 17.

19) Have possible trans-boundary effects (on ecosystems and human society) of the measures been taken into account and was research on these effects carried out? What was the scope of this research (national, bi-national, basin wide)?

19) The possible trans-boundary effects of the planned project have been taken into account within EIA procedure in accordance with ESPOO convention. Relevant authorities are in continuous communication with the Republic of Serbia.

20) Which environmental aspects that may be affected by the project are taken into account within the EIA/SEA/feasibility study?

20)The EIA has gone through procedure of Screening in which all relevant bodies have been contacted in order to define precise Table of contents for the EIA in order to include all environmental aspects that may be affected by the project.

21) Are effects of climate change taken into account? (adaptation possibilities to changing circumstances)

21) Outcomes of the project will have no interaction with the Climate change.

22) Is a description of possible effects of the taken/planned measures available? Is this description complete?

22) Description of possible effects of the taken/planned measures in the current state of completeness of EIA is available through the website of Inland waterway agency (in Croatian language only). The final version may differ in accordance with the comments from public hearing and meeting of the Evaluation Committee.

23) Which alternative practices/measures have been taken into account in order to reach the objectives of the project?

23) The author of the EIA have analysed three different alternatives in order to find the most acceptable solution for the environment. Analysis also included consultation with the relevant authorities which resulted in withdrawal of certain number of structures which deemed environmentally unacceptable in any alternative.

24) Which other alternatives than the ones that are taken into account would be possible?

24) All alternatives are possible but their degree of impact differs greatly.

25) Which measures will be conducted and what is the reason for the decision on those measures?

25) The project proposes minimum set of measures required for maintenance of existing inland waterway on river Danube which would eliminate bottlenecks and ensure safe transportation. These include construction of 21 new regulation structure, 5 reconstruction of existing structures and 2 alternative structures.

26) What is the expected effect of the taken/planned measures on ecology? (quality of the river and adjacent waters, status of adjacent ecosystems, effect on single species,…)

26) Author of the EIA wanted to give a unique solution which will cover the requirements of inland water transportation without any significant effects on the ecology. EIA also includes a set of protection measures in order to reduce remaining impacts to a minimum.

27) Do you regard the taken/planned measures as best available?

27) Proposed project measures are in accordance with Manual on Goodpractice in sustainable waterwayplanning – PLATINA.

28) Will the good status of the Danube and adjacent waters be achieved by 2015 as asked by the Water Framework Directive?

28) The project will not have negative impacts on status of water body.

29) Which habitats will be conserved, restored or improved within the project area?

29) The project proposes restoration measures of adjacent old channels of river Danube which will greatly improve ecological conditions of the related wetland habitats. These measures are in accordance with Joint statement and DRBMP.

30) Which compensational measures to possible negative environmental effects are planned for the project area?

30) The project analysed possible measures to compensate for possible negative impacts and these include removal of old structures, reconnection of old riverbeds, and cleaning of sediment from clogged channels. These will increase the ecological potential of the river body and are in accordance with above mentioned documents and EU regulations.

31) Is a monitoring process for the project area and taken/planned measures initiated or is it planned?

31) The monitoring process is planned within EIA and will be of a crucial role once the project is implemented.

32) Who (authorities, experts,…) is involved in the monitoring process?

32) Monitoring will be in accordance with EIA and will include adequate experts from relevant bodies.

mail WWF Croatia [3.5.2012]:

[redacted]

1) What is the objected draught for the fairway? Is there a short term and a long term objective?

The main objective of the project is to ensure minimal requirements for safe navigation. It is not clear what does it mean actually – this could be explained by the fact that primarily the Danube navigation project is seen as an opportunity to engage construction sector (very needy in Croatia) and excavate some gravel from the river.

2) What is the objected maximum load of vessels for the section?

In the EIA there are no data provided on the amount

3) How many bottlenecks and/or missing links are objected to eliminate with the project?

7 bottlenecks are objected by the project.

4) Are the plans coordinated with other countries? How is international coordination of the planned measures carried out?

The project was coordinated with Serbia, but their Ministry of environment was not directly involved (only the navigation authorities). Hungary was not involved in the project planning.

5) Which authorities and experts (relevant disciplines as navigation experts, water engineers, ecologists, …) are involved in planning of the project? At which stage of the project are they involved?

Agency for inland waterways initiated the project, Croatian waters (water management agency) was involved. At some stage, Nature Park Kopački rit was asked about their opinion and they opposed to some activities that were planned in the project, and they succeeded in reducing the scale of the project, but the improved version of the project would still affect the environment significantly. Unfortunately, NGOs were involved only in the public participation period, so at the end of the process.

6) Are the relevant river commissions (Danube Commission, ICPDR) informed and consulted about the project? When and how?

As far as we know, no.

7) Are the goals of International Water Transport respected? (Goals of AGN, TEN-T, Danube Commission)

8) Is ecological integrity respected? (Goals of EU-WFD, EU-Birds Directive, EU-Habitats Directive, ICPDR, RAMSAR,…)

No, the project is not in compliance with all of the aforementioned Directives.

9) Which stakeholders are informed about the project plans? (authorities, communities, NGO´s, public, …)

EIA was available for commenting for one month, but before that period, the public (including NGOs) was not informed about this project (not in details; the idea for the project is very old- more than 50 years).

10) Which stakeholders are consulted about the project plans? (authorities, communities, NGO´s, public, …)

During the development of project plans, only water management and navigation authorities were informed, and at later stage, Nature Park Kopački rit.

11) How is communication with the relevant stakeholders carried out and which media is used for communication? (information platform, website, meetings,…)

During the public hearing process, the EIA was available online, and NGOs were invited for the meeting where the EIA was presented.

12) Is public participation possible within the planning procedure? Are statements of stakeholders taken into account? (Involvement of interested parties)

Apart from Nature park, other stakeholders were not involved in the planning process.

13) Has a feasibility assessment been conducted for the project?

No, as far as is known publicly, there is no feasibility assessment and also there is no cost-benefit analysis for this project.

14) What are the results of the feasibility assessment and which decision derived from it?

15) Are parts of the project area located in protected natural areas (NATURA 2000,RAMSAR, …)?

Yes, Nature Park, Natura 2000 and Ramsar site.

16) Is an EIA or an SEA required for the project? What are the reasons for the requirement?

Yes, EIA is required, while SEA was not obligatory by law since the project planning began.

17) Has a SEA and/or an EIA been conducted or is it planned to be conducted?

EIA was conducted.

18) If SEA or EIA has been conducted, what is the result of it and what is the decision based on the results? Have changes to the plans been taken for instance?

EIA is now in the process of the approval by the relevant ministry. EIA says that there will not be any negative impact on the Nature park, but it has to be clear that almost all EIAs in Croatia are giving positive scores towards the projects, so the EIAs are produced just to obey the law.

19) Have possible trans-boundary effects (on ecosystems and human society) of the measures been taken into account and was research on these effects carried out? What was the scope of this research (national, bi-national, basin wide)?

This was not studied; only communication between Croatia and Serbia was done according to the ESPOO convention.

20) Which environmental aspects that may be affected by the project are taken into account within the EIA/SEA/feasibility study?

They examined some possible positive effects, while they ignore the probable negative effects on nature, mainly on Nature park Kopački rit, huge wetland, very important for fish and birds nesting, and for flood protection. The project could cause even less water coming from Danube to the wetland. All this is missing from the EIA.

21) Are effects of climate change taken into account? (adaptation possibilities to changing circumstances)

Climate change effects have been considered only as a need for possible reduction of road traffic but no concrete numbers have been stated.

22) Is a description of possible effects of the taken/planned measures available? Is this description complete?

The whole EIA is available online in Croatian language. Data in the whole EIA are very void and scarce.

23) Which alternative practices/measures have been taken into account in order to reach the objectives of the project?

No real alternative measures have been taken into account.

24) Which other alternatives than the ones that are taken into account would be possible?

Restructure of the whole project is necessary since it is focused on some areas that do not even present as the bottlenecks.

25) Which measures will be conducted and what is the reason for the decision on those measures?

So far, we do not know if the project will be approved or not since EIA is still in the process of approval. New Croatian government (we had parliamentary elections last November) hired independent experts to evaluate the project and its documentation. The report is still not ready.

26) What is the expected effect of the taken/planned measures on ecology? (quality of the river and adjacent waters, status of adjacent ecosystems, effect on single species,…)

Even faster deepening of the Danube which would cause lower level of underground water which are crucial for filling of depressions in the floodplain forests in the Nature park. This will cause faster succession of the wetland and destruction of all related habitats and species.

27) Do you regard the taken/planned measures as best available?

No.

28) Will the good status of the Danube and adjacent waters be achieved by 2015 as asked by the Water Framework Directive?

If the project will be carried out as planned, no, as natural ecosystem services will be lost or minimized. Probably they want to pronounce it as AWB or HMWB – this is still not defined in Croatia.

29) Which habitats will be conserved, restored or improved within the project area?

One old side branch is planned to be reopened. Funny thing is that for each step of this project (like this reopening of the side branch), the company announced that new EIA/NIA would be carried out.

30) Which compensational measures to possible negative environmental effects are planned for the project area?

Reopening of a side branch is presented as a positive effect of the project, although it neglects all possible negative effects.

31) Is a monitoring process for the project area and taken/planned measures initiated or is it planned?

It is planned.

32) Who (authorities, experts,…) is involved in the monitoring process?

Not determined yet.

Appendix II

International policy objectives and regulations		Indicator to measure compliance to international regulations	Project 1: "Integrated River Engineering East of Vienna"	Project 2: "Improvement of navigability of the Hungarian section of the Danube between Szob and the southern state border"	Project 3: "Regulation of the Danube for transport purpose in Croatia"	Project 4 "Improvement of river navigation at the Serbian stretch of the Danube"
Development of the Danube as transport corridor VII	TEN-T, AGN: Achieve a minimum draught of 2.5 m	Achieved/objected draught (in m)	2.50 m	2.50 m	2.50 m	AGN and DC requirements
	TEN-T, AGN: Enable navigation for vessels of up to 3000 t cargo load	Achieved/objected maximum load of vessels (in t)		-4000-4500 t between Szob and Budapest (Class VI/B) -4000-6200 t between Budapest and southern state border (Class VI/C)		AGN and DC requirements
	TEN-T, AGN: Eliminate missing links and bottlenecks in order to achieve those objectives	Achieved/objected number or length of eliminated missing links and bottlenecks	About 50 km project area	Over 50 locations on the 378 km long stretch	-13 bottlenecks defined between rkm 1427 and 1311 -53 km project area between rkm 1433 and 1380 -7 sections	-Rkm 1433 – 1170 -18 locations identified -Interim target to eliminate half of the critical sections by 2020 -clearing of 5 sections and establishment of regular maintenance dredging by 2016
Create sustainable development	WFD: Management along hydrological boundaries, ESPOO Convention:	international scope of coordination of planning objectives and measures (national, bi-national, multi-national, basin wide)	National scope of planning but early consultation of Slovak authorities	national	-plans are coordinated with Serbia on the basis of bilateral commission -Hungary was not involved in the project planning.	- border stretch needs to get coordinated with Croatia

	international coordination of measures					
	ICPDR, ISRBC, DC: information and consultation of the international river commissions in the Danube river basin	International river commissions informed and consulted (yes/no)	yes	yes	Yes/no	yes
	ICPDR, ISRBC, DC: interdisciplinary planning teams	Completeness of relevant disciplines that are involved in planning process	-accompanying conflict moderation -focus on a broad representation of the different stakeholders	"The exploration and evaluation of further utilization needs have been done by a questionnaire method. Questionnaires for different target groups – nature protection, local governments, associations of local governments, navigation organizations, professional associations, etc. have been compiled" (VITUKI year ?)	-Experts from the relevant institutions (Ministries, Croatian Waters, Inland waterway agency, Nature Park KopačkiRit)	
		Relevant authorities and experts involved (yes/no/partly)	-EIA expert group: navigation, river engineering, ecology, socio-economics - project promoter: BMVIT - project developer: via donau	-Ministry of Economy and Transport, -VITUKI Environmental Protection and Water Management Research Institute (consortium leader) -Aquaprofit Ltd.	-Bilateral commission between Serbia and Croatia: Experts from Ministries, Croatian Waters, Inland waterway agency, Nature Park KopačkiRit (Serbian Ministry of Environment not involved,	-Plovput, Ministry of Infrastructure

			-involvement of WWF, National Park Authority,… early in the planning process	(consortium member) -Ter-Team Mernök Kft. (consortium member) -VTK Innosystem Kft. (consortium member)	only navigation authorities) -EIA was also produced by team of experts to cover all aspects of the project. -NGOs were involved only in the public participation period	
	ICPDR, ISRBC, DC: define and ensure the prerequisites and goals of IWT as well as river/floodplain ecological integrity	goals of IWT respected (yes/no/which)	aimed to reach 2.5 m draught, steady water depth throughout the year	Elimination of shallow fords and bottlenecks to guarantee save navigation and to improve navigability	Yes	Aim to contribute to DC requirements
		ecological integrity respected (yes/no/which)	aimed to reach an ecological status of an anabranched system	-Concerns of ecological integrity are not reflected adequately	Vodniputovi: ecological integrity is taken into consideration through EIA procedure WWF: ecological integrity not taken into account	
	ICPDR, ISRBC, DC: transparent planning process (information/participation)	Which stakeholders are informed?	-BIMVT, Ministry of Finance and Ministry of Life representing federal politics, -Governors, departments and planning communities of the federal states Niederösterreich and Wien -Majors of local Danube communities -Border waters commission representing Slovak	-public	-relevant Ministries, local communities, NGO's, National Park Authority KopačkiRit have been informed and consulted at the corresponding stages -EIA was available for commenting for one month	

			Republik -NGOs in the topic of ecology -Stakeholders from navigation, fishery, chamber of trade -Experts in the topics of transport, ecology, regional development, -license authorithy -property stakeholders: federal forests, Nationalpark Donauauen -Environmental lawyers: Wiener UA, Niederösterreichische UA -relevant public was informed and consulted			
		Which stakeholders are involved?	Follow (which stakeholders are informed)	-public	-Stakeholders including relevant Ministries, local communities, NGO's, National Park Authority KopačkiRit	
		Which media is used for communication?	-accompanying conflict moderation -Public edition of EIS from Dec 2007 to January 2008 -Public hearing in October 2008	-two professional forums initiated by WWF Hungary -three public forums initiated by the Ministry and VITUKI -Ministry of Economy	-bi-lateral commission -EIA public hearing process -communication through websites, local newspapers and open meeting. -EIA was available online -NGOs were invited for the	

			-project website: http://www.donau.bmvit.gv.at/projekt/steckbrief/	and Transport published intermediate report on its website in Hungarian language -VITUKI established website (http://dunahajozhatosag.hu/index.php) for the provision of general information in Hungarian language	meeting where the EIA was presented	
		Is participation possible? If yes, how?	-accompanying conflict moderation during first phase of EIA - Because of large EIA Report it is objectively not possible to give a statement to all relevant issues at time.	**- VITUKI:** The design works and the licensing procedure have been running in a transparent manner for the broader public -expression of opinion was provided through the project website, the civil forums, through a wide array of consultations with the relevant central and local governmental, professional and non-governmental organisations as well as with the civil organizations - **NGOs:** outcomes of public participation process concerning the VITUKI study	-Statements of the stakeholder are taken into account. -Apart from Nature park, other stakeholders were not involved in the planning process	

				incorporated in the study to a very limited extent -no comments possible on the final VITUKI study		
	ICPDR, ISRBC, DC: feasibility assessment	feasibility assessment conducted (yes/no)	-Assessment of alternatives between 2002 and 2004, -in situ test phase still running	Baseline Study on the Improvement of the Navigability of the Danube between 2005 and 2007	-not required by Croatian Law. -If the project is financed by EU funds a feasibility study will be produced. -preliminary design for 4 sections prepared between 2004 and 2007	- "Preparation of design and tender documentation for river training works on the critical sections on the Danube River in Serbia" was planned to start in 2011 and shall be finalized by end 2012
		What is the decision, based on feasibility assessment?		- The construction works can be executed between 2009 and 2013		
	EIA directive, SEA directive, WFD, Birds directive, habitats directive, DRBM plan: conduction of EIA and SEA for infrastructure projects	Location in protected areas (yes/no/partly)	2x NATURA 2000, 2x Ramsar, 1x Biosphere reservation, 1x National Park, 2x Nature Protection area, 3x Landscape protection Area, several natural monuments	entire Hungarian Danube belongs to NATURA 2000	protected natural areas including Ramsar Sites and National ecological network sites which will become Natura 2000 once Croatia becomes a full member of EU	
		Other reason for conduction of EIA/SEA			SEA is not obligatory since the inland waterway on Danube River already exists.	

		conduction of EIA/SEA (yes/no)	EIA: -preparation of environmental statement between 2004 and 2006 -conduction of EIA between -submission of EIS in March 2006 -conduction of EIA between 2006 and 2010 Public edition of EIS from Dec 2007 to January 2008 -Public hearing in October 2008 -no EIA for test area (5 projects finalized: Side Arm reconnection Schönau 2004, Side arm reconnection Orth 2002, Side arm reconnection Haslau-Regelsbrunn 1998, 1.7km River Bank Restoration Groyne optimization Witzelsdorf 2009, River Bank Restoration Turnhaufen 2006; 6th in preparation – 3 km River Bed	-No comprehensive SEA conducted -EIA was conducted between 2008 and 2010 as part of the official licensing procedure -technical engineering experts considered it important to respect the SEA Directive requirements and decided to adhere to them during their work.	-EIA is currently in the consenting procedure - works already executed without EIA permit: - 2 T-groins at rkm 1405,57 and 1406,17 - Training works for bank protection between rkm 1406,68 and 1406,8 - Baffle pier between rkm 1406,637 and rkm 1406,680 rehabilitation of a damaged right bank at rkm 1393	

			stabilization, river bank restoration, side arm reconnection, groyne optimization Bad Deutsch Altenburg)			
		Decision based on EIA/SEA and possible overriding public interest	No decision taken yet	-Outcome: no significant environmental and ecological impact or risk -authorities issued permits for six points of	-EIA is now in the process of the approval by the relevant ministry. -consent is expected for 2013	

				intervention and also issued water management permit for two points - licensing was suspended in March 2011 by the Ministry of Rural Development due to absence of cost-benefit assessment, absence of real alternatives to the development of inland navigation and absence of fairway improvement alternatives -delivery of a totally new Strategic Environment Assessment wanted -The Consortium led by VITUKI has submitted the design plans and documentation to the relevant Authority for licensing.		
	EIA directive: assessment of basin wide/trans-boundary impact	geographical scope of investigation on trans-boundary effects (local, regional, national, bi-national, basin-wide)	Restricted to local communities that are divided in four parts (Wiener Bereich, Fischamend-Windungsmauer, Windungsmauer – Marchmündung, Border reach)	Fragmentation of project area for EIA and SEA – no comprehensive examination of impacts, -no trans-boundary impacts assessed	-Vodniputovi: possible trans-boundary have been taken into account within EIA -WWF: This was not studied	

	EIA directive/RBM Plan: outline of alternatives	Number and nature of alternatives taken into account Alternative practices and techniques that are taken into account	Assessment of alternatives between 2002 and 2004 **1st step:** 16 possibilities of bed stabilization **2nd step:** comparison of remaining 2 alternatives (sediment addition and granulometric bed improvement) **3rd step:** development of an additional alternative	-2 alternatives -authors were asked to look only at traditional river regulation measures	-three different alternatives	
		Reason for decision on alternative	-Meeting of all criteria that were not met by eliminated alternatives -Slope reduction by increase of length of the river – intolerable effect on navigation; -compensation of bed load by artificial bed load addition – intolerable effect on ecology		-no cost-benefit assessment of alternatives and variants justify the selection of the preferred set of measures and engineering works	
	RBM Plan: Application of best environmental practices and techniques	Nature of practices and techniques	-Dredging of shallow sections, additional groynes, granulometric bed improvement, side arm reconnection	-dredging the waterway -removal of marly, rocky riverbed material -riverbed narrowing by way of training works (groins, T-works,	-Originally planned: 72 T groins, 15,5 km of new embankments, 2 parallel structures, dredging -Currently planned: 21 new regulation structure, 5	removal of unexploded ordinates, dredging, groyne construction, bank excavation and bank protection

			and widening of river bed	parallel training walls) -combined dredging-narrowing solutions -re-drawing the fairway -correcting the fairway -specific river training procedures differing from the above	reconstruction of existing structures and 2 alternative structures	
		Effect of practices and techniques	-Eliminate structural bottlenecks, allows low-water regulation, raising of ground water table, minimizing necessary dredging, improvement of predictability of river bed, stop bed degradation, increase hydrogeomorphic dynamics and increase habitat quality	-harm drinking water resources and rivers recreational, tourism and water sports potential -contribution to deepening of the riverbed and decrease of low water levels -increased shipping results in increase of harmful impact of backspawn and waves on fish and bank habitats	construction of river training structures and the conduction of sediment extraction will most likely disturb one of the last free flowing stretches of the Danube	-IWT may have numerous effects on environment and accidents may have trans boundary impact -the project will reduce risk of accidents and ease navigation congestion and thereby create positive effect on natural environment
		Are they regarded as the best available?			-Vodniputovi: Proposed project measures are in accordance with Manual on Goodpractice in sustainable waterwayplanning – PLATINA.	
	EIA directive: description of environmental	number and nature of environmental aspects that	-Waters, groundwater, use of	environmental, hydrological issues as	Vodniputovi: all relevant bodies have been contacted	

	aspects that are likely to be affected	are taken into account	water and groundwater, soil, air/climate, animals/plants/habitats, nature protection (Habitats directive, fish, birds directive), hunting economy, fishery, agriculture, forestry, landscape, cultural goods, housing, health, leisure, terrestric traffic, waterway, technical infrastructure, resource, disposal	problems of drinking water supply, disappearance of species from protected areas, sinking of ground water level and deteriorating of connections between the river and its side branches were just briefly mentioned as possible conflict areas but not further taken into account in evaluation of consequences	in order to define a precise table of contents for the EIA in order to include all environmental aspects -NGOs: EIS does not properly and sufficiently assess: -the real transport needs for this project -the real impacts of foreseen interventions on:Future navigability, Danube ecosystems and their functions, Water bodies, Hydromorphology, Existing sediment deficit and balance, the European importance of the affected protected areas with their key species and habitats, Cumulative effects of existing and planned IWT projects in the wider area, Transboundary effects	
	ICPDR, ISRBC, DC: take effects of climate change into account	effects of climate change taken into account (yes/no/which)			considered only as a need for possible reduction of road traffic	
	EIA directive: description of effects	Description available and complete (yes/no/partly)	-mostly complete, but comprehensive paper is more than 10.000 pages long -lack of description of effects on sub	environmental, hydrological issues as problems of drinking water supply, disappearance of species from protected areas,	Description of possible effects of the taken/planned measures in the current state of completeness of EIA is available through the	

			terrestrial and ground water ecosystems -Lack of description of deep groundwater bodies -Description of possible mobilization of pollutants not taken for the whole area but only for suspicion cases	sinking of ground water level and deteriorating of connections between the river and its side branches were just briefly mentioned as possible conflict areas but not further taken into account in evaluation of consequences	website of Inland waterway agency (in Croatian language only). -follow "number and nature of environmental aspects…"	
	WFD/DRBM Plan: Improve ecological status of inland water and groundwater and achieve a good status by 2015	expected effect on ecological status of waters (positive or negative according to WFD Annex V 1.2 and nationally defined reference status)	-granulometric bed improvement: reduce bed degradation -side arm reconnection: increase hydrogeomorphic dynamics -river bank restoration: increase hydrogeomorphic dynamics, improve habitat quality -ecological target based on reference conditions prior to regulations in 19th century	-the desired ecological status has not been defined - -harm to ecology of the main branch expected	-Vodniputovi: The project will not have negative impacts on status of water body -WWF: faster deepening of the Danube, lower level of ground water, faster succession of the wetland and destruction of all related habitats and species - If the project will be carried out as planned, no achievement of WFD objectives until 2015	
	DRBM Plan: Restoration, conservation and improvements of habitats and	Habitats conserved, restored and improved	- Water body connection Zainet Hagel		restoration measures of adjacent old channels of river Danube	

	their continuity for sturgeon species and specified other migratory species in the Danube River and the respective tributaries		-Water body connection Beugen-Arm -Water body connection Fischamend (Bi-Graben, Melichar-Arm) -Water body connection Schönau – Optimierung (Schönauer-Arm) -Water body connection Orth – Optimierung (Kleine Binn) -Water body connection Haslau-Regelsbrunn – Optimierung (Regelsbrunner-Haslauer-Arm) -Water body connection Stopfenreuth (Stopfenreuther-, Karpfen-, Spittelauer- und Tiergarten-Arm) -Water body connection Röthelstein - (Röthelsteiner-Arm, Losl-Anschütt-Arm)			

	DRBM Plan: Protection, conservation and restoration of wetlands/floodplains to ensure biodiversity, the good status in the connected river by 2015, flood protection and pollution reduction-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.	Habitats protected			restoration measures of adjacent old channels of river Danube	
		Compensational measures	Reduction of bed errosion, bank restoration, water body connection	-rehabilitation of side branches as compensation for degradation of main branch	- removal of old structures, reconnection of old riverbeds, and cleaning of sediment from clogged channels.	

	ICPDR, ISRBC, DC: monitoring and adaptation of the effects of measures	monitoring process of measures initiated (yes/no/how)	-3km test reach for effectiveness of measures and accompanying monitoring; -for entire reach successive adaptive approach with feedback loops between monitoring, planning and execution -monitoring activities of pre- and post restoration conditions until 2020		monitoring process is planned within EIA and will be of a crucial role once the project is implemented Monitoring will include adequate experts from relevant bodies.	Planned to be carried out by: Ministry of Infrastructure - Sector for Inland Waterways and Navigation Safety and the Ministry of Environment and Spatial Planning (national level),