Adaptive Governance of Contested Rivers: A political journey into the uncertain

by

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Submitted to the Department of Urban Studies and Planning in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Urban and Regional Planning at the MASSACHUSETTS INSTITUTE OF TECHNOLOGY

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ABSTRACT

Governance of international rivers is characterized by complex institutional arrangements aimed at minimizing uncertainty and making it difficult for participants to avoid their responsibilities. However, as new information emerges, new impacts of activities on rivers are identified, new stakeholders emerge and new technologies are developed, international river management agreements and treaties may have to be modified. At the very least, the implementation of the governance arrangements may need to be adjusted. Most river governance agreements are the product of extended negotiations in which the parties work hard to codify and define the details. This makes the task of modifying the agreements, or even of implementing them in new ways, difficult. In some cases the details and format of the institutional arrangements make it hard to respond to the changing nature of the social and ecological problems that emerge over time. In other cases they do not. This raises the question, “Why and how do efforts to formulate international water resource arrangements that bring together countries with common resource management concerns but conflicting interests, limit or support needed adjustments?”

This dissertation explores what I call the conventional versus the adaptive approach to international river basin governance. The former makes it hard to adjust over time; the latter, less so. Climate change appears to be increasing the need for flexibility in river basin governance. So, I compare how institutional arrangements that reflect a conventional approach to uncertainty and conflict impede the ability of water governance participants to make necessary adjustments, while institutional arrangements that reflect an adaptive approach are more likely to provide the flexibility that is required. Case studies of the navigation and water protection regimes for the Danube River and the benefit sharing agreement for the Nile River provide the basis for my conclusions.

Thesis Supervisor: Lawrence Susskind
Title: Ford Professor of Urban and Environmental Planning
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I would like to thank my dissertation advisor, Lawrence Susskind, who believed I could pull this off and provided many opportunities for me to learn about different aspects of environmental and public policy and planning. I would also like to thank my PhD Committee members, Balakrishnan Rajagopal, who helped me figure out what I was trying to write about, and David Marks, who generously gave his time when I needed it. Thank you to Peter Rogers for his early support. Many other faculty members at MIT, Harvard, and elsewhere also helped me think critically about my topic. I would like to thank Ken Oye, Howard Raiffa, Max Bazerman, I. William Zartman, Pauline Peters, and Carol Chetkovich for their conversations and critical insights. Without the assistance of Sandy Wellford, Alice Twohig, Lyssia Lamb McDonald, Xenia Kumph, and Nina Tamburello I would never have managed to navigate the infinite halls of MIT. I don’t know how to express my appreciation for Sossi Aroyan, except to hope, as usual, she already knows. When I was finishing my master’s degree the Yale School of Forestry and Environmental Studies and considering applying for a doctoral program Garry Brewer provided some of the best advice I have ever received along the lines of, “Be absolutely sure you know what you want to do and why you want to do it. The process is too painful not to.” He was right.

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Water is sometimes sharp and sometimes strong, sometimes acid and sometimes bitter, sometimes sweet and sometimes thick or thin, sometimes it is seen bringing hurt or pestilence, sometimes health-giving, sometimes poisonous. It suffers change into as many natures as are the different places through which it passes. And as the mirror changes with the colour of its subject, so it alters with the nature of the place, becoming noisome, laxative, astringent, sulfurous, salty, incarnadined, mournful, raging, angry, red, yellow, green, black, blue, greasy, fat or slim. Sometimes it starts a conflagration, sometimes it extinguishes one; is warm and is cold, carries away or sets down, hollows out or builds up, tears or establishes, fills or empties, raises itself or burrows down, speeds or is still; is the cause at times of life or death, or increase or privation, nourishes at times and at others does the contrary; at times has a tang, at times is without savor, sometimes submerging the valleys with great floods.

In time and with water, everything changes. Leonardo da Vinci

Trying to avoid errors stultifies; besides no application of care will avoid all mistakes. Expecting to make errors and pick up after oneself is much more satisfactory. (Wildavsky, 1979):6)
Chapter 1: Governance of International Rivers

Introduction
Cooperation over International Water Resource
Adaptive and Conventional Approaches to International Water Governance
Research Overview

The Eridanos\textsuperscript{2}, a mythical international river, winds its way through a number of countries. Over time communities and industries developed to take advantage of the benefits the river system, such as using the water for drinking, irrigation, waste disposal,

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{Eridanus.png}
\caption{Eridanus\textsuperscript{1}}
\end{figure}

\textsuperscript{1}This image appears in Brown, R. J. (1883). \textit{Eridanus: River and Constellation: A study of the archaic southern asterisms.} London: Longmans, Green and Co. It is originally from a 15th Century German Manuscript.

\textsuperscript{2}The Eridanos (or Eridanus) is a riparian sibling of the Nile (Neilos) and the Danube (Istros) described in Hesiod’s \textit{Theogony} (Brown, 1883; Hesiod & Athanassakis, 2004). In Greek mythology Phaethon fell into the Eridanos after rashly seeking to drive Helios’ sun-chariot across the sky. Phaethon lost control of the chariot’s immortal horses and havoc ensued as the chariot approached Earth, causing streams to run dry and scorching the plains of Africa into desert. Zeus ended the cataclysmic event by hurling a thunderbolt at Phaethon, killing him and causing his body to fall into the Eridanos (Nagy, 1973).
power generation, navigation, recreation, and fishing. However these uses are threatened by a variety of natural and human factors, such as droughts, floods, and pollution. Some of the countries came up with ideas for how they wanted to address the problems, such as building dams and straightening the river channel. Other countries were opposed to their plans, which they thought would worsen problems within their own territories and cause problems for international shipping. So, the countries came together to see if they could come up with some mutually acceptable arrangements. They identified the problems they faced, negotiated an agreement to address the problems and resolve the current conflict, and agreed on mechanisms to implement their agreement. After reaching the agreement, the countries considered the issues resolved and continued to develop their use of the water. However, the agreement does not seem to address the problems now in the way the countries had hoped. Some of the countries no longer support the arrangements they agreed to in the past, yet feel compelled to follow them. Others simply ignore the arrangements they consider irrelevant, leading to tensions. Others still are unable to follow through with the commitments they made earlier. In the meantime, new issues loom on the horizon demanding international cooperation, such as trade agreements and security problems. Unhappy with the outcome of the first agreement, the countries are reluctant to invest time, resources and effort into developing a new agreement they have little confidence will produce better results.

This vignette illustrates some of the problems with the conventional model of sharing international water resources, and for addressing many international environmental issues. Change, uncertainty, and conflict undermine the conventional model’s usefulness.
First, it is difficult to reach an agreement about how to manage the water resources in the first place. For example, negotiations to develop institutional arrangements in the Nile River basin have lasted over ten years and are still ongoing. The issues facing negotiators are complex, involve multiple issues and many stakeholders. It is difficult for scientists, policy-makers and resource managers to reach a shared understanding of the issues for cooperation, including their causes and likely impacts. At the start of negotiations there may be very little information about some of the problems. During and after the negotiations, new information can quickly change how the problems are understood.

Second, different policy-makers think different strategies will better address the problems and will produce better outcomes. For example, one might think the best way to address water shortages is to increase food imports. Another may think building dams is the best way forward. Each option can require different stakeholders to take action, meaning each option has a different distribution of who bears the costs and who reaps the benefits.

Third, predictable change, such as national electoral cycles and population growth, and unpredictable change, such as natural disasters and economic instability, can hamper implementation. Countries may no longer be willing or able to follow through with their commitments. For example, in early navigation agreements Russia committed to keep the Danube delta free of silt so ships could pass. However, a significant increase in farming in the Danube basin increased the sediment load in the river, contributing to the difficulties Russia had with complying. New issues may arise which were not even thought of when the earlier agreement was concluded. For example, a new waterborne pathogen could spread disease or a new technology could make it feasible to extract water from a shared aquifer. In the Danube River water quality was not a concern when
navigation agreements were signed, most recently in 1948. The conventional treaty-
making system is slow to respond to such changes. It often takes a long time, if ever,
before agreed upon policies are evaluated to find out whether or not they are having the
desired impacts. The changes may lead to a whole new round of negotiations, already a
Sisyphean task, but one made even harder if countries have had poor experiences with
the existing agreement.

International water managers are faced with this quandary. Countries need to enter into
cooperative agreements to manage international water resources. At the practical level
this means they need to define who participates in decision-making and water
management, what range of issues will be addressed, the geographic scope of
cooperation, and the role or authority of the implementing organization. However, over
time new information will be identified about the state of the environment, the impacts of
activities on the watershed, technologies and the capacity to take action, and other
relevant stakeholders. As a result the agreement, with all the details the negotiators
worked so hard to define, will need to adjust to these changes. Making the task even more
difficult, in some cases the details of the agreement make it harder to respond to the
changing nature of the social and ecological problems that need to be dealt with over
time. In some cases they do not. This raises the question, “Why and how do efforts to
formulate international water resource arrangements that bring together countries with

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3 Sisyphus was a Greek king, promoter of navigation and commerce, and known to Homer and others as the
craftiest of men. His undoing was his hubris in assuming that he was more clever than Zeus. Sisyphus
shared the news that Zeus had abducted the river god Asopus’ daughter. Zeus punishment compelled
Sisyphus to roll a rock up a steep hill. The rock would inevitably fall back and Sisyphus would have to
begin again.
First this research asks the question, “Do international water management regimes vary in their ability to adjust to changes?” In some rivers countries are able to renegotiate the institutional arrangements they create to respond to the practical questions listed above, who participates, etc. In others, changes in the arrangements are imposed by some participants on the others or negotiations have stalled and no changes are taking place. Based on my in-depth analysis of three cases I find that these water management regimes are all affected by change and all encounter some difficulties in adjusting to them. However, some are better able to adjust to changes than others. There have been three Danube navigation regimes. Two of them have experienced significant problems adjusting to change, while the current regime demonstrates a much higher ability to adjust to change and is currently renegotiating its arrangements. In the Nile ongoing negotiations are trying to develop a benefit sharing regime, but have been unable to finalize a new agreement. In the Danube water protection regime the participants have renegotiated their institutional arrangements several times.

Given these differences, this research then asks, “How do existing international water management agreements affect the ability of the regimes to adjust to change?” To answer this I look at the institutional arrangements in each case and how mechanisms impede and or facilitate changing them. My hypothesis is that regimes with institutional arrangements that take a more adaptive approach are better able to adjust to change than regimes with
institutional arrangements that take a more conventional approach to key policy
questions. What does it mean to take an adaptive approach? The following section will
review the literature and compare the adaptive and conventional approaches to
international water governance. It will then elaborate the propositions guiding this
research and present an overview of the research design and a description of the cases.

Cooperation over International Water Resources

To consider why countries voluntarily enter into cooperative arrangements, imagine a
lake shared by several shorefront businesses, a water supply company, a farmer, a
gardener, and a fishing camp. Each business is dependent on water from the lake,
especially in the later summer, and each business extracts water as they need it. However,
in the late summer the lake level is frequently low enough to reduce water availability to
the businesses. In order to prevent these expensive losses the businesses could get
together and agree to limit their water use earlier in the season so there will be enough
water late in the summer when they need it most. Their cooperation in protecting the late
summer lake levels is a type of benefit they all share in,4 which is unlikely to be provided
without some kind of institutional arrangements. In other words, such cooperative
arrangements provide a public good in the face of individual self-interest (Olson, 1965).5

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4 The benefits from using the lake water are not a true public good because they are rivalrous, one businesses' consumption of the water reduces the water available for the other lakeshore businesses. The lake is more accurately considered a common pool resource. If each business had a designated allocation, or right to a certain quantity of water from the lake, the water could be considered a private good, which is both excludable and rivalrous.
5 Economists name benefits that are non-rivalrous and non-excludable "public goods". Non-excludable means that no one can be excluded from sharing in the benefits of using the resource. For example, everyone living within a region benefits from cleaner air there and cannot be excluded from this benefit. Non-rivalrous means that when one party consumes a good it does not reduce anybody else's ability to
Each business benefits from the agreement, but also bears some cost in abiding by it. The gardener and farmer risk the survival of some of their plantings. The water supplier and the camp have to implement supply restrictions, upsetting their customers. Each business therefore has a long-term interest in protecting the lake level for the future and a short-term interest in using water to meet current demand.

Whenever the agreed upon lake level is reached it triggers the terms of the agreement, restrictions on water use. Each business then has to decide whether to abide by the agreement and incur the immediate cost of cutting back on its water use, or continue to use water as usual. If one business does not abide by the agreement, but the others do, the “cheater” will likely share in the benefits without having incurred the costs from limiting its water use. However, if enough of the businesses make the short-term decision not to abide by the agreement they will all suffer from the low lake levels in the late summer. They will then incur greater losses than they would have if they had followed the agreed upon water restrictions. So, countries enter into cooperative arrangements to manage shared water resources in order to take advantage of possibilities that would not be available without collective action and reduce free-riding behavior.

Hardin used the (historically inaccurate) example of the medieval commons to describe the same phenomenon in which an open access pasture is decimated through self-interested herders (Buck, 1985; Hardin, 1968). Luce and Raiffa use the “prisoner’s dilemma” game to describe the same phenomenon in which individual self-interest can share in the good. One person breathing the cleaner air does not impinge on anyone else’s ability to do so as well.

6 Economists call this the “free-rider” problem.
lead to a Pareto inferior outcome, or an outcome in which each party would prefer a different outcome that does not make the other party worse off (Luce & Raiffa, 1957). In these models the above described businesses are frequently replaced with countries. The models are then used as metaphors to explain the difficulties encountered in getting countries to cooperate on protecting international environmental resources and then comply with their agreed upon arrangements (Ostrom, 1990).

However, cooperation does occur to protect international environmental resources. Evidence of international cooperation can be seen in the proliferation of international environmental agreements since the early 1902 Convention on the Protection of Birds Useful to Agriculture and, more recently, since the 1970s. Regarding international rivers

Whenever difficulties arose, a *modus vivendi* was established, as the only means of avoiding conflicts which a persistent refusal to yield to the necessities of the general interest would have rendered inevitable. All arrangements concerning international rivers were considered as matters of negotiation and recorded in conventions and treaties (Kaeckenbeek, 1962):19).

As described in the Register of International Rivers

Where national boundaries divide a drainage basin, which is the physical unit for assessing and allocating water resources, the countries sharing the resource must engage in negotiations with a view to cooperating on the development and use of the resources for the greatest benefit of all concerned (United Nations Center for Natural Resources Energy and Transport of the Department of Economic and Social Affairs, 1978):1).

There are 263 known international watersheds.7 175 of these are shared by 2 countries. 87 have 3 or more countries in the basin and 4 international river basins contain territories from 10 or more countries: the Danube, the Nile, the Niger, and the Congo.

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7 A watershed is considered international if “any perennial tributary crosses the political boundaries of two or more nations (Wolf, 1999):3).”
Figure 2: International River Basins

In international rivers a number of different relationships are defined by the intersection of political and natural borders.

- Countries’ territories contribute different quantities of water to the overall flow of the river and at different times. Some countries may have only a very small portion of their territory within the watershed and contribute water to the system during only a short part of the year, such as a rainy season. The entire territory of other countries may fall within the watershed and consistently contribute water to the river system throughout the year.

- A country’s location within the watershed determines the extent to which they are susceptible to externalities. When comparing area to geographic position, the Register of International Rivers states, “Perhaps more important is the relative geographic position of a country (i.e. whether it is in a downstream or upstream position, or whether it is a riparian country on a lake or river), and the volume of river flow across the border (United Nations Center for Natural Resources Energy and Transport of the Department of Economic and Social Affairs, 1978):2).” There are upstream countries who do not receive any water into the river system within their territory from other countries (although they may receive water flowing into other river systems within
their territory), midstream countries who both receive water from and transmit water to other countries, and downstream countries who only receive water from other countries, but do not directly pass it on to other countries (although they may contribute water to an international receiving sea).

- The dependency of each country on a particular watershed can also be used to distinguish the countries in the basin. There are countries who have multiple sources of freshwater and, therefore, a particular watershed makes up only a small percentage of their freshwater profile. Others rely on only a single river system to meet all of their freshwater needs.

- Countries vary in their hydrological dependency on external water resources. There are hydrologically independent countries who produce all of their available surface water within their own territory, semi-dependent countries who both produce and receive water, and dependent countries who produce almost none of their available surface water within their national territory. Hydrological dependency takes into consideration a country’s location with the watershed and all of its available freshwater sources.

- Some countries border the main stem of the river, while others, who may also significantly contribute water to the river, are not riparian to it. These two groups are affected very differently by problems in the watershed. There may also be a subbasin group of countries who are riparian to a river that is itself an international tributary of the main river. Some, but not all, of these countries will also be riparian to the main river. Other non-riparian countries may have significant interests in commercial
activities on the river, such as navigation, but have no territory along the river or within its basin.

- Countries also differ in their historical, present, or future capacity to use the water available by abstracting water and removing it from the system, consuming water and returning it to the river, or using the water within the river itself. Some countries have already developed most of their capacity to use the water from a specific watershed. Others may not have developed many existing uses but have considerable potential to develop their use of the system in the future.

These hydrological relationships among countries sharing a river mean that different countries may have varying incentives to cooperate with one another depending on the issue being addressed. Some issues are similar to the lake example described above; all countries stand to benefit from cooperating. For example, introduction of an invasive species can decimate native species throughout the river system. All countries stand to benefit from taking action to control the spread of the invasive species. However, other issues may incur asymmetric costs. For example, an action taken by an upstream country may lead to costs and benefits in a downstream country. The upstream country may not consider the downstream impacts as part of their evaluation of the domestic costs and benefits. Economists refer to such international impacts as externalities. Issues involving externalities can be particularly thorny for international cooperation because an issue, such as reducing pollution may require a country to incur costs from changing their behavior, for example installing waste water treatment plants, but not share in the benefits of cleaner water, which is passed on to downstream countries. Rogers (1993) and
Bernauer (2002) detail some of the actions that cause positive and negative externalities and their effects.

**Table 1 Water Uses and Their Externalities**

<table>
<thead>
<tr>
<th>Type of water use</th>
<th>Impacts on other countries (externalities)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydroelectric power production</td>
<td>Reduces natural flow variability, creates additional peaks, affects migratory species, may hinder or help navigation</td>
</tr>
<tr>
<td>Irrigation</td>
<td>Removes water from the system, reduces availability of water to other users, adds salinity and other pollutants</td>
</tr>
<tr>
<td>Municipal and industrial water use and treatment</td>
<td>Removes water from the system, reduces availability of water to other users, adds pollution</td>
</tr>
<tr>
<td>Flood storage</td>
<td>Provides downstream flood protection</td>
</tr>
<tr>
<td>Navigation</td>
<td>Creates pollution and noise, minimum flow requirement keeps water in the river, reduces flow variability</td>
</tr>
<tr>
<td>Recreational storage</td>
<td>Removes water from the system, reduces availability of water to other users, regulates flow, can create additional peaks</td>
</tr>
<tr>
<td>Ecological maintenance</td>
<td>Protects variability of flows, including low flows and connectivity</td>
</tr>
<tr>
<td>Groundwater development</td>
<td>Removes water from the system, reduces availability of water to other users, reduces stream flows</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Adds sediment, agricultural chemicals and nutrients</td>
</tr>
<tr>
<td>Forestry</td>
<td>Adds sediments and chemicals, increases runoff</td>
</tr>
<tr>
<td>Animal husbandry</td>
<td>Adds pollution, sediment and nutrients</td>
</tr>
<tr>
<td>Filling of wetlands</td>
<td>Reduces ecological carrying capacity, increases magnitude of floods</td>
</tr>
<tr>
<td>Urban development</td>
<td>Increases flooding, adds pollutants</td>
</tr>
<tr>
<td>Mineral deposits</td>
<td>Adds pollution, may disrupt flows</td>
</tr>
<tr>
<td>Fishing</td>
<td>Reduces fish stock</td>
</tr>
</tbody>
</table>

Despite the difficulties, especially in rivers where many countries share the resource, many macro-scale institutional arrangements have been created in international watersheds (Tiffin & Gichuki, 2000). Looking only at the number of existing river basin

---

8 Adapted from (Bernauer, 2002; Rogers, 1993).

9 According to Oye cooperation may be more difficult as the number of parties increases. With more parties there is more likely to be heterogeneity among their interests, which may make it difficult to recognize when a mutuality of interests exists or to coordinate a cooperative action plan once it has been identified. Transaction costs and information costs also rise, as does the risk that one or more parties will free-ride. Cooperation is more likely when states expect to have repeated interactions with one another in multiple rounds of negotiations, i.e. have a long shadow of the future. (Oye, 1986a).
organizations it is clear the number of agreements in international watersheds has proliferated. About half were created or renegotiated since 1990. This is the same number created in all the years before. This adds an additional relationship among countries sharing a river to those listed above, those who participate in multilateral agreements and those that do not.

Table 2 Overview of RBOs in International Watersheds\textsuperscript{10}

<table>
<thead>
<tr>
<th></th>
<th>International Watersheds</th>
<th>Bilateral Watersheds</th>
<th>Multilateral Watersheds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total #</td>
<td>263</td>
<td>175</td>
<td>87</td>
</tr>
<tr>
<td># of Watersheds with RBOs</td>
<td>45\textsuperscript{11}</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>% of Watersheds with RBOs</td>
<td>17%</td>
<td>15%</td>
<td>32%</td>
</tr>
</tbody>
</table>

According to Abate, “The utilization of boundary and transboundary rivers often involves a complex framework of management (Abate, 1994):237).” When developing agreements, negotiators face many practical questions about the kinds of rules they should develop (Wettestad, 1999). For example, who should have access to and participate in policy making? What range of issues should be addressed? Should the

\textsuperscript{10} This is based on the best data currently available from the International Basin Registry (International River Basin Registry, 2009). However, this data should not be considered exhaustive as it has three limitations. (1) It under-represents agreements in developing basins ((Turton, 2005). (2) It over-represents the number of countries in the basin. Some countries have very little territory in the watershed. To compensate for this effect, I omit countries that have less than 1% of their territory in the basin that do not participate in the river basin organization. (3) It considers only “first order” rivers and does not count subbasin agreements in first order basins separately. To account for these issues, I note when they are relevant.

\textsuperscript{11} Out of the 45, there is at least some kind of river basin organization in 15 bilateral basins (9 of these are basins with only 2 countries but 6 more can be considered bilateral basins since the other countries in the basin have less than 1% of their territory in the basin and do not participate) and 12 in multilateral basins that have only bilateral arrangements. 19 river basins have at least one multilateral river basin organization, for a total of 28. Multilateral here means that three or more countries participate in the river basin organization. It does not necessarily mean that all countries in the basin participate. 2 of these, the Danube and Rhine, each have 2 basin-wide multilateral organizations. 4 out of the 19 basins have subbasins with their own multilateral international river basin organization. These are the Sava (in the Danube basin), the Moselle, the Meuse, Lake Constance (in the Rhine basin), Rio Pilcomayo (in the La Plata basin), the Kagera and Lake Victoria (in the Nile basin).
agenda for cooperation consider only development of water resources or should it cover other activities, such as agriculture, energy production and transport? What geographical area should the agreement cover? How binding should commitments be? What should be the role of the watershed authority? How should the relationship between science and politics be organized? What kinds of follow through actions are needed, such as monitoring, verification, and compliance mechanisms? The answers to these questions will constitute rules, which will shape international cooperation over time. Before considering the impact of these arrangements, it is necessary to define a few critical concepts.

North defines institutions as “the rules of the game in a society or...the humanly devised constraints that shape human interactions (North, 1990:3).” When rules, principles, norms and decision-making in a specific issue area create expectations for behavior, Krasner refers to this bundle of institutional arrangements as a regime (Krasner, 1983).

Regimes can be defined as sets of implicit or explicit principles, norms, rules and decision-making procedures around which actors’ expectations converge in a given area of international relations. Principles are beliefs of fact, causation, and rectitude. Norms are standards of behavior defined in terms of rights and obligations. Rules are specific prescriptions or proscriptions for action. Decision-making procedures are prevailing practices for making and implementing collective choice (Krasner, 1983:2).

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12 According to the European Commission (European Commission DG: Regional Policy, 2000), institutional arrangements...form the conceptual context for the general notions of planning by the persons involved from the very beginning of a planning process. This refers to:

- the scale of perception of space,
- the geographic area of concern,
- the issues considered,
- the objectives given,
- the goals committed to, and
- the strategies possible.
Similarly, Young defines regimes as “recognized patterns of behavior or practice around which expectations converge (Young, 1983):93).”\(^\text{13}\) Institutional arrangements and regimes make it easier for actors to reach agreements about new arrangements, for example by creating bargaining forums (Levy, Keohane, & Haas, 1993) or relying on the principle of reciprocity or mutual obligation (Krasner, 1983).\(^\text{14}\) Institutions are then the result of international negotiations, but they also shape future cooperation (Giddens, 1979; W. Powell, DiMaggio, Paul J., 1991).\(^\text{15}\)

In order for institutional arrangements to provide a basis for expectations, they must be relatively stable. For example, “By ‘institutions’ we mean persistent and connected sets of rules and practices that prescribe behavioral roles, constrain activity, and shape expectation (Keohane, Haas, & Levy, 1993):4-5) (emphasis added).” Krasner also considers regimes relatively inertial. “Regimes must be understood as something more than temporary arrangements that change with every shift in power or interests (Krasner, 1983):2).” Presumably if regimes change too frequently they will not allow participants to develop expectations for behavior and will lose their usefulness.\(^\text{16}\) Instead, because

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\(^{13}\) Young considers this definition slightly different, yet compatible with Krasner’s (Young, 1983).

\(^{14}\) Actors include individuals, states, intergovernmental organizations, non-governmental organizations, professional associations and regulatory bodies who interact with each other on central policy issues (Hoffman, 2004). Unlike realist approaches, institutional theory sees actors as influenced and constrained by institutions and as designers of new institutions (Barley, 1997; Meyer & Rowan, 1977; Ness, 1988; W. Powell, DiMaggio, Paul J., 1991). The interactions of participants within an organizational field (Scott, 1995) or action arena (Ostrom, 1999) are constrained by the working rules and norms governing action (Granovetter, 1985; North, 1990).

\(^{15}\) Similarly, the literature on organizational change characterizes the larger institutional environment as both an enabling medium for international negotiations and an outcome shaped by them (Giddens, 1979; W. Powell, DiMaggio, Paul J., 1991).

\(^{16}\) According to North stable rules are beneficial because they allow each actor (person, state or organization) to engage in economic activity without first having to figure out what are the rules governing each transaction (North, 1990). Specific regime activities also serve to reinforce expectations. These include data gathering, dissemination and regular reporting, disclosure and notification and capacity building. When countries comply with these expected activities, which is often not difficult to do, their
regimes make it easier for participants to interact, they tend to reinforce stability and the status quo whether they are efficient or not (unlike evolutionary theories in which inefficient institutions die off over time). Contributing to institutional inertia, once negotiators invest the time and expertise into creating arrangements, they tend to become proponents of the existing arrangements and compliance with them. For example, Ostrom says, “If individuals find rules that work relatively well, they may have little motivation to continue the costly process of searching for rules that will work even better (Ostrom, 1990):211.”

At the same time institutional arrangements do need to change to fit new circumstances. “Regimes do not become static constructs even after they are fully articulated. Rather, they undergo continuous transformation in response to their own inner dynamics as well as to changes in their political, economic, and social environments (Young, 1983):106-107).” Since the writing of the Qur’an in the 7th century many new issues have arisen, such as questions about ethical conduct in complex financial transactions. Today, Muslim scholars interpret and apply the Qur’an’s guidance to such issues. Similarly, United States legislation and court proceedings interpret how freedom of speech, protected in the 18th century Bill of Rights, should be applied to questions about internet censorship.

There is therefore a tension between the role of institutional arrangements in shaping expectations for behavior. On one hand they are inertial, provide a stable basis for expectations even under changing circumstances and facilitate international cooperation. On the other hand institutions are dynamic and must adjust to changing circumstances.

participation in the regime confers legitimacy on their actions (A. Chayes & Chayes, 1993, 1995; Waterbury, 2002).
When institutional arrangements change so much that they give rise to different expectations for behavior, the entire regime can be considered changed (Krasner, 1983). A regime change can be identified when there are significant changes in the rights and rules, social choice mechanisms, and compliance mechanisms (Young, 1983). The point at which this happens and whether or not the changes really constitute a regime change is to some extent subjective (Krasner, 1983). The difficulty in identifying a regime change is illustrated by Young’s philosophical question asking how many Chevrolet parts need to be added to a Ford before the Ford is transformed into a Chevrolet (Young, 1983).

Young identifies several mechanisms causing regimes to change. Exogenous developments, such as changes in technology, can impact regimes. However, regimes can also contribute to bringing about their own transformation, for example by promoting changes in the underlying structures of power or as a result of their own internal contradictions (Young, 1983). If institutional arrangements cannot be adjusted to contemporary situations, instead of facilitating cooperation, they become barriers to cooperation.

For example, in the United States Maine lobster fishery technical advances in the 19th century led to the development of a live lobster industry, which competed with the existing lobster canning industry. The presence of a new group of stakeholders significantly changed the lobster regulation regime. As the lobster population began to decline the canning industry successfully lobbied for winter restrictions on catching small
lobsters, which would cost it very little but have a negative impact on the budding live lobster industry. However, over time it became apparent that these regulations were insufficient to protect the Maine lobster population, but the canning industry refused to consider other changes. At this point the live lobster industry was able to push through regulations favoring its own fishing practices and which also contributed to putting the canning industry out of business (Acheson, 1997; Acheson & Knight, 2000). In the international arena dramatic events, such as a war or revolution, may force a regime change. In the case of apartheid in South Africa black voters were excluded from the political process. Resistance, violent protests and economic collapse eventually forced an end to apartheid. In the case of the Danube, the build up to World War II increased Germany's control over much of the river and brought an end to the existing navigation regime. After the war the Soviet Union was able to limit participation in the new navigation regime and force through new institutional arrangements.

In other cases the participants cooperatively negotiate new arrangements. In the Maine lobster example, in the 1990s a zone management law gave fishermen more authority to develop regulations, which they have used to develop different regulations appropriate to individual lobster fishing zones (Acheson, 1997). In another example the 1985 Vienna Convention for the Protection of the Ozone Layer affirmed the importance of protecting the ozone layer, but did not regulate the use or production of ozone depleting substances, including chlorofluorocarbons (CFCs). In response to new information identifying the depleted ozone area in the stratosphere over the Southern Hemisphere, the parties

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17 These regulations protected spawning females, juveniles and large adults. Later regulations also require traps with vents allowing small lobsters to escape.
negotiated a timetable to reduce CFCs, contained in the 987 Montreal Protocol on Substances that Deplete the Ozone Layer. Since then the participants have further strengthened regulations on other ozone depleting substances and provided assistance to help developing countries comply with the regulations (Parson, 1993).

Why are participants able to renegotiate their institutional arrangements in some cases, but not in others? Referring to economic regimes North writes

> The key to continuous incremental changes is institutional contexts that make possible new bargains and compromises between the players...If such an institutional framework has not evolved, the parties to an exchange may not have a framework to settle disputes, the potential gains from exchange cannot be realized, and entrepreneurs...may attempt to form a coalition of groups to break out of the deadlock by strikes, violence, and other means (North, 1990):89-90).

North calls the features that enable change "...adaptively efficient characteristics of the institutional matrix (both the formal rules and the informal constraints embodied in attitudes and values) (North, 1990):136)." Lacking adaptive institutional features, North says deadlock results and the rules are subject to more dramatic change. However, North does not clearly specify what exactly are essential adaptive features (North, 1990).18

To summarize so far, collective action is needed to protect international water and other environmental resources. Countries create institutions, which then create expectations for behavior. At the practical level this means countries need to answer practical questions about who participates in water management decision-making, what range of issues are addressed, the geographic scope of their cooperation, and the role or authority of the

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18 Such gaps leave regime theory open to criticism, such as that by Abbott. "Regime theory deals with institutions at such a general level that it has little to say about the particular institutional arrangements that organize international politics (Abbott, 1998):6)."
implementing organization. However, once created the regimes are constantly responding to changing circumstances. We can therefore conceptualize regime development as an iterative cycle of negotiations, which are influenced by existing institutional arrangements and also adapt these to new circumstances.

**Figure 3 Regime Development**

![Diagram showing institutional arrangements at time 1 leading to negotiation, followed by institutional arrangements at time 2 leading back to negotiation.]

Institutional arrangements can make it easier for actors to renegotiate their arrangements. However, institutions also tend to reinforce the status quo. In some cases the details of agreements create obstacles to adjusting to future changes, in some cases they facilitate adjusting to changes. Regimes therefore vary in their ability to adjust to changes. This raises the question, "Why and how do efforts to formulate international water resource arrangements that bring together countries with common resource management concerns but conflicting interests, limit or support needed adjustments?" Some preliminary research suggests adaptive institutional features can facilitate adjusting to change. The next section will use the literature to introduce adaptive governance, an approach that expects change and sees uncertainty and conflict as inherent to environmental decision-making, and then compare the adaptive approach to the conventional environmental governance approach.

**Adaptive and Conventional Approaches to International Water Governance**
The adaptive approach to governing environmental resources is based on the
acknowledgement that human understanding of natural systems is inherently imperfect.
Therefore, policies should be planned and implemented as experiments that investigate
the ecosystems’ behavior (Lee, 1989). One of adaptive management’s strongest
advocates, Holling defines adaptive management as learning by judicious doing and
emphasizes that policy is experimental (Holling, 1978). A component of and precursor to
adaptive governance, adaptive management starts from the premise that prediction,
management, and control of the social and ecological systems are unlikely, and perhaps
impossible. Instead, the system or target of management interventions is considered a
moving target, always changing (Scoones, 1999). While “adaptive policies” deal more
with individual policies or instruments, adaptive management deals with a broader set of
policies directed at an issue (TERI & IISD, 2006). According to Dietz, Ostrom and Stern
adaptive governance further emphasizes the role of change and conflict in social and
natural systems.

... the idea of governance conveys the difficulty of control, the need to proceed in the face of substantial uncertainty, and the importance of dealing with diversity and reconciling conflict among people and groups who differ in values, interests, perspectives, power, and the kinds of information they bring to situations. Effective environmental governance requires an understanding of both environmental systems and human-environment interactions (Dietz, Ostrom, & Stern, 2003:1911, fn.28).

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19 (TERI & IISD, 2006) presents a useful review of the evolution of the term “adaptive policy”. Kai Lee (1993) appears to have coined the term in his discussion of how to integrate science and politics in salmon and hydropower development in the USA (TERI & IISD, 2006).

20 An earlier use of the phrase ‘adaptive governance’ to the environment appears in a document prepared for UNEP (Government of Finland, UNEP, & PAP/RAC, 1998). The report does not define the term but considers an adaptive approach, in which incremental actions are tested, essential for success of integrated coastal management. A 2000 conference roundtable discussion (Brunner & Steelman, 2000) led to an early articulation of adaptive governance and how it addresses critical environmental policy questions. In their later book (Brunner et al., 2005) the authors define adaptive governance as a pattern of practice.
Using an adaptive approach policies no longer aim to develop a single optimal policy for managing the environment. Instead, they strive to maintain ecosystem resilience and avoid catastrophic and irreversible ‘flips’ to other equilibrium states (Holling, 2001). The adaptive approach also requires explicit arrangements to encourage learning and policy adjustment. Policy changes are viewed as an inevitable part of a larger process and can therefore be planned for, instead of repeatedly occurring in an ad hoc fashion (W. E. Walker & Marchau, 2003). In the field of sustainability science Berkes, Colding and Folke developed a model of Holling’s adaptive renewal cycle to describe the dynamics of coupled social and natural systems (Berkes, Colding, & Folke, 2003b; Holling, 2001). They describe cycles of growth, conservation, release and reorganization in all such systems. Systems that are resilient can learn and will reorganize themselves over time. In systems that are not resilient tensions build up and produce more dramatic changes. The resilient and non-resilient resource management regimes vary in their ability to adjust to changes.

Based on a review of the literature comparing the adaptive and conventional approaches to governance, some of their critical differences are how they address uncertainty and conflict. The next section therefore focuses on these differences. A complete literature review informing this section can be found in Appendix 1. Following the discussion the main points are summarized in Table 3.

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21 The concept of resilience was first introduced by Holling (1973). Ecosystem resilience is defined by the Resilience Alliance as “the capacity of an ecosystem to tolerate disturbance without collapsing into a qualitatively different state that is controlled by a different set of processes (Resilience Alliance, 2010).”

22 In particular the discussion of adaptive governance relies heavily on (Walters, 1986).
Uncertainty

Stable, Linear System Dynamics or Dynamic, Integrated and Unpredictable

The conventional approach views the relationships underlying the natural system as linear and stable. Therefore, what is known about one component of the system can be extrapolated to predict how the system will behave across other scales. Scientists strive to understand how the natural system behaves and model it based on their understanding of its components. In the conventional approach to environmental governance the natural state of the environment is thought of as being in a stable equilibrium. For example, a river’s discharge would be assumed to follow a normal or bell-curved distribution in which its discharge is usually close to a long term average. The discharge of rivers varies seasonally, so the frequency of low flows and high flows should also follow a normal distribution. Extreme high and extreme low flows are considered relatively rare and unpredictable. Environmental change is seen as a modern disruption of traditional systems in which humans previously lived in harmony with the environment (Dietz et al., 2003; Scoones, 1999).\textsuperscript{23} Theories of resource limits and carrying capacities reinforce the idea of feedback mechanisms that facilitate homeostasis and stability. These metaphors inform how the environment is evaluated, help define what is considered a healthy or distressed system, identify particular causes and actors as responsible for degradation,

\textsuperscript{23} Scoones identifies a static approach to natural resources and the environment in his review of the early work by environmental economists on issues of rational allocation of resources (Markandya & Richardson, 1992), ecological economists on how economic and ecological systems co-evolve (Norgaard, 1994), and institutional economists on collective action problems and the management of common pool resources (Ostrom, 1990).
and are used to justify particular policy interventions to prevent rapid fluctuations and limit uncertainty (Folke, Hahn, Olsson, & Norberg, 2005; Scoones, 1999). In the conventional approach scientists also assume the natural system behaves predictably according to linear relationships and can be expected to respond to disturbance in predictable ways. So, what is known about how one component of the system behaves can be extrapolated to model how the entire system can be expected to behave across much larger spatial and temporal scales. 24

In contrast, the adaptive approach expect the natural and social system to behave in non-linear and dynamic ways. Therefore, an integrated approach is needed to understand the whole system, which is thought of as more than the sum of its parts. The adaptive approach sees the apparent stability of the natural system as illusory and actually masking underlying variation, which is visible only over large areas and long time periods. In comparison to the conventional governance approach’s focus on maintaining a river’s average annual or seasonal flows, the adaptive approach focuses on the river’s variability across space and time. For example, Hurst studied records of the Nile’s floods from a period of 800 years and noticed what David Hume called that which is unusual and extraordinary (Hume, Green, & Grose, 1890). 25 Hurst noticed the frequency of Nile

24 The fractal organization of rivers is one example of why one could expect a small part of the river system to be representative of the larger system. For example, there is no statistical difference between the pattern of branching of any one arbitrary scale of the river basin, such as the pattern of a small tributary, and another, such as the pattern of the entire basin. There is also a fairly constant relationship between how frequently stream segments of particular lengths are found in different river basins. The relationship between the size of a drainage area and its probability distribution across different rivers is also fairly constant (Bras, 2009).

25 Thus as the nature of a river consists in the motion and change of parts, tho’ in less than four and twenty hours these be totally alter’d; this hinders not the river from continuing the same during several ages. What is natural and essential to any thing is, in a manner, expected; and what is
floods and droughts did not have a normal distribution. Instead of usually being near an average (the peak of the bell curve), the natural system was usually significantly wetter or dryer. Mandelbrot and Wallis (1968) named this tendency the Noah effect. 26 The Noah effect provided evidence against focusing on protecting average flows and, instead, focusing on variability.

Hurst also observed predictable groupings, in which years with high precipitation and high floods tended to be followed by years with high flood years and years with low precipitation and low floods tended to be followed by years with low floods (Hurst, 1951). These observations indicated the Nile system fluctuates according to scales much longer than a year. Mandelbrot and Wallis (1968) described this tendency for persistence followed by sudden change as the “Joseph effect (Mandelbrot & Wallis, 1968).” 27 The Noah and Joseph effects are significant because they provide evidence against the conventional perception of a fairly stable “natural” state. By comparing predictions, based on the conventional understanding, to the actual record, Bras and Rodríguez-Iturbe find the conventional approach leads to systematic underprediction of the duration and severity of extreme events (Bras & Rodríguez-Iturbe, 1993). The adaptive approach tries build on an understanding of the natural system as non-linear and dynamic, in order to improve knowledge about how it actually behaves. It assumes change and its impacts as a given (Berkes, Colding, & Folke, 2003a).

26 Eltahir suggests that the Noah Effect in the Nile River basin is caused by variations in sea surface temperatures, El Niño, and other climatic variables (Eltahir, 1996).

27 According to the Bible, Joseph interpreted the Pharaoh’s dream of seven fat cows eaten by seven lean cows as a prediction of seven years of food surplus followed by seven years of famine.
Building on Schumpeter's concept of creative destruction (Schumpeter, 1942), Walters (1986), Holling and others (Berkes et al., 2003b) have documented cyclic change in natural and social systems. An initial period of finding the resource and beginning to exploit it is followed by a period of growth in resource use. However, eventually the resource reaches a period of declining productivity, which is followed by evolutionary development and renewal. Berkes et al. give an example of a forest system in which a forest stand grows and matures, until a disturbance, such as fire, releases the nutrients, which return to the forest floor and provide the basis for a new cycle of growth (Berkes et al., 2003a). Other complex systems, including policy-making, can also be understood as undergoing an iterative processes (Holling, 1987, 1992). In international watersheds, which have been used and managed throughout history, the cycle can be broken down into phases of (1) existing institutional constraints on resource management and policy-making; (2) crisis or upheaval, during which a policy issue is identified as requiring collective action; (3) a negotiation process; and (4) a revised set of institutional constraints and organizational capabilities. The coupled social-ecological system is always in a dynamic state, not a stable equilibrium.

In contrast to the conventional reductionist approach, scientists do not expect to resolve uncertainty about how the larger system will behave by putting together understanding about its components. The adaptive approach does not think uncertainty about how the larger system will behave in response to a policy intervention can be resolved by studying the effects on a component of the system and then extrapolating findings to larger
temporal and spatial scales. Instead, the adaptive approach seeks to integrate understanding across different scales, but expects that system dynamics can interact in surprising ways. Therefore, different spatial or temporal scales may be appropriate depending on the issue under investigation. For example, in addition to the watershed scale, other social and economic scales may be important for understanding the problem (Moench, Dixit, Janakarajan, Rathore, & Mudrakartha, 2003). However, most important will be experiential knowledge.

Scientific Consensus or Dialogue Among Stakeholders

It can be difficult for scientists to reach a consensus about how the socio-ecological system behaves and will to respond to management polices. Scientists collect different kinds of data, using different methods, over different intervals, and over different periods of time. For example some data sets on an international river may include information about historical patterns of land use, demographics and their effects on the watershed, while others include only information on rainfall and a few pollutants. The conventional approach privileges the input of scientific and technical experts and expects they will be able to reach a consensus after pursuing sufficient basic research. Knowledge creation is often dominated by government departments, focused on specific, narrow mandates. The perspectives of local resource user rarely enter the policy-making process (Moench et al., 2003).
The adaptive approach expects there will be disagreement among scientists, which will include other stakeholders who collect information about how the system behaves. In international water governance typical stakeholders include nations, intergovernmental organizations, international non-governmental organizations, such as the International Water Management Institute, local civil society organizations, international funding organizations, such as the World Bank, professional associations, and networks of academics. International secretariats of international river basin organizations also participate. According to the adaptive approach, the very act of defining and investigating a problem becomes a dialogue among stakeholders about how the system should be understood. The adaptive approach does not expect the stakeholders will be able to reach consensus, but does expect them to use what they know to develop alternative options for managing the system. The goal is not to seek a single optimal outcome, but rather to “...gain consensus about how large is the range of future outcomes and how deep are the conflicts about which outcomes would be best, and...to engender a healthy frustration about the state of affairs (Walters, 1986):335).” However, Walters cautions that typically learning rates are discouragingly slow, in particular because management policies are so risk-averse (Walters, 1986).

**Experimental and Experiential Knowledge**

The conventional approach to uncertainty is to conduct more basic research to try to understand and predict how the natural system will behave in response to different policy options. Such research can then be presented later to policy-makers. Scientists tend to
downplay uncertainty because they do not think “policymakers can be trusted to deal directly with uncertainty (Walters, 1986):343).” Instead, they try to present information to allow policy-makers to develop an optimal resource management policy, preventing further degradation and decline of value from resource use. Resource managers then tend to defer implementing any management policies likely to have significant impacts on the ecosystem until scientists produce information about its key processes and relationships. Instead, resource managers pursue conservative management strategies to maintain the system’s productivity and avoid disturbing the environment as much as possible.

In contrast the adaptive approach sees environmental governance as a continual learning process, in which research and policy activities cannot be separated. It recognizes the limits of what can be known through experimental knowledge. According to the adaptive approach, the behavior of a relatively undisturbed system can be very different than the behavior of an ecosystem under a management policy. So, deferring the decision in order to accumulate data does not necessarily produce valid or useful knowledge. The adaptive approach recognizes that perfect information does not exist, but that managers must make decisions in face of uncertainties. Environmental management policies are seen as anthropogenic interventions, site-specific experiments, that provide new information to test predictions and improve knowledge about the system. Natural resource policies as essentially gambles that provide a way to test hypotheses about human-ecosystem dynamics and learn, which is an explicit objective of policies.
Once implementation is underway the system’s response can be monitored and policies adjusted as needed to address undesirable outcomes. Scientists therefore need to clearly articulate to policy-makers their assumptions, predictions, and areas of uncertainty so mistakes and surprises can be detected and used for learning. Policy implementation is then part of the process of improving knowledge about the system. This means decisions need to be made and policies implemented even without a full understanding of how the system will respond. According to the adaptive approach, policy makers cannot be overly cautious and wait for basic science, as much of the uncertainty can only be resolved by monitoring the effects of implementation.

Optimal State or Resilience: Unexpected or Expected Change

Conventionally, most efforts are directed at reaching the best agreement possible that are likely to lead to desirable outcomes. Once an agreement is reached, the issues are considered resolved. Agreed upon policies may not be evaluated for a long time to find out whether or not it is having the desired impacts. However, actual implementation and results can vary considerable from what was expected when the policy was planned. For example, new countries or new interest groups within countries may want to join the effort, bringing their own ideas about policy objectives and implementation. New environmental issues may be identified that require collective attention. In the international arena every country has the liberty to decide which agreements they will be bound by. If all countries in the watershed are included in negotiations, the agreement will likely reflect only the most that the least willing party will agree to, known as a
lowest common denominator agreement (L. E. Susskind, 1994). As a result, countries may reach an agreement, but later find that the actions they agreed to are insufficient to tackle the environmental problem, which brought them together in the first place. Or, national governments may be unable to secure changes in actual practices from resource managers. A change in a country’s government or economy may also lead to a change in their interests, or render them incapable or unwilling to follow through with their commitments. Such outcomes contribute to skepticism about the effectiveness of institutional arrangements to manage international water resources (Bernauer, 1997). The conventional approach views such implementation issues as one-time, unpredictable surprises and uses ad-hoc strategies to address them as best as possible. In some cases a particular group of stakeholders may be assigned the fault for failing to implement the agreement properly. These stakeholders may contest how much they are to blame and resist changing how they implement the agreement. This is one reason why even if policies are recognized as flawed, if new issues are identified, or if the objectives for cooperation change, it can still be very difficult to change approaches and negotiate a new policy.

In comparison, the adaptive approach views ad-hoc strategies to address specific changes “miss[ed] opportunities to adapt to emergent trends (Leach, 2008):1791)”. Efforts to establish a stable socio-ecological system are considered increasing the vulnerability of the entire system to cataclysmic change and reducing the productivity of ecosystems (Folke et al., 2005). The adaptive approach expects change. As mentioned above policies are considered experiments and implementing resource management policies is viewed as
a continuous process of evaluation and re-design. Therefore, mechanisms for monitoring and feedback need to be designed from the outset to evaluate how the system responds. Policies need to be flexible to incorporate these results and reassess policies. Even if policies have the planned impacts, the parties’ interests may change. Therefore, institutional arrangements need to include opportunities to address changing interests.

According to Benvenisti

This is particularly important in the sphere of freshwater management. Adjustment in shares of fresh water is often necessary because relative demands for water change constantly, reflecting economic and social developments in the member states, while the supply side also fluctuates with unpredictable droughts or floods (Benvenisti, 2002:144-5).

The critical difference between the two governance approaches is that the adaptive approach considers institutional arrangement an opportunity to manage, not resolve, the parties’ differences. Repeated facilitated dialogues are one mechanism to encourage discussion about changing interests. Another mechanism that can provide flexibility is for the parties to focus on establishing principles for cooperation and leave specific obligations to be decided by future authorities assigned responsibility for implementation (Benvenisti, 2002). Policies can also include contingent clauses. Contingencies take advantage of different expectations for the future, information asymmetries, and different risk preferences. Parties to an agreement essentially bet on what they expect will happen. For example, two countries who are trying to reach an agreement on building a new hydropower dam may disagree on the likely extent of flooding. Instead of arguing over alternative compensation options they can agree on a scale of acceptable compensation for varying levels of flooding. After the dam is in operation for a specified period of time
the parties can assess the actual extent of flooding and determine the appropriate amount of compensation.

Conflict

Minimize Conflict or Manage Conflict

The conventional approach considers conflict between stakeholders a barrier to environmental governance. Using a conventional approach international negotiations typically seek to emphasize commonalities and minimize differences. Particularly when the negotiating parties have a history of poor relations or little trust in one another, they will avoid areas on which they differ as much as possible. When contentious issues have to be addressed, the negotiations strive to reach an agreement which will resolve the conflict once and for all. For example, negotiations between an upstream and downstream country may focus on shared interests, such as providing clean drinking water to their populations. If they disagree over how much water each country can use, they may try to negotiate a specific quantity of water each country is entitled to use or designate specific tributaries each country is entitled to use for its own purposes. In either arrangement the dispute is considered resolved. If they cannot reach an agreement on a contentious issue, they parties may narrow the agreement to exclude that issue.

The adaptive approach views policies as the result of a noisy, political debate among scientific experts, policy-makers, resources managers and users, in which conflict is as an
inherent part. While advising parties to focus on common interests and goals (Brunner et al., 2005; Dietz et al., 2003; Folke et al., 2005; Nooteboom, 2006), the adaptive approach also considers differences between the parties a potential source of value to reaching an integrative agreement (Boyle, Kay, & Pond, 2001; Brunner et al., 2005). In an integrative approach negotiators share information about their interests and needs (Lewicki, Barry, & Saunders, 2010). They also identify differences, for example in the resources they bring to the table, how they value the issues, their expectations for the future, their risk preferences, and time preferences. The negotiators can then use these differences to trade across their preferences and reach an agreement. For example, one party might come to the negotiation demanding increased connection between the river and its floodplains and wetlands. Another party might demand the river banks be stabilized and the river constrained to a narrow channel. These positions appear to be in conflict and, using a conventional approach, might be avoided during the negotiation to avoid escalating a dispute. Using an adaptive approach the parties could discuss their interests and find one is more interested in flood control during high flow periods while the other is more interested in maintaining navigation during low flow periods. The parties could then use this information to reach an agreement in which water is allowed to flows into a broader channel and historic floodplains during high flow periods, but constrained to a narrower channel during low flow periods. In such ways the negotiators take advantage of tradeoffs. Therefore, adaptive approaches try to use mechanisms for clarifying and understanding interests, such as water scenario planning to evaluate multiple alternative water development scenarios (Lankford, Merrey, Cour, & Hepworth, 2007). The process
of discovering differences becomes an opportunity to integrate preferences across a broader array of issues or make side payments to compensate parties for concessions.

Table 3 Comparison of How the Conventional and Adaptive Approaches to Governance Address Uncertainty and Conflict

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<tr>
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<th>Conventional Approach</th>
<th>Adaptive Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Uncertainty</strong></td>
<td>Consider relationships between parts underlying natural system behavior linear and stable; can use understanding of system components to scale up understanding across larger spatial and temporal scales</td>
<td>Consider relationships underlying natural and social system behavior non-linear and dynamic, use integrated approach to understand whole system</td>
</tr>
<tr>
<td></td>
<td>Privilege input from scientists and technical experts in policy-making; Seek scientific consensus to resolve uncertainty about system behavior and expected policy outcomes</td>
<td>Include ongoing participation from a range of stakeholders in policy-making; Encourage a dialogue among stakeholders about system behavior and possible policy outcomes</td>
</tr>
<tr>
<td></td>
<td>Seek to minimize uncertainty about natural system behavior through experimental research</td>
<td>Seek to reduce uncertainty about natural and social system by implementing projects and using experiential (in addition to experimental) knowledge to test hypotheses</td>
</tr>
<tr>
<td></td>
<td>Seek to model an optimal policy to maintain a productive and stable equilibrium; Address change on an ad-hoc basis</td>
<td>Seek to achieve a resilient state in which natural and social system can adjust to change across a range of conditions; Expect change, build in monitoring, contingent plans, re-assessment and review</td>
</tr>
<tr>
<td><strong>Conflict</strong></td>
<td>Pursue policy options that minimize conflict among stakeholders</td>
<td>Pursue policies to manage tensions among stakeholders, but also highlight difficult tradeoffs among alternative policies</td>
</tr>
</tbody>
</table>

Much of conventional policy-making in watersheds has tried to resolve uncertainty by producing precise predictions of how system features interact, management policies
aimed at avoiding disruptions to the social-ecological system, implementation based on stable preferences, and policies that remain static over time. However, international watersheds are dynamic, complex systems (Costanza, Wainger, Folke, & Mäler, 1993). Conventional institutional arrangements are unable to accommodate these the variability and changing nature of elements of the natural system or the social system, such as changing preferences for particular policies. Adaptive governance takes on conventional attitudes to uncertainty and conflict by (1) using an integrated approach to understanding the social-ecological system; (2) making the plurality of interests and values explicit among diverse stakeholders (Lessard, 1998; McKelvey, 2001; Norton, 2001; Walters, 1986); and (3) beginning with the problems identified by stakeholders to create an expedient policy-making process, implement policies and building in opportunities for adjusting them (Brunner et al., 2005; Lankford et al., 2007). As Waterbury remarked, “Any cooperative regime, if it is to survive, must be open to periodic renegotiation and adjustment as the cost-benefit analysis of each of the parties to the regime changes (Waterbury, 2002):34).” Unlike Sisyphus, environmental negotiators and managers do not have to start over from scratch each time social preferences or environmental conditions change.

Research Overview

Research Question
My broad research question is, “Why and how do efforts to formulate international water resource arrangements that bring together countries with common resource management concerns but conflicting interests, limit or support needed adjustments?”

My dependent variable is a regime’s ability to adjust to change. I evaluate this variable by evaluating whether regimes changed over time through cooperative negotiations in which the participants redefined their institutional arrangements, or whether regime changes were forced through by only some of the participants or the negotiations have stalled. Given the difficulty in identifying when a regime has changed, this is a subjective approach. However, by comparing the institutional arrangements for multilateral cooperation over time it is possible to distinguish a Ford from a Chevrolet, or one regime from another. Looking at how a regime has changed over time also runs the risk of privileging current regimes, which may currently appear able to adjust to changes but in the future prove to have trouble negotiating adjustments to change, have changes forced through or stall negotiations. Lacking a crystal ball to provide insight into the future, this research tries to address this weakness by carefully considering the current regime’s negotiations and activities. However, for future research it would be useful to develop an improved metric for evaluating a regime’s ability to adjust to change. Based on my in-depth analysis of three cases I find that all water management regimes are affected by change and all regimes encounter some difficulties in adjusting. However, some regimes are better able to adjust to changes than others.

Research Propositions
This research investigates whether an adaptive approach to the governance of international water resources, if implemented successfully, can overcome the obstacles or traps that usually make it hard for complex international water institutions to cope with the challenges they were intended to address. I evaluate whether or not an adaptive approach is being used by looking at the institutional arrangements used by each regime to see which mechanisms impede and which seem to facilitate adjusting to change. My hypothesis is that regimes with institutional arrangements that take a more adaptive approach to addressing uncertainty and conflict are better able to adjust to changes than regimes with institutional arrangements that take a more conventional approach to key policy questions. Based on the above literature review comparing adaptive and conventional governance approaches (and the more detailed review included in Appendix 1), I define five propositions in connection to uncertainty and conflict. Based on a literature review of institutional arrangements for international water resources, included in Appendix 2, I specify institutional arrangements that can be considered more conducive to an adaptive approach to evaluate these propositions. To evaluate these propositions I focus on institutional arrangements that answer four practical questions policy-makers face (Wettestad, 1999): (1) Who should have access to and participate in policy-making?; (2) What range of issues should be addressed? Should all basin development activities that have any impact on the water system be included, or should the agreement focus only on water resources development?; (3) What geographic area should the agreement cover?; and (4) What should be the authority of the river basin organization or other implementing organization?
**Dynamic Systems Proposition:** Arrangements that integrate understanding of the whole system and its dynamic components will facilitate adjusting to change, as compared to arrangements that view the system as stable and seek to understand it through its component parts. Institutional arrangements that use an adaptive approach will include all of the relevant hydrologic system. For navigation this would include all navigable parts of the river. For environmental protection and benefit sharing this would include all of the watershed.

**Stakeholders Proposition:** Arrangements that include ongoing participation from a range of stakeholders in policy-making and encourage a dialogue among stakeholders about system behavior and possible policy outcomes will facilitate adjusting to change, as compared to arrangements that privilege input from scientists and technical experts in policy-making and seek scientific consensus to resolve uncertainty about system behavior and expected policy outcomes. Institutional arrangements that use an adaptive approach will include participants from all countries in the relevant hydrologic system, and depending on the issue may include other countries with significant interests. Adaptive arrangements will also include participation from different kinds of stakeholders, not only key government delegates. For example, participants from academia, professional groups, and non-governmental organizations would be expected to participate in expert working groups and provide input into evaluating policy options.
**Tensions and Tradeoffs Proposition:** Arrangements that seek to pursue policies that manage tensions among stakeholders, but also highlight difficult tradeoffs among alternative policies will facilitate adjusting to change, as compared to arrangements that seek to pursue policy options that minimize conflict among stakeholders. Adaptive arrangements will focus on a broad range of issues, not only the few issues on which countries agree. They may also include strategies to help the participants explore tradeoffs between policy options, for example through use of facilitated dialogues. Adaptive arrangements could also provide for implementation at multiple scales so, for example, conflicts could be addressed where they are most relevant.

**Contingency Proposition:** Arrangements that seek to achieve a resilient state and expect change include plans for how to deal with different possible future outcomes will facilitate adjusting to change, as compared to arrangements that seek to model an optimal policy to maintain a productive and stable equilibrium and address change on an ad-hoc basis. Adaptive arrangements include contingent agreements and review periods. Adaptive arrangements could also provide flexibility by empowering the implementing authority to review operating policies, shape and change them, without requiring additional ratification processes. For example, according to Benvenisti:

> When designing institutional arrangements, emphasis should not be placed on minutely defined and rigid obligations, such as, for example, with regard to allocation of quantities of water or of permitted emissions. Due to the uncertainty with regard to future conditions and the inability to foresee complex adaptations, the parties, when constructing the joint institution, are incapable of reducing important terms of the arrangement
to the well-defined obligations. The greatest attention therefore, should be
directed at structures and procedures for future exchanges. Moreover,
flexibility in the institutional design is also important. (Benvenisti,

**Monitoring and Review Proposition:** Arrangements that seek to reduce
uncertainty about natural and social system by implementing projects and using
experiential (in addition to experimental) knowledge to test hypotheses will
facilitate adjusting to change, as compared to arrangements that seek to minimize
uncertainty about natural system behavior through only experimental research and
modeling. Adaptive institutional arrangements will focus on implementing
policies, even without full understanding of the social-ecological system. These
efforts will be coupled with monitoring, evaluation, review and opportunities to
shape future policies.

**Case Selection**

I use a case study approach to evaluate the ability of different institutions for international
water governance to adjust to change (Yin, 2008). I use a comparative method to examine
how institutional arrangements adjust to change and explore how specific mechanisms
used in water governance have either made it easier for negotiators to adjust to change or
have functioned as barriers to change. I compare qualitative information across three
issues for sharing international water resources in two river basins: navigation in the
Danube, water protection in the Danube, and benefit sharing in the Nile. Although the
small number of cases means that I cannot eliminate alternative explanations, it also
means I can look carefully at these few cases to understand them, which is not possible with a large set of cases or statistical analysis. Although the cases are unique in many respects, the format of the negotiations within these two river basins exemplifies the common treaty-based style of negotiation (Barrett, 2003; Sjöstedt, 1993; L. Susskind & Ashcraft, 2010; L. E. Susskind, 1994). The cases can therefore be considered somewhat representative of international environmental regimes more generally (Walton, 1992). I chose to use qualitative research methods because I believe in-depth questioning, in addition to a review of written agreements, will provide the best way to understand extended efforts to share international waters. In particular it will provide information about how resource managers think institutional arrangements make it easier or harder to adjust to change in practice.

**Danube Navigation Regimes (DNR):** There have been three Danube navigation regimes. The first Danube navigation regime began in 1856, when an agreement was reached among European and Danubian countries to improve navigation by freeing the delta of sand, and lasted until World War I. After the war the victors imposed the second navigation regime, with changed institutional arrangements on the losers, which for this research indicates a low ability to adjust to change. This second regime lasted until World War II, when new institutional arrangements were again imposed by some participants over the objections of others, indicating a low ability to adjust to change. After World War II some of the Danube riparians excluded other European countries from participating and concluded a new agreement, the 1948 Belgrade Convention and established the Danube Commission to implement the agreement. This third navigation
regime has adjusted its arrangements twice, defining three phases of development. The most recent phase, created by negotiations between 1993 and 1997 after the end of the Cold War, resulted in the 1998 Protocol enabling all riparians to participate. Remaining conflict over who should participate in regulating navigation and which issues should be addressed are the focus of current negotiations since 2002. These changes and the current negotiations indicate the third Danube navigation regime has a high ability to adjust to change.

**Nile Benefit Sharing Regime (NBSR):** Although earlier bilateral agreements existed, multilateral technical cooperation began in 1967 under Hydromet and continued until 1992. After 1992 technical cooperation continued under the Technical Cooperation Committee for the Promotion of the Development and Environmental Protection of the Nile Basin and the Nile 2002 Conferences. Since 1998 the riparian countries have been developing institutional arrangements to create a benefit sharing regime through technical cooperation within the transitional Nile Basin Initiative and negotiations on a cooperative framework agreement. In 2010 the Agreement on the Nile River Basin Cooperative Framework was opened for signature. Despite the Agreement’s significant progress on defining critical policy challenges. So far, only five of the ten riparian countries have signed the Agreement, over the objections of some of the other riparians, which for this research indicates a lower ability to adjust to change.

**Danube Water Protection Regime (DWPR):** The Danube water protection regime has renegotiated its institutional arrangements twice, defining three phases of regime
development. Building on earlier scientific cooperation, the Danube riparians began to address water protection issues in the 1980s. The riparian countries declared their intent to cooperate in the 1985 Bucharest Declaration. In 1994 all riparians with significant territories within the Danube basin signed the Danube River Protection Convention and established the International Commission for the Protection of the Danube River (ICPDR) to implement the Convention. In 2000 the signatories agreed to use the ICPDR as the platform to coordinate their implementation of the European Union Water Framework Directive and to cooperate on developing a River Basin District Management Plan by the end of 2009. Due to its record of renegotiating its institutional arrangements, this research considers the Danube water protection regime to have a high adjust to change.

Table 4 Ability of Cases to Adjust to Change

| DNR 3 C | High |
| DWPR 1 C |
| DWPR 1 B |
| DWPR 1 A |
| DNR 3 B |
| DNR 3 A | Higher |
| NBSR | Lower |
| DNR 1 B | Lower |

28 Please note: “DNR” indicates a Danube navigation regime over a particular time period. DNR 1 is the first international navigation regime for the Danube from 1856-1914 and is further subdivided into two stages of regime development (for details of the changes in the institutional arrangements of the first Danube navigation regime please see Chapter 2, Table 2). DNR 1 A lasted from 1856-1858 and DNR 1 B from 1858-1914. DNR 2 is the second navigation regime for the Danube from 1919-1936. DNR 3 is the third, from 1948 to the present and is subdivided into three stages of regime development (for details of the changes in the third Danube navigation regime please see Chapter 2, Table 6). DNR 3 A lasted from 1948 to around 1953, DNR 3 B from around 1953 to 1998, and DNR 3 C from 1998 to the present. “DWPR” indicates the Danube water protection regime over a particular time period. DWPR 1 A represents the early developments of the Danube water protection regime from the Bucharest Declaration to the Danube River Protection Convention (1985 - 1994); DWPR 1 B, the Danube water protection regime from the Danube River Protection Convention to the EU Water Framework Directive (1994 - 2000), DWPR 1 C, recent developments of the Danube water protection regime From the EU Water Framework Directive to Today (2000-Present). “NBSR” indicates the Nile benefit sharing regime under the Nile Basin Initiative since 1999.
The research design simplifies the universe of possible environmental regimes cases by focusing on one type of ecosystem, river basins, in which some level of multilateral cooperation has been achieved. Both river basins, the Danube and the Nile, are among only four river basins with territory from ten or more countries (the other two are the Niger and the Congo), making it difficult to coordinate cooperation.\(^\text{29}\) Table 5, below, summarizes some of the characteristics of these two rivers.

**Table 5 Summary of Some Characteristics of the Danube and Nile Rivers**

<table>
<thead>
<tr>
<th></th>
<th>Danube (unless otherwise indicated data are from: (ICPDR, 2009a))</th>
<th>Nile (unless indicated otherwise data are from: (Nile Basin Initiative, 2009))</th>
</tr>
</thead>
</table>
| **Other names**        | German: **Donau**  
                        Hungarian: **Duna**  
                        Croatian, Macedonian, Serbian, Bulgarian: **Dunav**  
                        Russian, Slovakian, Ukrainian: **Dunaj**  
                        Romanian: **Dunăre**  
                        Albanian: **Danub**  
                        Turkish: **Tuna**  
                        Greek: **Istros** | *The main Nile:*  
                        Arabic: **Nahr el-Nil** |
| **Source**             | The **Brigach** and the **Breg**  
                        Rivers, which meet in Donaueschingen, Germany  
                        By agreement the source is considered a spring at Donaueschingen | *Main Nile:* Confluence of the White Nile and the Blue Nile in Khartoum, Sudan  
                        *White Nile:* The most distant tributary of the Kagera is the **Rukarara**, originating in the |

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\(^{29}\) Analogy was already important in early Greek science, and Herodotus used a comparison of the Danube and Nile in order to construct meaning of the world (The Histories 2.33 and 2.34 (Hartog, 1988; Strassler, 2009)).
Nyungwe forest in Rwanda (Dumont, 2009b). The Kagera flows into Lake Victoria. After leaving, the Victoria Nile flows to Lake Albert. The Albert Nile flows to Sudan and becomes the Bahr al-Jabal or Mountain Nile. At the confluence with the Bahr al-Ghazal the river becomes known in Arabic as the Bahr al-Abyad, or the White Nile.

Blue Nile: The Little Abbay (also written Abbai), Wetet, or Milk Abbay flows from the Sakala spring at Mount Gish in Ethiopia and is the most important tributary of Lake Tana. Lake Tana is considered the source of the Blue Nile. Upon leaving Lake Tana the river is known as the Great Abbay or Abay Wanz in Amharic. Crossing into Sudan the river is known in Arabic as Al Bahr al-Azraq or El-Nil el-Azraq, which means dark Nile in English.

<table>
<thead>
<tr>
<th>Outlet</th>
<th>Black Sea</th>
<th>Mediterranean Sea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select international tributaries</td>
<td>Tisza: Hungary, Romania, Serbia, Slovak Republic, Ukraine</td>
<td>The main Blue Nile and White Nile subbasins (described above) are considered part of the main stem of the river.</td>
</tr>
<tr>
<td></td>
<td>Sava: Bosnia i Herzegovina, Croatia, Slovenia, Serbia and Montenegro</td>
<td>Atbara: Eritrea, Ethiopia, Sudan</td>
</tr>
<tr>
<td></td>
<td>Inn: Austria, Germany, Switzerland</td>
<td>Kagera: Burundi, Rwanda, Tanzania, Uganda</td>
</tr>
</tbody>
</table>

30 Until 2006 the Luvironza (also Ruvyironza) of Burundi, also a tributary of the Kagera, was considered the source.

31 Abbay means “our father” in Amharic (Erlich & Gershoni, 2000).
<table>
<thead>
<tr>
<th></th>
<th>Measurement</th>
<th>Rank</th>
<th>Measurement</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Length</strong></td>
<td>2857 km / 1775 mi</td>
<td>26&lt;sup&gt;th&lt;/sup&gt;</td>
<td>6695 km / 4184 mi</td>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Discharge</strong></td>
<td>6500 m&lt;sup&gt;3&lt;/sup&gt;/s</td>
<td>22&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>3472 m&lt;sup&gt;3&lt;/sup&gt;/s</td>
<td>26&lt;sup&gt;th&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Size of watershed</strong></td>
<td>801,463 km&lt;sup&gt;2&lt;/sup&gt; / 309,446 mi&lt;sup&gt;2&lt;/sup&gt;</td>
<td>25&lt;sup&gt;th&lt;/sup&gt;</td>
<td>3,349,000 km&lt;sup&gt;2&lt;/sup&gt; / 1,293,049 mi&lt;sup&gt;2&lt;/sup&gt;</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong># of countries in watershed</strong></td>
<td>19</td>
<td></td>
<td>10</td>
<td>Burundi, Democratic Republic of Congo, Egypt, Eritrea, Kenya, Rwanda, Sudan, Tanzania, Uganda</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>10</th>
<th>Austria, Bulgaria, Croatia, Germany, Hungary, Moldova, Romania, Serbia, Slovak Republic, Ukraine</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong># of countries river flows through</strong></td>
<td>9</td>
<td>Blue Nile: Egypt, Ethiopia, Sudan White Nile: Burundi, Democratic Republic of Congo, Egypt, Kenya, Rwanda, Sudan, Tanzania, Uganda Main Nile: Egypt, Sudan</td>
</tr>
</tbody>
</table>

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<sup>32</sup> The Central African Republic is not usually considered a Nile riparian. See the description of the Nile in Part 3 for more information.

<sup>33</sup> Approximate Global Rank among Primary Rivers- not tributaries (rank determined according to WRI data http://www.wri.org/)

<sup>34</sup> The Nile has traditionally been considered the longest river in the world. However, new data indicate the Amazon may be longer (Roach, 2007).

<sup>35</sup> EU refers to Member States of the European Union, EUCC refers to European Union Candidate Countries (Accession Countries) as of 2008.
Historically, the Nile (up to the cataracts) and Danube both formed boundaries of the Roman Empire (Herrick, 1920). They both provided ancient civilizations with natural access to the Mediterranean basin (Allen, 1890). Although the morphology of both rivers create some similar groupings of countries, such as upstream riparians and downstream riparians, it also differs significantly. The Danube forms a single main river, flowing west to east. South of Khartoum the Nile forms two main branches, the White Nile and Blue Nile, with watersheds that are largely hydrologically independent of one another.

One river basin is located in the global North and one in the global South. Due to their locations the two river basins have significantly different climates. Evaporation rates are much higher in the Nile than in the Danube. Precipitation in the Danube occurs over much of the basin, although annual accumulation does vary by over 2500 mm between the mountainous headwaters and the delta. Precipitations also occurs over much of the year. Water levels are lowest in the fall and winter, when the river is sometimes blocked by ice, and highest in the summer, when the river is susceptible to flooding. The basin is sometimes affected by drought, but this does not lead to critical food shortages and in general water supply is not a major issue for users. The Nile is longer and its watershed larger, but is relatively water poor compared to the annual mean discharge of the Danube and the population relying on the water. Precipitation in the Nile is much more variable, both in space and time. In the Nile there are two distinct meteorological patterns, one for the While Nile basin and one for the Blue Nile basin. In each subbasin precipitation is primarily concentrated within its rainy seasons. These rains produce substantial flooding,
but can vary dramatically between years, decades, and even over longer cycles. Periods of persistent drought have led to devastating famines. Precipitation also varies dramatically across the watershed. For example annual precipitation in the Ethiopia highlands and downstream Egypt can vary over 1300 mm. However, precipitation also varies dramatically within countries. The variability of the Nile’s climate is expected to increase in response to climate change. Its natural variability, coupled with projected population growth and proposed infrastructure developments, make it very difficult to predict how the Nile water will be used in the hear future. In comparison to the Danube, water supply and water scarcity are significant issues for Nile cooperation.

Significant development of the Danube began in the 19th century. Countries from outside the basin, in particular Great Britain, developed significant interests in the Danube. Shipping and transport of Danubian agricultural products launched the region into the global economy. Multilateral agreements for using the Danube began in the mid-19th century, with cooperation on navigation issues. Not until the 1990s did multilateral cooperation develop on other water issues. Significant development of the Nile basin also began in the 19th century. Great Britain, along with a few other colonial powers, developed significant interests in the Nile. The Nile was harnessed to irrigate cotton, particularly in Egypt. Cotton and the Suez Canal established the Nile basin as a critical area in the global economy. Unlike the Danube, long distance shipping on the Nile is primarily limited to the downstream reaches. Much of the Nile basin was administered by Great Britain until the 1950s. Multilateral arrangements for managing the Nile did not emerge until the 1990s. Both river basins experienced significant political changes and
wars. The Napoleonic Wars, the Crimean War, and First and Second World Wars had a significant impact on Danube regimes. More recently the end of the Cold War, the dissolution of the Soviet Union, Yugoslavia and Czechoslovakia, the reunification of Germany, and the expansion of the European Union have altered the political map of the basin. The Nile has also experienced significant wars, in particular against colonial occupation. Independence of the riparian countries and the end of the Cold War have had a significant impact on the Nile regimes. The expansion of the East African Community presents new opportunities for cooperation. However, unlike most of the Danube countries, many of the Nile countries continue to deal with civil conflicts and political instability, such as the conflict in the DR Congo and Southern Sudan, which may lead to its independence in 2011, and the ongoing power-sharing difficulties of the Kenyan government.

Despite the significant differences between the rivers, the countries in both watersheds have made significant efforts to develop multilateral institutional arrangements, particularly within the 1990s. In the last decade the countries in both river basins have experienced disasters related to the water and tried to address them by improving their cooperative institutional arrangements. In the Danube the Danube River Protection Convention was signed in 1994, and entered into force in 1998. In 1998 a new protocol was signed expanding cooperation on navigation to all Danube riparians along the main stem of the river. In 1999 the Nile Basin Initiative came into being. Negotiations on a cooperative framework agreement for the Nile recently led to the 2010 Agreement on the Nile River Basin Cooperative Framework, which has not yet entered into force.
Data Collection

My research in the Danube and Nile River watersheds was informed by semi-structured in-depth interviews with people involved in international water resource management. In addition to conducting interviews and administering questionnaires I examined formal agreements, action plans, minutes from meetings, project proposals, study reports, internal negotiation documents participants were able to share, other documents from the international watershed organizations, media reports, and scholarly publications. In each watershed I also had the opportunity to observe an intergovernmental meeting.

In each interview I sought information to understand how institutional arrangements were influencing the ability to adjust to change. I asked participants to describe how they saw the development of cooperation in the basin, how arrangements were changed, specifics of the negotiating process, and what was left out of the negotiations. I also asked about their experiences with how uncertainty and conflict were addressed in practice and how they thought specific institutional arrangements fostered or impeded improvements in cooperation. I promised interviewees I would not refer to their responses in a way in which they could be identified, both in order to protect their anonymity and to allow them to speak more candidly. I met with most interviewees for about an hour and asked about their experiences. I conducted most interviews in English, some in German, occasionally resorted to French and very limited Arabic. One interview was conducted with the help of
an official interpreter. I took notes during all interviews. Some interviews were tape recorded with the permission of the participants.

In each river I interviewed participants from as many countries and basin-wide organizations as possible. I began by creating a survey questionnaire. My survey employed a purposeful sampling technique (Merriam, 1998) to select key individuals and organizations from the Danube and Nile basins engaged in river management. My survey sought to maximize variation among participants with regards to nationality and profession. Based on the success of my initial survey, I established contact with a short list of key informants. I later met with many of them to talk about the history of cooperation in their watershed. I asked these initial respondents to help me identify other possible participants, who could help inform my research further. I also continued to contact other individuals in basin-wide organizations. I sought participation from a diversity of countries, national ministries, watershed-based organizations, international financing organizations, professional backgrounds, and importantly, time periods. I interviewed a number of retired professionals, who had actively negotiated past arrangements, as well as participants active in shaping current arrangements.

Surveys and interviews took place between 2004 and 2007. In each river I had the benefit of repeated visits to the area, although not to all countries. In the Nile River basin I had the advantage of working out of the United Nations Food and Agriculture office for a period of time, which is conveniently located adjacent to the Secretariat of the Nile Basin Initiative in Entebbe, Uganda, and the International Water Management Institute’s office
in Addis Ababa, Ethiopia. In the Danube River basin I had the opportunity to work out of the International Institute for Applied Systems Analysis (IIASA), located near Vienna, Austria, the site of the International Commission for the Protection of the Danube River and not far from Budapest, Hungary, the site of the Danube Commission.

In the Danube, in total I conducted thirty-five interviews and received written responses to fifteen questionnaires. Participants in that region included people from a variety of professional backgrounds from twelve of the nineteen countries in the watershed, as well as from both international commissions, other intergovernmental organizations, academic institutions, and non-governmental organizations. I was able to conduct more interviews related to the Danube River Protection Convention than the navigation regime. In the navigation regime many of the institutional arrangements were negotiated long ago, making it impossible to interview participants involved in developing them. For the navigation regime I augmented my research process with a comprehensive review of historical documents written in English, German and French, which includes the official languages of both international commissions. Regrettably, I was unable to review material in other languages.

In the Nile I conducted fifty-five interviews and received written responses to eight questionnaires in the Nile basin. Participants from the Nile basin included people from a variety of professional backgrounds from nine of the ten countries in the watershed, as

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36 I did not seek participation from five countries, Albania, Italy, Macedonia, Poland, and Switzerland, who contribute only minimally to the basin and do not usually participate in basin-wide water management fora. When I conducted interviews Serbia and Montenegro were still one country and, so, participants I spoke with represented their joint interests. I did not speak with any participants from Bosnia i Herzegovina and Slovenia as I did not receive any responses to my requests.
well as from the Nile Basin Initiative, other intergovernmental organizations, academic institutions, and non-governmental organizations.\textsuperscript{37}

**Dissertation Structure**

This dissertation is organized into five chapters. This chapter introduced cooperation over international water resources, the differences between the conventional and the adaptive approach to governing them, the research design and the cases. The second chapter introduces the Danube and its three navigation regimes. It describes the principle of freedom of navigation, the history of the navigation regimes, their institutional arrangements and how they have or have not adjusted to change. The third chapter describes the Danube’s water protection regime, the principle of integrated river basin management, the history of the regime’s development, its institutional arrangements, and why it has been successful in adapting to changes. The fourth chapter describes the Nile benefit sharing regime, the concept of benefit sharing, the history of the regime, and progress and barriers to ongoing efforts to develop mutually acceptable institutional arrangements. The final chapter presents a cross-case comparison, discussion of the significance of the findings and policy recommendations.

**Contribution to Practice and Theory**

Environmental policy-makers and technical experts suggest adaptive approaches may be the way to address ‘business as usual’ attitudes to international water governance, with

\textsuperscript{37} I did not speak with any participants from Tanzania as I did not receive any responses to my requests.
their accompanying inefficient practices and potential for escalating conflict (See for example (Biswas, 2008)). According to the literature on adaptive approaches the ability of water governance regimes to adjust to change depend on institutional arrangements that plan for uncertainty and conflict. Nevertheless, conventional approaches remain ubiquitous. It is difficult to evaluate the approach to adaptive governance in a particular river system and even more difficult to compare the approach in one to the approach in another river because of how unique each river’s circumstances are and how many factors contribute to how its regime(s) adjust to change. Much of the literature falls short of evaluating water governance in practice and instead only provides recommendations for what should be done in theory. This research investigates takes a new approach to investigate the potential for adaptive approaches to realize the promise proponents espouse. To address the unique characteristics of the rivers and the myriad of influencing factors, this research draws on first-hand accounts from individuals engaged in river governance to evaluate the ability of the water governance regimes to adjust to change and the role of the approach to conflict and uncertainty. The focus of this research on practice and personal experience is different from many others and provides new insights.

In particular, the first-hand accounts provide an opportunity to discuss many details of international river governance for the first time. In particular, the history of the Danube navigation and water protection regimes have rarely been considered together. Through interviews and a thorough review of primary and secondary documents this research provides a comprehensive history of both regimes. The first-hand accounts of the Nile benefit sharing regime provide insight from participants at a critical stage in its
development. These insights, framed within a comparison of conventional and adaptive approaches to environmental governance, provide a basis for evaluating the potential for a new approach to multilateral arrangements for the governance of international natural resources.
The Danube and Its International Regimes

The Danube is an experiment, which influences the whole world—what fails here, may well fail everywhere, what is successful here, gives hope to every other place on Earth.¹ (Karl-Markus Gauß, cited in (Busek, 2006):182)

A Brief Description of the Danube River System

The Danube River basin is the most international watershed in the world. The territories of 19 countries contribute to it along its eastward course to the Black Sea. Of the Danube’s seven major tributaries, six are themselves international rivers. The Danube flows past four capital cities: Vienna, Bratislava, Budapest, and Belgrade. Three other capitals are located on its tributaries: Zagreb and Ljubljana on the Sava and Sofia on the Iskar. Munich, the capital of the German state of Bavaria, is located on another tributary, the Isar.

Figure 1 Countries Sharing the Danube Catchment²

¹ The original text is “Die Donau ist ein Experiment, das die ganze Welt beeinflusst – was hier scheitert, mag überall scheitern, was hier Erfolg hat, gibt Hoffnung für jeden anderen Platz der Erde (Karl-Markus Gauß, cited in (Busek, 2006):182)).”
² Source: (IHP Danube Cooperation / Vituki, 2005)
### Table 1 Overview of States in the Danube Watershed

<table>
<thead>
<tr>
<th>Country</th>
<th>Area in Danube basin (km²)</th>
<th>% of Total area of basin in the country</th>
<th>% of total area of country in the basin</th>
<th>Country water dependency %</th>
<th>International watershed organizations participate in or agreements signed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albania</td>
<td>126</td>
<td>&lt; 0.1</td>
<td>0.01</td>
<td>36</td>
<td>UNECE Helsinki</td>
</tr>
<tr>
<td>Austria</td>
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<td>10.0</td>
<td>96.1</td>
<td>29</td>
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</tr>
<tr>
<td>Bosnia i Herzegovina</td>
<td>36,636</td>
<td>4.6</td>
<td>74.9</td>
<td>5</td>
<td>Bucharest Declaration IAD DRPC/ICPDR DCP UNECE Helsinki</td>
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<tr>
<td>Bulgaria</td>
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<td>5.9</td>
<td>43.0</td>
<td>1</td>
<td>Belgrade Conv./DC Bucharest Declaration IAD IHP Danube EPDRB EU WFD DRPC/ICPDR DCP UNECE Helsinki</td>
</tr>
</tbody>
</table>

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3 This table is based on information found in the following sources: (European Commission, 2010; ICPDR, 2004; UNESCO, 2008; United Nations Economic Commission for Europe, 2010; World Resources Institute, 2004).

4 This figure refers to the percentage of the total basin contributed by the country’s territory.

5 This figure refers to the percentage of the total area of the country that lies within the basin.

6 The water dependency ratio is a measure of internal renewable water resources, or how much water is generated over the country’s territory through precipitation, compared to the total renewable water resources that originate outside the country. 0% means the country does not receive water from neighboring countries. 100% means that all of its water comes from other countries.

7 Some countries are listed here although they did not sign themselves because they were part of a signatory or participating country at the time the agreement was reached, such as Czechoslovakia, Yugoslavia, or the Soviet Union.
<table>
<thead>
<tr>
<th>Table 1 continued</th>
<th>Area in Danube basin (km²)</th>
<th>% of Total area of basin in the country</th>
<th>% of total area of country in the basin</th>
<th>Country water dependency %</th>
<th>International watershed organizations participate in or agreements signed¹⁸</th>
</tr>
</thead>
<tbody>
<tr>
<td>Croatia</td>
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<td>4.4</td>
<td>62.5</td>
<td>64</td>
<td>Belgrade Conv./DC Bucharest Declaration IAD IHP Danube EPDRB EU WFD (Candidate) DRPC/ICPDR DCP UNECE Helsinki</td>
</tr>
<tr>
<td>Czech Republic</td>
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<td>27.5</td>
<td>No data</td>
<td>Bucharest Declaration IAD IHP Danube EPDRB EU WFD DRPC/ICPDR DCP UNECE Helsinki</td>
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<tr>
<td>Germany</td>
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<td>16.8</td>
<td>31</td>
<td>Belgrade Conv./DC Bucharest Declaration IAD IHP Danube EPDRB EU WFD DRPC/ICPDR DCP UNECE Helsinki</td>
</tr>
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<th>% of total area of country in the basin</th>
<th>Country water dependency %</th>
<th>International watershed organizations participate in or agreements signed</th>
</tr>
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<tr>
<td>Hungary</td>
<td>93,030</td>
<td>11.6</td>
<td>100.0</td>
<td>94</td>
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<td>EU WFD UNECE Helsinki</td>
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<tr>
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<td>0.2</td>
<td>16</td>
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<tr>
<td>Moldova</td>
<td>12,834</td>
<td>1.6</td>
<td>35.6</td>
<td>91</td>
<td>Belgrade Conv./DC Bucharest Declaration IAD EPDRB DRPC/ICPDR DCP UNECE Helsinki</td>
</tr>
<tr>
<td>Montenegro*</td>
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<td>0.9</td>
<td>55</td>
<td>No data</td>
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<tr>
<td>Poland</td>
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<td>&lt; 0.1</td>
<td>0.1</td>
<td>31</td>
<td>EU WFD UNECE Helsinki</td>
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<tr>
<td>Romania</td>
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<td>97.4</td>
<td>80</td>
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<tr>
<td>Serbia*</td>
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<td>10.1</td>
<td>92.8</td>
<td>79</td>
<td>Belgrade Conv./DC Bucharest Declaration IAD IHP Danube DRPC/ICPDR DCP</td>
</tr>
<tr>
<td>Table 1 continued</td>
<td>Area in Danube basin (km²)</td>
<td>% of Total area of basin in the country</td>
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<td>International watershed organizations participate in or agreements signed</td>
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<td>---------------------------------------------------------------------</td>
</tr>
<tr>
<td>Slovakia</td>
<td>47,084</td>
<td>5.9</td>
<td>96.0</td>
<td>75</td>
<td>Belgrade Conv./DC Bucharest Declaration IAD IHP Danube EPDRB EU WFD DRPC/ICPDR DCP UN/ECE Helsinki</td>
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<tr>
<td>Slovenia</td>
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<td>81.0</td>
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<tr>
<td>Switzerland</td>
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<td>4.3</td>
<td>25</td>
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<tr>
<td>Ukraine</td>
<td>30,520</td>
<td>3.8</td>
<td>5.4</td>
<td>62</td>
<td>Belgrade Conv./DC Bucharest Declaration IAD EPDRB DRPC/ICPDR DCP UNECE Helsinki</td>
</tr>
</tbody>
</table>

* Serbia and Montenegro split into two countries in June 2006. Some separate data for them are limited.

Danube mightiest of all,  
that refuses, Nile, to yield in power even to you.  
The spoil of so many waters adulterates the waves  
it swells, and stops the sea maintaining its power.  
Indeed, like a still pool or a stagnant swamp,  
it’s colour is diluted, and it’s barely blue.  
The fresh water overlays the flood, lighter than sea-water,  
which gains specific weight from the salt admixture (Ovid & Kline, 2003)  
*Letters from the Black Sea to Albinovanus: The Rivers.*
The climate of the upper basin is heavily influenced by the Atlantic Ocean and receives heavy precipitation as a result of air being forced upward along the mountains. The Mediterranean Sea drops water and humid air in parts of the middle basin. The lower basin and estuary are characterized by a drier, lowland climate and continental climate, with cold winters. There is an average temperature of 9°C at lower elevations with about 20°C variation between the coldest and hottest months (Breiling & Hashimoto, 2004).

Water levels are highest in the summer and lowest in the fall and winter, when the river is sometimes blocked by ice. Precipitation can fluctuate from more than 3000mm in the mountains to less than 400 mm in the delta (Hock, 1987b; Hofius, 1991a; International Commission for the Protection of the Danube River, 2005). The Danube experiences both significant droughts (for example in 2003) and floods (for example in 2002, 2005, 2007) (Sommerwerk et al., 2009).

The Danube’s basin can be divided into three sub-regions based on its geographical features and the average gradient of its river bed. The Upper Basin includes the portion of the basin from its source to around the Slovakian-Hungarian border. This part of the basin is characterized by a steeply sloped river bed and swift currents. In the narrow mountain channels near the source a significant quantity of water flows to the Rhine watershed through underground limestone pathways. At the border between Germany and Austria the Danube is joined by the Inn, which contributes more water to the river at this point than flows from the upper part of the Danube. The river first becomes navigable at Ulm for smaller boats and at Kelheim for bigger ships.

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9 The two international commissions of the Danube each divide the Danube into 3 sections, although the divisions are not in exactly the same places.
Danube is again linked to the Rhine through the 171 km (106 mi) Rhine-Main-Danube canal, completed in 1992. This canal creates a 3503 km (2177 mi) continuous waterway, linking Rotterdam on the North Sea to Sulina on the Black Sea.

The Danube is wider, slower and less steep through most of its Middle Basin. However, even here it traverses two narrow gorges, at Visegrad, Hungary and at the Iron Gate on the border between Romania and Serbia. The Iron Gate encompasses a stretch of cataracts 74 miles long, which poses a formidable challenge to navigation. In between the river traverses the European plain, which was once a large inland sea and, as a result, is shallow and marshy. The Drava, Tisza and Sava join the Danube, nearly tripling its flow.

The Lower Basin, including the Maritime Danube, is characterized by lowlands, plateaus, and mountains. The river’s slope becomes even more gradual and its current slower. In Ismail, Romania, 79.6 km from the Black Sea, the Danube divides into three main branches: the Chilia (forming the border between Romania and Ukraine), the Sulina (usually considered the mouth of the Danube), and the Sfîntu Gheorghe or St. George. Canalization and dredging render only the Sulina navigable by ships. The delta area of these three arms of the Danube spans about 6500 km² and is Europe’s second largest wetland. In the 1980s under Ceaușescu, Romania drained about 800 km² to create agricultural land and opened the Danube-Black Sea canal from Cernavodă to Constanța. This allowed cargo ships carrying up to 5000 tons to pass through the delta. Parts of the delta have since been restored and are designated a “World Heritage” site under the

---

10 The exact extent of the maritime Danube has changed over time. Roughly, it covers a portion of the lower Danube whose ports are significant for Black Sea shipping.
Ramsar Convention on Wetlands. All of the delta is designated a “Biosphere Reserve” by
the United Nations Educational, Scientific and Cultural Organization (UNESCO). The
entire Danube is a biodiversity hotspot. Its species richness includes such remarkable and
endangered species as the anadromous sturgeons (Sommerwerk et al., 2009).

Today, along most of its length the Danube is used for hydropower generation, shipping,
tourism, industry, agriculture, wastewater disposal and recreation. Early hydraulic works
regulating the Danube date back to the Roman Empire. The first river infrastructure was
constructed for flood control (Fitzmaurice, 1998) and then increasingly to regulate the
river for navigation. By 1980 the Danube was a “cheap waterway” for transporting goods
(Benedek & László, 1980). Ships now navigate on 2411 kilometers of the river and
transport 90 million tons of goods annually (Donaukommission, 2004). Uniquely among
the world’s rivers, these kilometers are counted beginning at the mouth of the river.11

Since the second half of the 18th century multipurpose water works have been built to:
allow large ships to navigate independent of fluctuations in discharge; protect settlements
and agriculture from flooding; provide a reliable supply of water of sufficient quality for
drinking, industry, and irrigation; maintain the self-purification capacity of rivers; and
produce energy (Hock, 1987b). The first dam to generate hydropower was built in 1927
at Vilshofen, Germany (Jansky, 2001). Between 1950 and 1980 sixty-nine dams were
constructed on the Danube (Jansky, Pachova, & Murakami, 2004). Many of the
hydropower works are located on the upstream reaches, but there are works all along the

---

11 Most rivers count kilometers from the headwaters down to the mouth the river.
river, including at Gabčíkovo, Slovakia\textsuperscript{12} and the Iron Gate gorge on the border between Serbia and Romania. These works eliminated the river’s meandering and shifting. Along this portion of the river the Danube now flows through a straightened, fortified channel with large fluctuations in water levels, increased river velocity, higher flood peaks, more devastating floods and scouring and deepening of the river bed in the middle Danube (Pachova & Jansky, 2008). Many countries downstream of Germany rely heavily on bank-filtered water\textsuperscript{13} for drinking water and irrigation. Fishing, fish farming and reed harvesting are important sources of sustenance and income for downstream countries. Tourism is important especially for the local economies of the upper Danube, the Delta and the Black Sea region (Linnerooth-Bayer, 1996). There is a significant downward gradient in gross domestic product (GDP) along the length of the river, with GDP significantly higher in Germany and Austria and lower in Ukraine (Bendow, 2005).

\textsuperscript{12} The hydropower facility at Nagymaros was originally part of a joint project between Hungary and then Czechoslovakia, which required diverting the main stem of the Danube.

\textsuperscript{13} Bank filtered water is ground water that is directly influenced by surface water seeping from a river or lake.
Chapter 2 Navigation Regimes of the Danube

Chapter Overview

Freedom of Navigation

Navigation on the Danube Before the First Regime for International Navigation

The First Navigation Regime: From the Treaty of Paris to World War One (1856-1914)

The Second Navigation Regime: From World War One to World War Two (1919-1936)


The 1998 Protocol to Today (1998 - the present)

The mainstream of a river system may be conceived of as an axis around which the organization of the entire system for navigation tends to crystallize (Teclaff, 1967):27).

The whole history of the Danube river shows not only how seldom human conditions have favoured the full utilisation of the river and its valley as a route, but also how permanent, under the changing conditions of civilisation, have been the limitations imposed by physical geography (East, 1932).

If one prophecy can be made about the end of the present war, it is this: that whoever the statesmen may be who have to reconstruct the world after it, whatever else they may have on their agenda, one of the tasks which they will have to attempt will be to find a new political form for the Danube valley (Macartney, 1942):7-8).

Chapter Overview

The above quote from Ludwik Teclaff, an international water law expert, describes a river as a geographic unit defined by the river’s morphological features, such as its channel size and streamflow. The geographer William Gordon East describes political
and physical barriers, which have historically prevented such organization and prevented the river from becoming the natural unit for organizing navigation. Instead of a holistic system of navigation, the navigation regimes along the Danube have been divided by natural barriers impeding long-distance navigation, by geographic divisions between different administrative regions, by political divides within the basin and by conflicts between riparians and non-riparians. As conveyed by Macartney, wars and peace treaties, not river morphology, have been the primary vehicles for developing new political forms for international cooperation on navigation in the Danube.

Before 1856 navigation on the Danube was regulated by riparians according to mostly bilateral agreements. Multilateral international cooperation on Danube navigation can be divided into three successive regimes, all of which ascribed to the principle of freedom of navigation. Under the first navigation regime after the Crimean War, two international commissions were given authority over separate parts the river, the delta area, or maritime Danube, and the remaining navigable river, or fluvial Danube. Only the delta was truly “internationalized” as riparians and non-riparians administered this part of the river independently from the immediate riparian state. Under the second navigation regime between World War I and World War II the fluvial Danube was internationalized under a separate commission. Under the third regime since World War II a single international commission coordinates navigation under riparian control.

As described earlier the interests of river users can be divided according to different hydrological relationships, one of those is whether or not the state is riparian to the river.
This is one way of understanding Teclaff’s comment that the river’s morphology organizes cooperation on navigation. Morphology defines who is part of one group and who is part of the other. Riparians can be further differentiated based on whether they are riparian to the main stem of the river or to the international river system, i.e. including tributaries providing more than one state with access to the sea. In the history of the three Danube navigation regimes, the coalition of non-riparians has always included France and Great Britain. Others have come and gone, such as Italy and the United States. As borders changed, still other countries have switched between riparian and non-riparian status, such as Prussia, Russia, and Turkey. The fourth group of states are those who have always participated as riparians, although their borders changed over time and new independent states joined: Austria, Bulgaria, the German states of Bavaria and Württemberg, Hungary, Moldova, Romania, Serbia, Slovakia, Ukraine, and the states of the former Yugoslavia.

Coalitions are comprised of actors with multiple interests, and therefore are dynamic and inherently unstable in multiparty negotiations (Crump, 2003; Lax, 1991). Although there are differences among countries in each coalition, the interests of the riparians and non-riparian states in each of the institutional arrangements can be broadly categorized. Non-riparians have usually been interested in expanding opportunities for international trade. Riparians, in particular those with a growing fleet of ships on the river, have also been interested in international trade opportunities, but their primary interest has usually been in maintaining control over how the river is used and how the benefits from that use are distributed. Looking at each institutional arrangement in turn, the non-riparians generally
pushed for a broad geographic scope, opening up as much of the Danube system to
navigation and trade as possible. The non-riparians sought to limit the geographic scope
of international cooperation. The non-riparians have also interpreted freedom of
navigation as providing for no distinction between riparian and non-riparian ships, and
covering a broad range of shipping activities needed to conduct trade, such as river
maintenance. The riparians have interpreted freedom of navigation as enabling them to
maintain control over navigation. Non-riparians have sought inclusion in implementing
cooperation on the river, while riparians have often tried to exclude the non-riparians.
Finally, the non-riparians have sought to give broad authority to the organization for
implementing cooperation, while the riparians have sought to limit its authority. The
institutional arrangements for each regime can then be understood as a negotiated
solution, or an artifact of the tug-of-war between riparian and non-riparian approaches to
governing navigation on the Danube.

This chapter first discusses the principle of freedom of navigation, described by Johnson
as a chameleon (Johnson, 1964), changing its meaning based on the time, place and user.
Changes in its meaning are evidence of the fierce disputes, even among its proponents,
over how the principle should be applied to institutional arrangement, which have raged
since the idea was first introduced and continue today.

1 The following section discusses the debate, primarily between riparian and non-riparian
states, over how freedom of navigation should be applied to the four policy-making
questions of focus for this research.

1 The principle of freedom of navigation is primarily applied in European rivers (Johnson, 1964).
First, what range of activities should the principle apply to? Does freedom of navigation give ships only the right of passage on a river, or also the right to trade? If allowed to trade, does it give ships the right to access all port facilities needed to conduct trade? Does it apply between ports within countries, between ports of different riparian countries, or only between ports on the river and the open sea? Second, which community is given the right to these activities? Does freedom of navigation apply only to ships from riparian states or to ships from all states? Third, which waters are included? Are ships allowed to navigate only the main river, or on tributaries of it and canals as well? And finally, who has the authority to implement freedom of navigation? If an international commission is created to implement the principle, which activities does it have authority over and which do the riparians retain authority over? This discussion provides the foundation for the following section, which describes the institutional arrangements, adaptive or conventional, through which the disputed principle was applied in practice across the history of multilateral cooperation on Danube navigation. The institutional arrangements of each Danube navigation regime is discussed in detail later in the chapter and summarized at the end in Table 8.

**Freedom of Navigation**

The debate on how to apply the principle of freedom of navigation can be traced back to differences between the Roman and feudal approaches to navigation. On one hand are states who, in the Roman tradition, assert the right to freedom of navigation for all, independent of riparian regulation. On the other are states who, in the feudal tradition,
assert the right of riparian states to regulate the river and its uses. Roman law
differentiated between actors (the state, riparian property owners and the general public)
and their rights to different river activities (maintenance, public navigation, private
consumptive uses). Roman law considered rivers within its empire part of the *res
publicae*, property held in common by the public and managed, but not owned, by the
state. Public rights included fishing, navigation, and use of the banks for all activities
related to navigation, such as the loading and unloading of cargo. The state’s role was to
provide public services related to maintaining these public activities, such as policing,
maintaining or improving the river for navigation. To pay for public works, including
 canal building and damming, the state was entitled to collect duties. The state also
maintained control over commerce on the river. The riparians owning land along the
banks had the right to divert and use water for their private benefit (Kaeckenbeek, 1962),
as long as their use did not interfere with public rights, including navigation (Sherman,
1923; Teclaff, 1991a). Significant for the development of the principle of freedom of
navigation, the public had a right to navigation *by nature*, meaning the right existed
independent from decree or assent by anyone, including the governing authority and
riparian land-owners. The right to navigate on a river could not be infringed by any
authority (Kaeckenbeek, 1962; Teclaff, 1991a).

In comparison to Roman law, under the feudal period, the state was the owner of the river
and held all rights and obligations concerning it. As owner, the state asserted a sovereign
right within its territory to regulate the river and use of it. Navigation became a privilege

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2 The Romans called the whole river *rivus* (sometimes also *flumen*). However, the river was seen as
comprised of three different parts: the current (also called *flumen*), the river bed (*alveus*), and the river
banks (*ripa*). All of these were open to use by all citizens.
granted by the riparian state (Kaeckenbeek, 1962). This meant the riparian could permit some to navigate on the river and exclude others. A system of riparian rights evolved in which only those who owned land with access to the water had a right to use the water (Teclaff, 1996). The riparians were entitled to levy fees, enact regulations, and other measures as they saw fit in exchange for permitting use of the river. As a result foreign ships were often excluded from navigating on European rivers during feudal times and a cumbersome system arose of local fees and barriers to long-distance navigation and trade.

After the Middle Ages, some riparian states continued this approach. For example, the French Crown centralized control over rivers in 1669 and assumed the right to regulate all uses of them (Kaeckenbeek, 1962; Sherman, 1923).

Already in the early modern period legal experts debated these the Roman and feudal approaches. Two legal experts, Grotius, a Dutch jurist in the 16-17th centuries, and Vattel, a Swiss legal expert in 18th century argued in favor of a public right to innocent passage to conduct trade, independent of the riparian owner or state. Similar to the Roman approach, these jurists considered navigation an inexhaustible use of the river, unlike water diversion or extraction. Inexhaustible uses, they claimed, caused no harm to the riparian states and therefore should not be part of the system of state private property rights. According to this approach, riparian states should not be allowed to monopolize navigation on an international river. Instead, they are obliged to provide the conditions for free navigation and can levy fees only in proportion to the public service they provide. States can cooperate with one another to provide the services needed for free navigation,
i.e. river maintenance, regulation, and policing, to implement their international obligations and further their own interests (Kaeckenbeek, 1962).³

A number of states supported the interpretation of river law given by these jurists as more enlightened than the feudal approach, more just than the French Crown’s approach. The industrial revolution was just beginning and a laissez faire economic approach was becoming popular. Nations were looking to expand their economies beyond their borders through international trade in natural resources and other commodities. For example, the Holy Roman Emperor Joseph II sought to open the Dutch controlled Scheldt River to navigation (Kaeckenbeek, 1962; Sherman, 1923). Although Joseph II was unsuccessful in opening the Scheldt, the French Revolution accomplished what he could not. Referring to the Scheldt (Escault) and Maas (Meuse) rivers, the executive council of the 1792 French National Convention decreed:

No one may consider himself exclusive proprietor of a navigable river since the course of a navigable stream must be common and inalienable property of all countries which it waters; it is unjust on the part of any nation to pretend a right of exclusive occupancy on any river since all bordering people must enjoy equal facilities along the stream. Any supposed exclusive right is a remnant of feudal oppression, or at the least it is an odious monopoly capable only of institution through force or suffered by reason of weakness; such oppression may therefore be abolished at any time since nature recognizes neither privileged peoples nor individuals as against imprescriptible rights of man. It is the glory of the French Republic that in all places within the protection of its arms liberty should be re-established and tyranny put down; in addition, therefore, to her advantages accruing to the people of Belgium through the French army there will now be joined the free conduct of its river commerce. The nations of Europe will not fail

³ Indeed, the membership of any community, whether of individuals or of nations, necessarily involves a limitation of rights and an assumption of obligations, to which ultimately corresponds the sum of all the advantages inherent in such membership. Under ideal conditions, these advantages would be so numerous and complete, that the chief practical question would become merely the determination of every member’s duties in order best to promote, with the interests of all, his own individual interest (Kaeckenbeek, 1962):17).
to recognize that the triumph of the rights of man is the sole ambition of the French people (Quoted in (Sherman, 1923):443-444).

This decree declared the use of the river for navigation a right, common to all riparians and a right of man. Herein also lies the debate. On one hand the river is the “common and inalienable property of all countries which it waters”. Free navigation is then a right to all bordering, or riparian, states and no one country can monopolize or tyrannize others by preventing their use of the river. On the other “nature recognizes neither privileged peoples nor individuals as against imprescriptible rights of man.” Similar to Roman law, navigation is then a human right by nature, irrespective of whether the person lives in a state bordering the river or not and independent of the riparian authority. If freedom of navigation is used in the first “riparian right” sense it is a right only for riparian ships. If freedom of navigation is used in the second “human right” sense it is a right for ships from all countries, giving riparians and non-riparians equal rights. Therefore, the text of the decree contains an ambiguity, allowing for debate on the participants to which free navigation applies.

Freedom of navigation was applied to the Rhine a few years later using the human right approach. At the 1797-1798 Congress of Rastadt, the French sought to allow ships from non-riparian countries to navigate freely on the Rhine, its tributaries, and other European rivers under German control, with the consent of the contracting parties. Although the German states declined to open the rivers under their control, the Congress of Rastadt introduced the idea of applying free navigation to the river system, not only the main river, and broached the rights of non-riparians to navigate on a river. The 1804 Convention of Paris on the Tolls of the Navigation on the Rhine was the first to elaborate
common international rules for regulating navigation and the practices and infrastructure needed to conduct trade, such as cargo unloading and port usage. It also created a joint administration to implement the regulations and joint commission to hear complaints (Kaeckenbeek, 1962).

In the 1814 Treaty of Paris and 1815 Congress of Vienna international river issues were addressed for the first time within a broader, regional negotiation, instead of among a few nations concerned with a specific river. The Congress sought (1) to develop general principles for international rivers, which would later guide elaboration of a river regime for individual rivers, and (2) to develop specific river regimes for some rivers, including the Rhine (Costa, 1981). The main issues at the Congress were the scope of access to the river and the dues levied for conducting commerce, as these were seen as potential limits to accessing the river. One question was who should have the right to freely navigate? Should the principle of freedom of navigation be applied to open navigation to ships from all countries, so each riparian is able to benefit fully from trade with every country as if its port were located on a sea, or should the principle open navigation only to ships from riparian states? This was the same question raised earlier by the 1792 French National Convention decree. Another question was which activities should be covered, only free passage or should riparians also be prevented from monopolizing commercial activities on certain parts of the river as the ability to transport cargo or passengers is what makes navigation valuable (Chamberlain, 1923). For example, the country at the mouth of the river could monopolize all international trade, excluding upper riparians from trade beyond the river. However, if the delta country did so, it would be creating the conditions
for conflict, which was considered contrary to the intent of the Treaty of Paris peace agreement (Kaeckenbeek, 1962).

The British and French favored the broadest interpretation of freedom of navigation. Lord Clancarty, the British delegate, proposed language that explicitly made the river completely free to all nations for commerce and navigation. However, the Prussian delegate, von Humboldt, inserted ambiguous language into Article 109 of the Final Act of the Congress.

The navigation of the rivers referred to in the preceding article, along their whole course, from the point where each of them becomes navigable, to its mouth, shall be entirely free, and shall not, as far as commerce is concerned, be prohibited to anyone; due regard, however, being had to the regulation to be established with respect to its police; which regulation shall be alike for all and as favorable as possible to the commerce of all nations ("Congress of Vienna, June 9, 1815," 1815):Article 109 as quoted in (Teclaff, 1991a):49).

This language allows for the broad interpretation of the principle of freedom of navigation, creating a binding provision (but not a human right as expressed in the 1792 French National Convention) providing for open access to navigation to ships from all nations. However, the Article can also be interpreted as soft-law, giving primacy to national commercial interests over navigation (Costa, 1981), allowing for freedom for all nations to transport goods along the river, but maintaining riparian control over navigation through agreements and authorizations (Teclaff, 1991a). According to this interpretation, international rivers should be administered for the benefit of global commerce, but the actual administration and navigation remains subject to riparian will (Chamberlain, 1923). Therefore, the text of the Final Act of the Congress of Vienna...
contains an ambiguity, allowing for debate on the range of activities included under the concept of free navigation.

The Final Act also provided for a unified river administration, which would develop and implement uniform rules for navigation and paying dues on goods. The goal was to provide as few impediments to navigation and trade as possible, prioritizing these interests over other river uses (Costa, 1981). However, the Final Act did not clarify what authority the river administration would have to implement free navigation, as compared to other users and individual riparians.

At the beginning of the 19th century the principle of freedom of navigation was popularly accepted in Europe. However, there was debate over which ships it should apply to, what activities would be covered and what authority any river administration should have. The Congress of Rastadt also introduced the idea of applying freedom of navigation beyond the main river to the entire navigable river system, including tributaries within countries. The next section will explore how the debates over how to apply freedom of navigation were resolved by the three Danube navigation regimes and discuss how each regime’s approach to uncertainty and conflict influenced its ability to adjust to change.

**Navigation on the Danube Before the First Regime for International Navigation**

This section introduces the history of navigation and its role in shaping the subsequent international navigation regimes. Since pre-historic times humans have settled along the
banks of the Danube, attracted by the river basin and its loess, a light, porous soil, and engaged in a variety of social activities, including travel, trade, commerce and war (East, 1932). The name *Danube* likely derives from the Celts, who occupied most of the Danube basin between 750 and 500 BC. Despite the significant difficulty of navigating the strong winds and currents of the Straits of Bosporus, according to classical accounts the ancient Greeks navigated through them and explored the lower portions of the Danube (Focas, 1987). However, the Greeks' navigation on the Danube was limited to the lower reaches by the rapids and shallows of the cataracts and the Iron Gates area, which prevented their rowing ships from penetrating further upstream (East, 1932).

Under the Roman Empire long-distance navigation prospered. For the first and only time in history the whole length of the river, although not the whole basin, was under a single

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4 The discovery in 1908 of the Venus of Willendorf, a small statue of a woman dating to between 24,000 and 22,000 BC, in Austria provides the earliest human evidence in the basin. North of this find, a meeting place for mammoth hunters has also been identified from the same era. Excavations date the first actual settlements in the Danube to around 8500 BC. These were fishing and hunting settlements of the Linear Pottery culture, which flourished in the western and central part of the basin, and the Vinča culture in the east (Sommerwerk et al., 2009). In Austria extensive excavations of the highly developed Hallstatt culture show that it was actively involved in the trade of salt between 1200 and 500 BC.

5 "Dan" or "Don" is the Celtic word for big river. "Danu" is Celtic and Persian for flowing (Sommerwerk et al., 2009). Alternately, some have claimed that the Danube is the river of Noah and that the name originates from Noah (Herodotus & Beloe, 1830);203, n.5).

6 The geographer Timogetos tells of Jason navigating his ship the "Argo" from the Black Sea up the Istros (Danube). Focas suggests the golden fleece may have been a figure of speech referring to golden grain fields. Whether or not the Argonauts actually searched for the golden fleece via the Danube, the Greeks did navigate from the Black Sea to the lower Danube. The Greeks established the first maritime and river ports in Scythia Minor (now Dobruja shared by Romania and Bulgaria) in areas with the physical conditions and economic potential conducive for navigation and trade in the 6th to 4th century BC. They mostly used the St.George branch of the Danube in the delta. Agricultural products, such as cereals, and fish were transported to the colonies and then to the Greek homeland, Hellas (Focas, 1987). Hesiod and Herodotus also wrote of the Danube. Herodotus wrote, "No river of which we have any knowledge is so vast as the Danube it is always of the same depth experiencing no variation from summer or from winter (Herodotus & Beloe, 1830):XLVIII." In the second half of the 4th century BC the Macedonians established control in the Danube basin under Alexander the Great.
administrative unit (East, 1932). The Danube formed part of the fortified frontier region, or *limes*, between the Roman Empire and the “barbarian” Germanic tribes (Vrba, 2008). As a boundary river, both navigation and commerce on the Danube were carefully regulated by the state (Teclaff, 1991a). For example, the Roman navy policed the main stem of the river, the Sava, and the mouth of the Danube to eradicate piracy and protect commercial ships (Focas, 1987; Teclaff, 1967). Indicative of the Roman interest in improving navigation, roads were built along the banks of the Danube to make it possible to tow ships from shore past the Iron Gates (Chamberlain, 1923; East, 1932). The Romans also reached several bilateral agreements regulating the passage of international ships. Toward the end of the 4th century until the 6th century the lower Danube was primarily used for military purposes by the Byzantine Empire, although it also entered into bilateral shipping agreements (East, 1932).

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7 The Romans ruled the land south of the Danube and much of what is now Romania (then Dacia) until around 454 AD. They maintained a strong fleet of ships near Vienna and Belgrade to keep order. Slaves, and later oxen, pulled ships laden with up to 7 tons of, primarily, military cargo and troop provisions up portions of the Danube, which they could otherwise not pass (Donaukommission, 2004). The Romans left behind important ports and trade centers, such as Castra Regina (now Regensburg, Germany), Serdica (now Sofia, Bulgaria), Aquinicum (now Budapest, Hungary), and Sinigidunum (now Belgrade, Serbia).

8 According to Vrba (2008) although a border or boundary can be fixed according to geographical features such as a river, the Roman concept of *limes* should best be understood as a frontier ranging across this border and spanning area on both sides of it. More than a divider between them, the frontier area is the locus of interactions between multiple ethnic, class and social groups.

9 Recall that navigation on rivers flowing wholly within the Roman Empire was considered a public right, which could only be managed by the state.

10 For example, in 271 AD the Vandals, a Germanic tribe, had an agreement with Emperor Marcus Aurelius Antoninus to permit their trade ships to navigate along the river (Donaukommission, 2004).

11 Although East (1932) contends that cooperative navigation and trade along the Danube came to a virtual halt during this period, Focas (1987) describes goods being collected in the Braila, Galatz, Kilea and Asprokastron (today Bilhorod-Dnistrovskyi in the Bessarabia historical region of Ukraine) for trade between Europe (in particular Moldavian, Hungarian, Polish and Russian lands), Asia and Africa under the protection of the Byzantine Empire. The Byzantines entered into bilateral shipping alliances, for example with the Genoese and Venetians who would assume a significant share of navigation and trade much later in the 19th century. Germanic and Slavic tribes were engaged in regional shipping in the basin in the 6th to 9th centuries, as was the Bulgarian kingdom in the 10th century (East, 1932).
During the Middle Ages, political divisions, severe weather, and river morphology contributed to the risk and expense of navigation and trade along the Danube. The land along the watercourse was fragmented among many rulers. The feudal powers asserted the right to levy charges for navigation and commerce, block access if they wished, and protect existing uses along their stretch of the river. For example, along the river above the Iron Gate, merchants needed to have a special agreement with each individual feudal power and town in order to conduct trade. In total, approximately eighty different entities levied customs duties along the course of the Danube, doubling the price of goods. From Budapest to Ulm boatmen’s guilds claimed the exclusive right to ship goods along particular stretches of the river, impeding the continuous movement of goods. Boats were frequently hijacked for ransom. Severe weather conditions, such as flooding, drought, and freezing further discouraged long-range navigation on the river. As a result of unfavorable natural conditions, unfavorable rules and regulations, and rising competition from alternate sea routes used to transport goods from east to west, regional navigation along the Danube declined. Instead, navigation and trade during this time was primarily local, with goods being transported over longer distances by land (Chamberlain, 1923; Donaukommission, 2004; East, 1932).

During the early modern period authority to grant or exclude ships from navigating and trading was consolidated among a few riparian states. As nation-states emerged a few states consolidated their control over large parts of the Danube. As a result, ships navigating the length of the river needed to secure bilateral agreements for passage with

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12 Charlemagne and later the Crusaders did use portions of the river to and from the Holy Land. Famously, Richard the Lionheart was kept captive in 1192 in a castle along the banks of the Danube in Dürnstein, Austria.
only a few rulers: the Ottoman Empire, Austria, and Bavaria. These riparians began entering into agreements granting each other’s ships the right to freely navigate within their territories in order to stimulate trade and economic growth. Even countries from beyond the Danube basin could obtain permission for their ships to navigate on the river. However, similar to feudal times, the rights to navigate and trade granted by these agreements relied on the will of the riparian state and covered only the citizens and subjects of the signing countries (Teclaff, 1991a).

As the Ottoman Empire’s influence in the Danube and beyond declined in the 18th century, Russia established its influence over trade in the Black Sea and trade over both

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13 The Ottoman Empire controlled portion of the lower and middle Danube from the end of the 15th century to the 19th century. At the end of the 15th century the Ottoman Empire began establishing fortifications along the downstream riverbanks. From one of their fortifications, Ada Kaleh, the Turks suspended iron chains across a narrow section of the river and collected customs duties from passing ships. This area is now known as the Iron Gates. Suleiman the Magnificent advanced westward along the river in the 16th century. In 1683, Jean Sobieski, King of Poland, defeated the Turkish army at Vienna, turning back the Ottoman’s westward march across the Danube and their influence gradually began to weaken. The Turkish vessels themselves were not known as strong navigators and most commercial activity continued to be conducted in the lower Danube by the Greek Phanariots. Focas documents Turkish vessels being refused insurance for navigating the Danube due to their lack of understanding of nautical science (Focas, 1987).

14 Rudolf I of Habsburg consolidated some of the German and Austrian feudal states and in 1278, with the defeat of Ottokar King of Bohemia, began what can be considered 600 years of German rule over the Slavs (Costa, 1981). This also had the effect of shifting the center of Habsburg power from the Rhine to the Danube region.

15 For example, the 1616 Treaty of Vienna between the Ottoman Empire and Austria may have been the earliest intergovernmental agreement giving merchants the right to navigate within each others’ territories (Teclaff, 1991a). In another example, the Ottoman Empire allowed ships from all riparians it was not at war with to freely navigate the lower portion of the Danube (Costa, 1981). The 1784 Ottoman firman (royal decree) allowed Austrians and Hungarians to trade on the river back and forth to the Black Sea. The 1779 Treaty of Teschen between Austria and Prussia included what may be the earliest statement of the principle of freedom of navigation in international law. Guaranteed by Russia and France, the Treaty allowed Austria and Bavaria the common use of their portions of the Danube and its two navigable tributaries crossing their territories, the Inn and Salzach (Costa, 1981). In declaring navigation a common use, the Treaty of Teschen re-introduced the Roman idea of *res publicae*, property held in common by the public and managed, but not owned, by the state. However, unlike Roman law, the right to navigate freely was granted only to these two riparians, not the entire community of “citizens”, or in this case even the entire community of riparian states.

16 For example, England secured the right through a 1675 agreement with the Ottoman Empire (Teclaff, 1991a).
water and land in the lower Danube. The 1812 peace Treaty of Bucharest ended the
Russian-Ottoman war and granted Russia Bessarabia, making Russia a Danube riparian.
Russia also acquired trading rights and control over the Chilia branch of the Danube
through the delta to the Black Sea (Costa, 1981).

During this period, it became significantly easier for ships to obtain permission to
navigate and increasingly safe to ship cargo. However, river morphology continued to
impede long-range navigation and trade. The Danube’s strong current rendered westward
navigation impractical and made international shipping primarily a one-way, eastward
enterprise (East, 1932). Additional impediments included cataracts preventing larger
ships from passing between the lower and middle Danube, rapids, steep drops in the
river, whirlpools, ice in the winter and low water for three months during the summer
(Donaukommission, 2004). At least in the delta area the Ottoman Empire kept the
Danube delta free of silt through the low-tech strategy of requiring all passing vessels to
drag an iron rake behind them (Jensen & Rosegger, 1978).

The Congress of Vienna to the Crimean War

The Napoleonic Wars and subsequent 1815 Congress of Vienna changed the political
map of the Danube basin and created principles for cooperation regarding international

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17 For example, the down-stream trip from Ulm to Vienna (about 854 km) took 10 days. The up-stream trip
from Vienna to Regensburg (about 450 km) would have taken six weeks. As a result, ships in the upper
Danube were built for one-way passage from Ulm to Vienna or points further downriver. Once the ships
delivered their goods or passengers, the ships were dismantled and the wood sold for construction materials
(East, 1932).
As previously described, the Congress' Final Act included principles guaranteeing freedom of navigation on some western European rivers, including the Rhine, and calling for unified administration of regulations for navigation and dues. Although the French delegates to the 1798 Congress of Rastadt had suggested extending the principle of freedom of navigation to the Danube, the Germans rejected the idea (Sherman, 1923). Despite or possibly because of its location at the center of European politics the Danube was deliberately omitted from the discussion at the Congress of Vienna.

One reason the Danube was omitted was because Turkey, which ruled most of the middle and lower Danube, was not a member of the European State system and did not participate in the Congress of Vienna (Gorove, 1964; Kaeckenbeek, 1962). The European states also sought to avoid antagonizing Russia, whose control over Bessarabia and trade through the delta was strengthened during the Congress. Russia controlled no other territory in the basin. With little interest in international navigation along the Danube, its czarist regime was unfavorable to the idea of freedom of navigation on it (Chamberlain, 1923; Costa, 1981; Teclaff, 1991a).

Around the same time as the Congress of Vienna improved physical and institutional conditions for navigation and technological developments, such as the steamship, helped propel European economies from national to regional and then into the first phase of the global economy (Steiger, 2004). Major engineering projects to change the Danube’s

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18 The Congress established a balance of power in the Danube basin and beyond between France, Britain, Prussia, Austria, Russia, (and also Spain, Portugal and Sweden). The political balance in the Danube basin lasted until the Crimean War. The Crimean War was part of the ongoing struggle between (1) France, Britain, Austria, and Prussia, (2) Russia, and (3) the Ottoman Empire.

19 Around this time Talleyrand declared the mouth of the Danube to be the center of gravity of European politics (East, 1932).
natural morphology and make long-distance navigation easier.\textsuperscript{20} For the first time ships could navigate the Danube at all times of year, except when ice blocked the river. New shipping enterprises developed in response to the commercial possibilities, including in 1830, the Austrian Danube Steam Navigation Co., the first steamship company. Austria began transporting significant quantities of manufactured goods to downstream ports and the Black Sea. After the 1829 Peace Treaty of Adrianople Great Britain began shipping wheat from the Danubian principalities and competing with Austrian trade (Chamberlain, 1923; East, 1932).\textsuperscript{21}

Concurrent with navigation improvements, the principle of freedom of navigation began to receive acceptance along the Danube, at least in name. At the Congress of Vienna Austria, along with Prussia, opposed interpreting the principle broadly. However, Austria’s interests began to change with its expanding river fleet of steamships and growing interest in regional trade. Bilateral agreements on the Danube in the 19\textsuperscript{th} century,

\textsuperscript{20} The path of the Danube was regularized to protect against floods and improve navigation. For example, in Vienna the main portion of the Danube was redirected through a canal. Other portions of the river were straightened and shortened and confining walls were built. Some of the rocky impediments at the Iron Gates were removed. Wetlands in the European plain were drained. In 1844 the 172 km long Ludwig Canal was completed, which connected the German cities of Kelheim on the Danube to Mainz on the Rhine via three rivers: the Altmühl, Regnitz and Main. Already in 793 Charlemagne envisioned a similar connection and even began work the Fossa Carolina, or Charles’ Ditch. The Fossa Carolina ran along a different route between the Frankish Rezat and Altmühl river (East, 1932; Liedel & Dollhopf, 1996). However, the Ludwig Canal was narrow and could not accommodate the larger commercial ships that were being built to successfully compete with rail transport (Zelmhefer, 1992). Already in the 1890s there were plans to build a new canal. The Ludwig Canal finally fell out of use and, by the 1950s was no longer maintained.

\textsuperscript{21} The Peace Treaty of Adrianople abolished the single-buyer system in which Turkey was the only market for livestock, grain, wine and cooking oils from the Danubian principalities, primarily from Moldavia and Wallachia. Local Danubian merchants lacked the capacity to take advantage of the change in trading terms. Instead, western European merchants gained rights to trade from the Ottomans and stepped in to take advantage of new opportunities for trading agricultural products, such as grain, thereby establishing an interest in the Danube economy (Jensen & Rosegger, 1978). The Treaty of Adrianople also extended Russian control over most of the Danube delta and permitted Russia quarantine shipping goods on islands within the river, which would later became a serious point of contention (Chamberlain, 1923; Costa, 1981; Sherman, 1923).
first between Russia and Austria in 1840, then Austria and Bavaria in 1851, then Russia and Bavaria in 1853, incorporated the principle of freedom of navigation, specifying navigation would be open to ships of all nations (Chamberlain, 1923; Costa, 1981).

However, signing a treaty Russia established sanitary quarantine stations at the mouth of the Danube, using the Plague as justification, and then failed to maintain the Sulina delta channel adequately for shipping (Kaeckenbeek, 1962; "The Re-Opening of the Danube," 1954). The conditions for navigation in the delta deteriorated. Ships frequently ran aground on shoals in the delta. Lighters were therefore needed to unload cargo onto river barges. These barges were sailed mostly by Greeks, who the other merchants considered pirates who stole cargo and were in collusion with river pilots. The river pilots were accused of purposefully running the ships aground in the first place. Sir Charles Hartley, chief engineer of the European Danube Commission from 1856 to 1907, described the state of the Sulina mouth of the Danube in 1852:

For some years before the improvements an average of 2000 vessels of an aggregate capacity of 400,000 tons visited the Danube and of this number more than three-fourths loaded either the whole or part of their cargoes from lighters in the Sulina roadstead, where lying off a lee shore, they were frequently exposed to the greatest danger. Shipwrecks were of common occurrence, and occasionally the number of disasters was appalling. One dark winter night in 1855, during a terrific gale, 24 sailing ships and 60 lighters went ashore off the mouth and upwards of 300 persons perished (quoted in ("Danube," 1910): 822).

A decline in the lower Danube grain trade allowed Russia to rival British control over trading interests in the region ("The Re-Opening of the Danube," 1954). The main export along the lower Danube was grain, which directly competed with Russia’s grain trade from Odessa (Chamberlain, 1923). The quarantine rules obliged ships heading for the
Danube to first go to the Russian port of Odessa to be inspected and purified. The poor delta conditions further shifted the transport of goods from the Black Sea away from the Danube and to Russian territory (Krehbiel, 1918; Teclaff, 1991a). As a result, Russia gained financially. Great Britain contended the Russians deliberately neglected the channel. Joining Great Britain, Austria and later other countries protested futilely that Russia was not living up to its obligation to maintain the river in a condition suitable for commerce (Krehbiel, 1918). Whether or not Russia’s failure was intentional, the general lack of knowledge about the geography and hydrology of the delta would have made it very difficult for the Russians to maintain it adequately (Focas, 1987). Austria tried to secure an agreement to construct another in the lower Danube, from Cernavodă to Constanta on the Black Sea, bypassing Russian territory. Unsuccessful, the Austrian Danube Steam Navigation Co. was forced to transport goods over land in that area (Chamberlain, 1923).

In summary, until around the 17th century most navigation and trade on the Danube was regional, not long-distance. As nation-states emerged and their economic interests grew, bilateral agreements were struck allowing merchants to navigate and trade along the river. Although the Danube was excluded from the Congress of Vienna’s provisions for freedom of navigation, these ideas spread along the Danube and were expressed in bilateral agreements. However, as Danubian and other European economies looked to

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22 Farming was expanding along the Danube’s tributaries and was accompanied with higher rates of erosion, meaning the river was transporting higher sediment loads to the delta than it had in the past. The Russians also ended the Ottoman requirement for vessels to rake the delta as they passed, which had prevented siltation of the delta in the past. (Jensen & Rosegger, 1978).
expand beyond national and regional boundaries, a variety of physical and political
obstacles continued to impede navigation along the river.

The First Navigation Regime: From the Treaty of Paris to World War One (1856-
1914)

Defeat in the Crimean War and, according to Teclaff (1991), Russia’s ensuing transition
from riparian to non-riparian status provided the opportunity for the western European
powers to expand the principle of freedom of navigation and unified, international
cooperation on river administration to the Danube. According to the terms of the post-
Crimean War 1856 Treaty of Paris, Russia reluctantly (Temperley, 1932) gave up its
territory in the delta to the Ottoman Empire and was, therefore, no longer a Danube
riparian. As a non-riparian, Russia changed its position and supported freedom of
navigation on the Danube as a right of all ships independent from riparian control. This
paved the way for the first international regime for navigation on the Danube. However,
similar to the Congress of Vienna, agreement to adopt the principle of freedom of
navigation belied the debate over how to implement it in four policy areas. Over the
course of the regime the institutional arrangements changed. The first navigation regime
for the Danube can therefore be subdivided into two stages, an initial stage from 1856 to
the period between 1858 and 1865, when multilateral efforts on the fluvial Danube
dissolved and the authority of the European Danube Commission expanded. The second
stage lasted until World War I.

23 Recall that one of the reasons the Danube was excluded from freedom of navigation under the Final Act
of the Congress of Vienna was resistance from Russia, which controlled territory in the Danube delta.
Implementing Administrative Organization

At the start of the first navigation regime, authority for implementing international cooperation on navigation was, in principle, temporarily divided between two commissions corresponding to two different geographic areas, the fluvial and maritime Danube. Article 16 created the European Danube Commission (EDC). The EDC was designed to be a temporary, two-year organization, with a seat in Galatz, to implement urgent cooperation to improve the conditions for navigation in the maritime Danube. Upon dissolution, its responsibilities were to be assumed by the river commission, whose riparian members were eager to gain control over the entire river (Krehbiel, 1918). However, unanimous consent was needed to dissolve it. The Riparian Commission was intended to create uniform regulations for navigation, ensure security on the river, coordinate improvements to river navigability (although authority for implementing river maintenance remained under riparian control), and assume the responsibilities of the maritime European Danube Commission after its temporary two year period (Donaukommission, 2004; Gourdon, 1857). Intended as a permanent commission, its only notable action was to promulgate the 1857 Upper Danubian Navigation Act. This Act effectively gave control of most river activities to individual riparians and reduced the authority of the Riparian Commission. The Riparian Commission itself met for only two years. Thereafter the upper and middle Danube were administered by individual

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24 Article 16 was based on a French proposal with an Austrian amendment.
25 Russia later tried unsuccessfully to revive it (Sherman, 1923). Austria was also later uninterested in reviving the Riparian Commission because Prussia would have demanded to participate to represent Bavaria and Württemberg, who had joined the German Empire in 1871 (Costa, 1981).
riparian authorities. Dismayed by the new rules, the non-riparians refused to consent to the dissolution of the EDC, over Austria’s strong objections (Krehbiel, 1918). Instead, the EDC’s mandate was renewed numerous times and for successively longer time periods, rendering the EDC a lasting commission in practice.

At the end of the Crimean War one of the four areas for negotiation the victorious allies and neutral countries communicated to Russia was: “The freedom of navigation of the Danube shall be completely secured by effectual means, and placed under the control of a permanent syndical authority (Count Buol-Schauenstein, plenipotentiary of Austria, quoted in (Kaeckenbeek, 1962):84).” Russia was concerned over the impact of the new implementing authority on the adjacent riparians’ sovereignty. It considered internationalizing the delta the conferral of extraterritorial rights to non-riparians. Russia wanted the syndicate to assure freedom of navigation, but act only on scientific, technical and commercial issues, not political issues. France did not think it was possible to create such an authority without extending its competence into political areas. In accordance with the principle of freedom of navigation, France thought the syndicate should represent the interests of riparians and non-riparians alike. France also considered the recent failure by the Russians to maintain the navigability of the mouth of the Danube sufficient justification for making the delta and the new authority political neutral, effectively limiting riparian control of the areas. As part of the overall compromise agreement, Russia accepted renaming the organization a commission, instead of a

26 The victorious allies were France, Great Britain, the Ottoman Empire, and Sardinia. Austria and Prussia remained neutral during the war.

27 Although Russia was not a riparian at the time, it had ambitions to regain territory in the Danube delta, which it did by annexing Bessarabia in 1878 after the Romanian War of Independence.
syndicate (Kaeckenbeek, 1962; Krehbiel, 1918). Russia may have thought the participating countries could more easily control the actions of a commission than a syndicate.  

After the non-riparians refused to dissolve the EDC in 1858, its mandate was extended for eight years. In 1865, at the third Paris Conference, the participants extended the EDC’s mandate for another five years. In 1871, its mandate was extended for another twelve years. In 1883 its mandate was extended for another twenty-one years and the participants agreed thereafter to automatically renew the EDC’s mandate for three year periods, unless a member gave one year’s notice of its opposition (Krehbiel, 1918).

Over time the EDC did acquire the discretionary political powers Russia was concerned about during its conception, such as legislative, executive and judicial powers (Sherman, 1923).  The EDC took over most efforts to maintain the delta. This was in part because the Ottoman Empire initially lacked the financial means to do so itself (Jensen & Rosegger, 1978). Britain and France were also eager to use EDC projects to improve commerce in the delta region for their merchants, who were generally excluded from the upper and middle Danube.  Austria-Hungary and the two German states were also interested in ships having access to trade in the delta, which was downstream of their own

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28 “Commission” conveys authority to act only in a prescribed manner, whereas “syndicate” could indicate authority to act more independently ("commission," 1989; "syndic," 1989).

29 The only remaining concession to the Ottoman Empire, which maintained suzerain control over much of the delta, was the approval of the nomination of officials to the EDC (Kaeckenbeek, 1962). The Ottoman Empire was the suzerain state of the regions around it, which at one time included Serbia, Moldavia, Wallachia and Montenegro. The Ottoman Empire exercised control over these regions in areas such as foreign policy and defense, but the states also retained some degree of domestic autonomy.

30 Britain and France maintained significant interests in the Danube as the Treaty of Paris declared the Danube principalities independent but under their supervision.
territories. In 1865 the EDC became an independent international organization and eventually was allowed to have its own insignia and flag. Its authority expanded in the delta to include issuing regulations for ships of all flags,\(^{31}\) authority over any water works in the delta area,\(^{32}\) hiring and firing employees,\(^{33}\) choosing which river channel should be developed,\(^{34}\) levying tariffs to pay for needed works,\(^{35}\) borrowing money, and acting as a tribunal for the delta for disputes involving captains or implementation of its regulations (Krehbiel, 1918; Teclaff, 1991a). The EDC's regulations were included in annexes, which it could change as needed by majority vote. Any such changes were binding on the member states, without requiring additional ratification procedures (Krehbiel, 1918).

The expansive authority of the EDC became a significant source of irritation for the newly independent states in the lower Danube.\(^{36}\) At the end of the Russian-Turkish War the Treaty of Berlin of 1878 expanded the geographic scope of the EDC and authorized it

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\(^{31}\) The EDC could even call on the Powers’ warships near the delta to enforce its regulations (Kaeckenbeek, 1962).

\(^{32}\) The EDC’s works, funds, and personnel were declared neutral and given diplomatic immunity in the event of war. The EDC’s works included quays, dikes, lighthouses, channels and deepening, straightening and canalizing the Sulina river branch in the delta. At the same time other land based developments were also initiated to promote the grain trade, such as a privately funded railway between Cernavodă and Constanța. This railway was intended to provide a link between the Black Sea and the Danube, avoiding the shallow and hazardous delta. However, hydrology, natural disasters, poorly developed infrastructure for land-based trade, difficulties with local bureaucrats, ineffective technology transfer and other problems prevented the railroad from successfully competing with the delta for Danube trade (Jensen & Rosegger, 1978).

As a result of the EDC’s work, both the total tonnage of ships using the Danube and the size of ships that could pass carrying cargo and passengers increased ("Danube," 1910). For example, the British expanded their tonnage over three-fold between 1861 and 1874 (Jensen & Rosegger, 1978). However, even with the growth in shipping, cargo moved along the Danube in 1911 was under 7 million tons, compared to the 57.5 million tons, which moved along the much shorter Rhine (East, 1932).

\(^{33}\) Many of the EDC’s engineers were British or from western Europe, i.e. not from delta riparian countries.

\(^{34}\) At times delegates to the EDC, including the EDC’s chief engineer Charles Hartley, pursued what they saw as their international duty to promote navigation over the wishes of their own countries. For example, this included the decision to improve the Sulina branch and not develop the St. George branch of the maritime Danube (Jensen & Rosegger, 1978; Krehbiel, 1918; Sherman, 1923).

\(^{35}\) The EDC collected fees enabling it to expand improvements up the river (Jensen & Rosegger, 1978).

\(^{36}\) The 1878 Treaty of San Stefano at the end of the Russian-Turkish War of 1877-1878 made Romania and Montenegro and Serbia independent and Bulgaria autonomous.
to act “in complete independence of the territorial authority (Kaeckenbeek, 1962):127).” Romania, the newly independent territorial authority, protested against what it considered an infringement on its sovereignty (Costa, 1981). Lingering issues over participation (discussed in the next section), the wars in the Balkans and the tensions before World War One contributed to the new riparians’ concern over the EDC’s expanding authority.

The start of World War I brought the EDC’s work to a halt. Toward the end of the war the entire Danube basin was controlled by Germany, the Austro Hungarian Empire, and their allies. Through bilateral agreements in 1918 Germany attempted to create a new delta commission to replace the EDC, with membership open only to Danube riparian countries and Black Sea countries (Teclaff, 1991a). However, by the end of 1918 the Central Powers were defeated by the Allies and the bilateral agreements were superseded by new arrangements.37

**Geographic Scope of Cooperation**

Riparian Austria initially sought to limit internationalization of the river to the lower portion of the Danube, the point from which it was shared by Austria and the Ottoman Empire, to the Black Sea (Krehbiel, 1918). All non-riparian states, France, Great Britain, Prussia, Russia, and Sardinia, supported applying freedom of navigation to ships from all countries along the entire navigable length of the river, independent of any individual

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37 An Inter-Allied Danube Commission was created in 1918 under the British Admiral Troubridge’s command to restore navigation under conditions of equal treatment, bring relief to the Danubian countries, and help them restore their economic activity. This Commission transferred its functions to the International Danube Commission in 1920 (Popper, 1943).
riparian’s will. The British, who were interested in increasing grain transports from the Danubian principalities, protested the narrower Austrian scope on the basis that Austria would then have sole control of navigation on the Upper Danube and acquire an exclusive trade advantage. In light of the disagreement, the French negotiator made a distinction between, on one hand, the principle of freedom of navigation and, on the other, the means for maintaining navigation and commerce. In response, Austria agreed to open navigation to all ships on the entire Danube, but sought to keep river maintenance under the authority of the riparian states (Kaeckenbeek, 1962; Sherman, 1923).

The maritime Danube was first proposed to extend from Galatz to the Black Sea at Sulina, but negotiations reduced its extent to the shorter length from Isatcha (now Issacea, Romania) to the Black Sea (Kaeckenbeek, 1962; Krehbiel, 1918). When the EDC’s mandate was extended in 1878, the geographic area under its authority was expanded to Galatz (Krehbiel, 1918; Verzijl, 1970). The EDC later tried to further expand the geographic scope to Braila and, under the Mixed Commission, from Braila to the Iron Gates, but neither of these was never successfully implemented (Costa, 1981). In 1883 Russia withdrew the Chilea branch from the EDC’s authority (Kaeckenbeek, 1962; Sherman, 1923; Teclaff, 1991a). Therefore, even at its greatest expanse, in practice, multilateral cooperation under the first regime extended over only the main river from Braila to the Black Sea via the Sulina and St. Georges branches (about 170 kilometers).
Participation

In the negotiations for the Treaty of Paris, the debate over participation in the new Danube authorities highlights the apprehension riparian and non-riparian states had over whether or not their interests would be represented. Great Britain claimed important economic interests in Danube shipping and sought to be included in the river commission. However, Austria successfully opposed Great Britain, claiming the Final Act of the Congress of Vienna provided only for representation of riparian states on such commissions (Kaeckenbeek, 1962). Only the seven post-Crimean War riparians were intended to participate in the river commission: Austria, Bavaria, Württemberg, and the Ottoman Empire, along with a representative from the Danube principalities of Moldavia, Wallachia, and Serbia, to be approved by the Ottoman Empire (Donaukommission, 2004; Gourdon, 1857). Lord Russell, for Britain, countered with a claim that the EDC should then be permanent, presumably to protect the interests of non-riparians, but was opposed by the other states. In practice the 1857 Upper Danubian Navigation Act subjected freedom of navigation to riparian regulation and weakened the authority of the Riparian Commission. After two years the fluvial Danube returned completely to control by individual riparian states and multilateral cooperation was confined to the maritime Danube.

The EDC included participation from all signatories to the 1856 Treaty of Paris, including both riparian and non-riparian delegates. At the beginning this included five

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38 As mentioned above Russia was also concerned the new authority would not represent riparian interests sufficiently and would lead to an expropriation of their sovereign right to control their territories.
non-riparians and two riparian states: Austria, the Ottoman Empire, Great Britain, France, Prussia, Russia and Sardinia. Bavaria and Württemberg joined Prussia in the German Empire in 1871, making it a riparian state. Romania became an independent state in 1878 and was given full membership in the EDC. Russia annexed territory in Bessarabia in 1878 and again became a riparian. As a result of these changes the Ottoman Empire lost its territory along the Danube. There were now four riparians and four non-riparian states in the EDC. Serbia also became independent in 1878, but was not admitted to the EDC. Bulgaria became autonomous from the Ottoman Empire in 1878 and independent in 1908, but was not given membership in the EDC. If Serbia and Bulgaria had been given full membership, according to the EDC’s majority voting rules the riparian countries could have dominated the EDC’s decision-making.

The EDC’s 1878 decision to create a Mixed Commission for the part of the river from Braila to the Iron Gates, put under international control the portion of the river flowing through the territories of the new downstream riparians: Romania, Bulgaria, and Serbia. However, Bulgaria and Serbia were not represented in the EDC and did not participate in this decision. Austria, which was not riparian to the new section of the river, proposed it would chair the Mixed Commission, which would otherwise include delegates from the new downstream riparians. This was a way for Austria to expand its own influence in the basin, while opposing the influence of the non-riparians and Russia. The French proposed a similar composition, but added a rotating member from the EDC to give the other stakeholders some input. Romania was concerned permanently giving Austria the

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39 In the lead up to World War I the German Empire and Austro-Hungarian Empire were trying to expand their influence over the basin. At the start of World War I, allied with the Ottoman Empire, Romania and Bulgaria, they opposed British, French, Russian, and Italian influence in the basin.
chair would strengthen Austrian ambitions for control in the lower basin. Romania therefore offered a third proposal in which the Mixed Commission would include the three new riparians and two delegates from the EDC, which would rotate among the EDC’s members excepting Romania. One of the rotating EDC delegates would be the chair. In 1883 the original EDC members (Austria, Britain, France, Germany, Italy, Russia, and the Ottoman Empire) held a conference. Recall Romania was by then a full member of the EDC. Nevertheless, based on a majority vote, Romania and Serbia were invited to participate only in a consultative, not full voting, capacity. Bulgaria, was not invited to participate as it was autonomous but not yet independent. Instead, its interests could be represented by the Ottoman Empire. Serbia agreed, but Romania and Bulgaria protested and refused to participate (Kaeckenbeek, 1962; Sherman, 1923; Teclaff, 1991a).

The EDC voted in support of the French proposal for the Mixed Commission. Although detailed rules were developed regulating navigation from Braila to the Iron Gates, these rules were not implemented and the Mixed Commission never came into existence because Romania refused to participate. From then on Romania resisted the authority of the EDC (Kaeckenbeek, 1962; Sherman, 1923; Teclaff, 1991a). During World War I a new delta commission briefly replaced the EDC, with membership open only to Danube riparian and European Black Sea littoral states (Teclaff, 1991a).
Range of Activities

As a result of Russian concerns over its authority, the range of activities addressed by the EDC was initially limited. The main issues addressed by the first regime focused on cooperating to provide the physical conditions, freeing the delta from silt, and institutional conditions to implement freedom of navigation in the maritime Danube (Donaukommission, 2004; Kaeckenbeek, 1962; Krehbiel, 1918). Article 15 of the Treaty of Paris prohibits impediments to navigation, such as tolls on navigation, other than those explicitly provided for in the Treaty, and specifies that the necessary impediments should be applied to all nations equally and strive to foster navigation as much as possible.40 However, unlike the Final Act of the Congress of Vienna, the Treaty of Paris does not contain explicit language internationalizing rivers for trade. As a result, it was unclear whether freedom of navigation would apply to ships from both riparian and non-riparian states or whether this freedom would be subject to riparian regulation (Costa, 1981; Gourdon, 1857).

Although the fluvial Danube was originally intended to address similar institutional and physical issues as the EDC, river maintenance and improvement for navigation were excluded from international cooperation due to Austrian concerns. These activities remained under riparian control. International cooperation was limited to implementing

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40 La navigation du Danube ne pourra être assujettie à aucune entrave ni redevance qui ne serait pas expressément prévue par les stipulations contenues dans les articles suivants. En conséquence, il ne sera perçu aucun péage basé uniquement sur le fait de la navigation du fleuve, ni aucun droit sur les marchandises qui se trouvent à bord des navires. Les règlements de police et de quarantaine à établir, pour la sûreté des États séparés ou traversés par ce fleuve, seront conçus de manière à favoriser, autant que faire se pourra, la circulation des navires. Sauf ces règlements, il ne sera apporté aucun obstacle, quel qu’il soit, à la libre navigation (Article 15 of the Treaty of Paris as cited in (Gourdon, 1857)).
the principle freedom of navigation, i.e. the passage of ships of all flags. The Upper Danubian Navigation Act further limited cooperation on freedom of navigation to only those ships traveling between ports on the Danube and the open sea. Navigation occurring between river ports was to be operated by riparian ships and closed to others. Similarly, only riparians were given the right to use port facilities along the river for navigation and commerce. The riparians also reserved the right to subject navigation to other regulations in the future (Costa, 1981). As implementation and enforcement of these regulations were left to the individual riparians, this cannot be considered an international regime in practice.

At the subsequent conference in Paris in 1858, the non-riparians, led by the British, French, Sardinians, and Prussians, protested the Upper Danubian Navigation Act, claiming its rules were contradictory to their interpretation of freedom of navigation, which included enabling commerce for all along the international river. Austria, Bavaria and Württemberg interpreted freedom of navigation as applicable only to ships from riparian states. Over the others' protects, these riparians applied the new rules along the Danube within their territories from Ulm to the Iron Gate gorge until the start of the World War I (Costa, 1981; Kaeckenbeek, 1962; Sherman, 1923; Teclaff, 1991a).41

In summary, following the Crimean War, the 1856 Treaty of Paris established the first multilateral regime for the Danube. The Danube and its delta were declared international

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41 As already mentioned, the Ottoman Empire’s main interest was in preserving its territorial boundaries and, as the Treaty of Paris accomplished this, was willing to go along with either the riparian or non-riparian coalition’s preferences. It agreed not to apply the Riparian Commission’s rules until a full agreement was reached between all Contracting Parties, which never happened (Kaeckenbeek, 1962).
in Article XV, in accordance with the principle of freedom of navigation articulated in
the 1815 Final Act of the Congress of Vienna. This brought the last major European river
under international regulation (Sherman, 1923). The Riparian Commission issued rules
for navigation, which the non-riparians deemed unacceptable and dissolved itself after
two years. Instead, the EDC became an ongoing forum for coordinating multilateral
cooperation on navigation. In practice navigation on the Danube was divided between the
maritime regime, implemented by the EDC, in which freedom of navigation was applied
to all ships, and the rest of the Danube, which was regulated according to riparian rules
providing for freedom of navigation only to ships trading between river ports and the
open sea. The development of the institutional arrangements are summarized in Table 2.
Table 2 Development of the First Danube Navigation Regime’s Institutional Arrangements

<table>
<thead>
<tr>
<th>Institutional Arrangements</th>
<th>DNR1A</th>
<th>DNR1B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Geographic scope</strong></td>
<td><strong>DNR1A</strong></td>
<td><strong>DNR1B</strong></td>
</tr>
<tr>
<td></td>
<td>Fluvial Danube: In principle, navigable length of main river</td>
<td>Maritime Danube: Main river from Galatz to the Black Sea and littoral areas adjacent to the delta. Later unsuccessfully expanded to Braila and the Iron Gates</td>
</tr>
<tr>
<td></td>
<td>(Dissolved in 1958).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maritime Danube: Main river from Issacea to the Black Sea and littoral areas adjacent to the delta.</td>
<td></td>
</tr>
<tr>
<td><strong>Range of activities or issues addressed</strong></td>
<td><strong>DNR1A</strong></td>
<td><strong>DNR1B</strong></td>
</tr>
<tr>
<td></td>
<td>Fluvial Danube: Regulations for navigation</td>
<td>Maritime Danube: Regulations for navigation; Maintenance and improvement of conditions for free navigation</td>
</tr>
<tr>
<td></td>
<td>Maritime Danube: Regulations for navigation; Maintenance and improvement of conditions for free navigation</td>
<td></td>
</tr>
<tr>
<td><strong>Participation</strong></td>
<td><strong>DNR1A</strong></td>
<td><strong>DNR1B</strong></td>
</tr>
<tr>
<td></td>
<td>Fluvial Danube: 7 riparians: Austria, Bavaria, the Ottoman Empire, Moldavia, Serbia, Wallachia, Württemberg</td>
<td>Maritime Danube: (By regime end)</td>
</tr>
<tr>
<td></td>
<td>Maritime Danube: 2 Riparians: Austria, the Ottoman Empire</td>
<td>4 Riparians: Austria, Prussia (riparian as of 1871), Russia (riparian as of 1878), Romania as of 1878</td>
</tr>
<tr>
<td></td>
<td>5 Non-riparians: Great Britain, France, Prussia, Russia, Sardinia</td>
<td>4 Non-riparians: Great Britain, France, Ottoman Empire (not riparian as of 1878), Sardinia</td>
</tr>
<tr>
<td><strong>Role of the international authority</strong></td>
<td><strong>DNR1A</strong></td>
<td><strong>DNR1B</strong></td>
</tr>
<tr>
<td></td>
<td>Fluvial Danube: Create uniform rules for navigation and its security, coordinate river navigability improvements, assume EDC’s responsibilities after 2 years</td>
<td>Maritime Danube (EDC):</td>
</tr>
<tr>
<td></td>
<td>Maritime Danube (EDC):</td>
<td>Executive: Coordinate, maintain and develop improvements for navigation in the delta area; Raise funds for delta works Legislative: Issue and enact uniform regulations for navigation Administrative: Hire its own staff Judicial: Settle disputes involving captains or delta regulations</td>
</tr>
<tr>
<td></td>
<td>Executive: Implement urgent works to improve the conditions for navigation</td>
<td></td>
</tr>
</tbody>
</table>

Please note: “DNR1” indicates the first Danube navigation regime from 1856-1914, which is further subdivided into two stages of regime development. DNR1A lasted from 1856-1858 and DNR1B from 1858-1914.
Discussion

The institutional arrangements created by the Treaty of Paris can be considered adaptive in some respects over the initial two year period. The riparian and non-riparian states disagreed with one another over how to implement freedom of navigation. The non-riparians wanted broad freedom of navigation for all ships on the entire river and were unsure whether or not the riparians would support those interests. The non-riparians wanted riparian control over navigation and were unsure how cooperating with the non-riparians’ could limit decision-making within their own territories. Rather than waiting until they could all agree to finalize the institutional arrangements, the participants took an adaptive approach in deciding to manage their conflict through a short-term two year agreement as a means to a final outcome. This gave all the countries the ability to develop urgent measures for the delta, which was in all the parties’ short-term interest, while the riparians developed long-term rules for the entire river. In its geographic scope, the effort to develop rules for the entire river is also an adaptive approach to dealing with conflict because, if implemented, it could have encouraged the riparians to consider the impacts of their decisions on the entire river.

The initial two-year period involved participation from both riparian and non-riparian states. However, if the non-riparians voted to dissolve the EDC, the long-term arrangements of the Riparian Commission did not include any opportunity for ongoing participation from the non-riparians. The non-riparians would have no say in any future rules the riparians developed or changed and, as happened, the non-riparians had little
incentive to vote to dissolve the EDC. The long-term arrangements of the Riparian Commission took a conventional approach to conflict because there was no mechanism to address any future conflicts between the riparian and non-riparian stakeholders. There was also no review period for the Riparian Commission in which the non-riparians could participate.

The initial range of issues the commissions addressed was restricted. However, the EDC and Riparian Commissions had the authority to change their regulations without additional ratification by the Treaty of Paris signatories. Ratification procedures can be cumbersome and take a long time as countries debate the changes. This would make it harder for the Commissions to adjust navigation rules as needed to respond to future conditions. Therefore, giving the Commissions the authority to enact and change rules was an adaptive approach to uncertainty. However, because there were no other mechanisms for the non-riparians to participate in future regulations, the lack of ratification can also be considered a conventional approach to ignoring future conflict.

The riparians and non-riparians were also uncertain about how cooperating with the other coalition would affect their own ability to protect their interests. The short-term arrangements addressed this uncertainty through a kind of contingent agreement, a two year period in which they could see what would actually happen. If the Riparian Commission developed rules that accommodated the conflicting interests of all the stakeholders, they could establish control over the entire river. Then, even though the future Riparian Commission would include participation from only some of the
stakeholders, it would have to represent the interests of them all in order for the EDC to be dissolved. If, instead, the new rules ignored the non-riparians' interests, the non-riparians could block dissolution of the EDC and the riparians would have to deal with a long-term non-riparian presence in navigation decision-making. For each coalition, the short-term agreement addressed uncertainty about how the other coalition would act and, in this sense, was an adaptive arrangement.

The institutional arrangements created by the Treaty of Paris can be considered adaptive over this initial two year period because (1) they approached the entire navigable river as a system and would have provided for the development of rules governing the entire river; (2) the implementing authority could adjust the navigation rules to respond to change without additional ratification procedures; (3) a contingent agreement addressed uncertainty so the participants could proceed with cooperation despite continuing differences; and (4) the contingent agreement managed the stakeholders' differences in the short-term by providing a mechanism to ensure all interests were represented in some way under either future outcome. The long-term arrangements for participation took a more conventional approach to conflict, by not providing opportunities for ongoing input from all the stakeholders. This created a significant incentive for the non-riparians to vote against dissolving the EDC.

The second stage of the regime took an adaptive approach to uncertainty. In 1858 the participants were unsure of what work and activities would be needed to ensure freedom of navigation in the delta in the future. The countries therefore limited the duration of
their agreement to a time period over which the participants had some confidence about their expectations for the future. After this time they could review their cooperation and renegotiate the arrangements as needed. They used the same strategy over the next roughly fifty years. The parties took advantage of the review to adjust their arrangements in a number of ways. They expanded the geographic scope of international cooperation so it encompassed some additional parts of the lower Danube. Most of the river, however remained outside of the scope of multilateral cooperation. The expanded the range of issues they addressed. They expanded the authority of the EDC and enabled it to change regulations through majority vote, which then became binding on all participants. The institutional arrangements for participation were adaptive, at least in principle, because the participating countries could have adjusted them to include new stakeholders. For example, they extended nominal participation to Romania. The requirement for majority, and not unanimous, support for changes to the regulations made it easier for the EDC to respond to changing conditions.

However, the requirement for only majority support for changes also made it possible for countries to ignore minority interests. For example, by majority vote, the EDC declined full voting participation to Romania, Bulgaria, and Serbia in the 1883 conference to renegotiate the EDC’s mandate. By excluding them from voting the EDC did not have to manage any conflict between their interests and those of the EDC’s members. The EDC’s refusal to include the new riparians was a conventional approach to conflict and provided little opportunity to manage the worsening conflict among the now expanded group of stakeholders. Indicative of the conflict between the stakeholders was the limited
geographic scope of international authority over the river and failed efforts to expand it. Because there was no forum for considering the impacts of decisions on the entire river, the limited geographic scope can also be considered a conventional approach to conflict.

The approach to conflict and uncertainty of the institutional arrangements of the two stages of the first Danube navigation regime are summarized in Table 3 below.

Table 3 Approach to Conflict and Uncertainty of the Institutional Arrangements of the First Danube Navigation Regime

<table>
<thead>
<tr>
<th>Regime</th>
<th>Approach to Conflict</th>
<th>Approach to Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adaptive: Intent to address entire river</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adaptive/Conventional: Initial participation from both riparians and non-riparians, but no long-term participation from non-riparians after end of two year period</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conventional: No mechanism to manage tensions with non-riparians (for example, no requirement for future ratification or other opportunity to provide input)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adaptive: Temporary two year arrangement while enact long-term rules</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conventional: Narrow range of issues</td>
<td></td>
</tr>
<tr>
<td>DNR1A</td>
<td>Adaptive/Conventional: Both riparians and non-riparians participated, but new states excluded from full participation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conventional: Majority vote meant could ignore minority interests and participation of new stakeholders</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adaptive: Broad range of issues</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conventional: Limited geographic scope</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adaptive: Authority of EDC to adjust arrangements through majority vote with no additional ratification procedures, made it easier to adjust arrangements</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adaptive: Limited duration of agreements, built in opportunities for review and renegotiation</td>
<td></td>
</tr>
</tbody>
</table>

43 Please note: “DNR1,” indicates the first Danube navigation regime from 1856-1914, which is further subdivided into two stages of regime development. DNR1A lasted from 1856-1858 and DNR1B from 1858-1914.
The Second Navigation Regime: From World War One to World War Two (1919-1936)

After World War I the number of nations within the Danube basin again increased with the creation of new countries, such as Czechoslovakia and Yugoslavia. More of the trade within the basin, much of which had previously been within large countries or empires, was now international. The Allied Powers considered the new and newly enlarged states vulnerable to economic domination by Germany and internationalization of the river an essential part of accomplishing this objective. In comparison to pre-World War I when the newly independent states considered internationalization a threat to their sovereignty, establishing international authority over the river was seen as a way of defending their independence (Costa, 1981).

At the end of the World War I, the 1919 Treaty of Versailles, Treaty of Saint-Germain-En-Laye, and 1920 Treaty of Trianon included language establishing international authority over the Danube. Pursuant to the treaties, the Convention Instituting the Definitive Statute of the Danube was negotiated in the 1921 Conference of Paris between Belgium, France, the United Kingdom, Greece, Italy, Romania, Yugoslavia, Czechoslovakia, Germany, Austria, Bulgaria, and Hungary ("Convention Instituting the Definitive Statute of the Danube," 1923).

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44 The Treaty of Versailles ended the state of war between the Allied Powers and Germany, the Treaty of Saint-Germain-En-Laye ended the state of war between the Allied Powers and Austria, and the Treaty of Trianon ended the state of war between the Allied Powers and Hungary.
Geographic Scope

This second Danube navigation regime maintained the first regime’s administrative
distinction between the delta area and the rest of the river. The maritime Danube was
designated from Braila to the Black Sea. International cooperation was also extended, for
the first time in practice and not only principle, along the entire navigable international
river, which was defined as the main river from Ulm to the Black Sea. The Treaty of
Trianon declared additional parts of the river system under international authority:

...all navigable parts of this river system which naturally provide more than one
State with access to the sea, with or without transshipment from one vessel to
another, as well as lateral canals and channels constructed either to duplicate or to
improve naturally navigable sections of the specified river system or to connect
two naturally navigable sections of the same river ("Treaty of Peace between the
Allied and Associated Powers and Hungary, June 4, 1920 (Treaty of Trianon),"
1920): Article 275).

The geographic scope of the second regime also included tributaries providing more than
one riparian State access to the Sea, some canals, including the planned Rhine-Danube
deep canal, and areas adjacent to the Danube delta. Tributaries located wholly within one
country and non-navigable parts of the river system were excluded. The Convention
therefore falls short of the adopted in some European agreements at the time, which
declared international all tributaries which flow into lakes and streams located along
borders, regardless of their navigability (Teclaff, 1967). The nation-state border and
navigability are the determinants of what is and is not considered an international river,
not the hydrologic connections of the river system themselves. Despite these limitations,
the second regime dramatically expanded opportunities for cooperation to include issues
related to the entire navigable international river system.
Range of Activities

The Treaties at the end of World War I used similar language to define freedom of navigation under the second navigation regime.

On the waterways declared to be international...the nationals, property and flags of all Powers shall be treated on a footing of perfect equality, no distinction being made, to the detriment of the nationals, property or flag of any Power, between them and the nationals, property or flag of the riparian State itself or of the most-favoured nation ("Treaty of Peace between the Allied and Associated Powers and Austria (St. Germain-en-Laye, 10 September 1919)," 1919): Article 292). 45

In comparison to the 1856 Treaty of Paris, which left it implicit that freedom of navigation would apply to ships from both riparian and non-riparian states, the second regime made it clear that freedom of navigation should apply “on a footing of perfect equality, no distinction being made” to ships from riparian states and to victorious non-riparian states. Fluvial cooperation included implementing freedom of navigation on the river, with the use of ports and other facilities necessary for trade, and technical cooperation, such as developing standards for river channel depth. The issues for the EDC were the same as those it addressed under its pre-war capacities. In addition to the EDC, several new multilateral bodies were envisioned for implementing cooperation on a range of issues: an International Commission, a permanent technical Hydraulic System Commission, and an ad-hoc tribunal to be created by the League of Nations was envisioned for settling disputes as needed.

45 Powers referred to the signatories. The signatories of the Treaty of Saint-Germain-En-Laye included both riparians and non-riparians with significant interests in the Danube, as well as a number of other Allied Powers with limited interest in the Danube. The signatories were Austria, Belgium, the British Empire, China, Cuba, France, Greece, Italy, Japan, Nicaragua, Panama, Poland, Portugal, Romania, Serb-Croat-Slovene State, Siam, Czecho-Slovakia, and the USA.
The riparian states within Hungary’s pre-World War I territory participated in The Hydraulic System Commission (HSC): Austria, Hungary, Czechoslovakia, Yugoslavia, Romania, and a chair appointed by the Council of the League of Nations. Although it was therefore not a true basin-wide organization, the territories of the participating riparians make up a large part of the basin. The HSC was intended to collect data relevant to navigation to

...maintain and improve, particularly as regards deforestation and afforestation, the uniform character of the hydraulic system, as well as of the services connected therewith, such as the hydrometric service and the service of information as to the rising of the waters. It shall also study questions relating to navigation ("Treaty of Peace between the Allied and Associated Powers and Hungary, June 4, 1920 (Treaty of Trianon)," 1920): Article 293).

The HSC for the first established a standing mechanism for producing joint knowledge about both the river system and connected territories. By coordinating activities among multiple stakeholders, the HSC also adopted an adaptive approach to managing conflict between them. The reference to forest cover meant the HSC would also conduct studies and collect data on territories impacting the international river system. It would therefore be concerned with non-navigational aspects in the territories hydrologically connected to the Danube river system. In this regard the HSC was groundbreaking. This approach enabled the HSC to consider the impacts of land and navigation decisions on one another and address any conflicts between them.

Additional evidence of the growing awareness of non-navigational river uses is found in the Treaty of Trianon’s dispute resolution provisions. The ad-hoc dispute resolution
tribunal created by the League of Nations could also consider disputes between navigation interests and irrigation, water-power, fisheries, and other national interests. With the consent of the states members to the IDC, these interests could even be given priority over navigation ("Treaty of Peace between the Allied and Associated Powers and Hungary, June 4, 1920 (Treaty of Trianon)," 1920): Article 282). These arrangements are an adaptive approach to conflict and uncertainty because they coordinate knowledge production among multiple stakeholders, across an expanded geographic area encompassing land and water, and across multiple uses. This adaptive foreshadowed the integrated approach adopted in the Danube in the 1990s (Schwabach, 2000). However, as will be discussed later, the Convention Instituting the Definitive Statute of the Danube limited the effect of these provisions in practice as individual riparians retained primary authority over enacting and enforcing activities on the fluvial Danube (Bruhács, 1993; Popper, 1943).

**Participation**

The second international regime “temporarily” limited the countries participating in regulating the maritime Danube to the World War I victors who has previously participated in the EDC. This included one riparian state, Romania, and three non-riparians, Great Britain, France, Italy.47 The three Central Power countries who

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46 McCaffrey considers the Treaty of Trianon and the HSC a precursor of the integrated approach to managing international rivers because it (1) established macro-scale, intergovernmental organizations for managing the river; (2) provided for the production of joint knowledge on the river system and connected territories; and (3) provided for mechanisms to address conflicts between multiple uses of the river system (McCaffrey, 2006).

47 Sardinia was a member of the EDC under the first navigation regime and part of Italy since 1861.
participated in the EDC under the first Danube navigation regime, Austria, Prussia (part of the German Empire since 1871), and the Ottoman Empire, and Russia,\textsuperscript{48} were excluded. Given the actions during World War I by Germany, Russia and Romania to limit freedom of navigation on the Danube, the Allies (which Romania joined by the end of the war) were particularly interested in limiting German and Russian control over navigation. In principle, all European states with significant maritime commercial or interests were eligible to join the EDC. However, they first had to demonstrate their commercial, shipping, and political interests in the Danube delta. They also needed the unanimous consent of the existing members ("Convention Instituting the Definitive Statute of the Danube," 1923; Popper, 1943). In practice, this prevented any additional countries from joining. Limited participation in the EDC and resentment by other stakeholders may also have made it easier for Romania to erode the EDC’s authority.

The Allies expanded participation in the IDC to include both non-riparians and riparians, with eight riparians, Austria, Bavaria, Bulgaria, Czechoslovakia, Hungary, Romania, the Serb-Croat-Slovene State, and Württemberg, outnumbering three non-riparians, Great Britain, France, and Italy. Participants included one representative from each of the two German riparian states, giving the German Empire two delegates. Bessarabia had become part of Romania in 1918, eliminating Russia as a Danube riparian. Through their participation the non-riparians hoped to prevent any unfavorable changes. However, the weak authority of the IDC also limited international cooperation on the river.

\textsuperscript{48} During the war Russia left the Allies to sign a separate peace with the Central Powers.
Authority of the Implementing Organization

Under the second navigation regime the EDC’s authority was initially similar to the first regime. It was designed as a permanent commission, its authority extended to Braila, and it assumed authority over a similar range of activities. Romania, which controlled all of the Danube delta after World War I, still considered the EDC an infringement on its sovereignty and sought in vain to limit the EDC’s authority to the Danube from Galatz to the Black Sea. Although unsuccessful, Romania’s opposition reduced the effectiveness of the EDC (Costa, 1981). In the 1938 Sinaia agreement between Great Britain, France, Romania, and approved by Italy, the EDC was finally rendered solely a consultative body subject to Romanian veto (Gorove, 1964; Johnson, 1964). Nevertheless the role of the EDC under the second regime can be considered similar to that under the first in intended authority and geographic scope.

Similar to the commission proposed by the 1856 Treaty of Paris, the Convention established a second commission with authority for implementing cooperation on the fluvial Danube, the International Danube Commission (IDC). Located in Bratislava, the IDC was comprised of a permanent secretariat with a non-riparian chief, a technical department, a navigation service with a chief from a non-IDC European State, and an accounting and tax-controlling department. Although the IDC had legislative authority to develop uniform regulations for navigation and its security, it was up to each riparian state to enact and enforce the regulations. Similarly, although the 1921 Convention Instituting the Definitive Statute of the Danube provided for ships from all flags to use
ports and facilities needed for navigation and trade without discrimination, it was up to local authorities to ensure the facilities were accessible. The riparian states were required to provide the IDC with a summary of efforts affecting the river, such as flood control, irrigation and hydropower works. The IDC had the executive authority to supervise navigation such improvement projects, reject them if they impeded navigation, and if the riparians did not follow through, take over project implementation, as well as raise funds for this purpose (Sherman, 1923).

However, in practice the IDC interfered little with riparian projects. The riparian states had the primary responsibility for planning, executing, and financing river maintenance and improvement projects. The IDC could only reject such works if they were detrimental to navigation, giving navigation priority over other river uses (Popper, 1943). Although each riparian designated functionaries to assist the IDC, the IDC also had administrative powers to hire its own staff ("Convention Instituting the Definitive Statute of the Danube," 1923). The IDC’s judicial authority was limited to receiving questions from states related to implementation. If a state alleged the IDC violated the Convention, the IDC would submit the dispute to a special ad-hoc tribunal created by the League of Nations. As a result of its limited executive and judicial powers, the IDC’s authority can be considered limited in comparison to the EDC.

Nevertheless, the IDC provided other value to its participants. International engineers and hydrologists collaborated under the IDC and successfully created standards to improve the conditions for navigation. For example, they issued standards for channel depth and
river bend radii so ships navigating in both directions could pass one another. They also made a list of low water levels along the river and its tributaries. This feat required thousands of synchronized measurements throughout the basin (Popper, 1943).

As a result of the post-World War I cooperation, long-distance cargo and overall transport on the Danube increased steadily until the outbreak of World War II, despite hydrologic difficulties and increasing competition from roads as the primary means for moving short-distance cargo (Popper, 1943). Although manufactured materials, coal and fertilizers from industrial Northwestern Europe could be transported downstream, it was much more difficult and expensive to move Southeastern Europe’s agricultural products, lumber, petroleum and other mineral products upstream. The difficulties were compounded by low flows during the fall, when much of the grain from the Lower Danube needed to be moved upstream. As a result of the river levels, many Danube barges could only operate between four and six months of the year. Despite these obstacles, upstream traffic exceeded downstream traffic by a factor of four or three to one (Gorove, 1964). Much of the long-distance shipping was consolidated under only a few companies, financially controlled by a single British company.49

49 Before World War I there were three main shipping companies in the Danube: the First Danube Steamship Company, based in Vienna, the Hungarian Royal River and Sea Navigation Company of Budapest, and the South German Danube Steamship Company in cooperation with the Romanian State Navigation Company and the Bavarian Lloyd. After the war these companies needed new capital, which was provided when Furness, Withy and Co. financed the Danube Navigation Company in 1920 and obtained significant shares in each of the three existing companies, about one third, half, and all of the shares respectively. The Danube Navigation Company was also entitled to nominate directors to local boards, giving Furness, Withy and Co. control over much of the Danube traffic. Although the Danube Navigation Company exercised its monopolistic authority to encourage economic development, and led to more regular service between some Danube cities, such dominant foreign control of Danube economic interests could have irritated the riparian states. For example, an Anglo-Romanian Danube Navigation Company was formed by the same British group (Woods, 1921).
Discussion

International cooperation under the second regime expanded the geographic scope of cooperation to include most of the navigable river system. The technical department of the IDC and the Hydraulic System Commission (covering only part of the basin) are evidence of an adaptive approach to conflict because they included participation from many stakeholders, addressed most of the river system and sometimes even included land activities. They could therefore explore the tradeoffs between different resource use options. A similar opportunity was provided by the creation of an ad-hoc dispute resolution procedures with a mandate to consider disputes between uses, including non-navigational uses. However, because planning was actually in the hands of the individual riparian countries and the IDC’s authority was weak, the opportunity provided by the adaptive approach to explore tradeoffs was likely significantly limited in practice. Nevertheless, at a minimum the broad participation of riparian and non-riparians did provide a forum for them to discuss issues. For example, according to a Czechoslovakian Technical Adviser and IDC engineer, “The mere fact that the representatives of the riparian States kept in constant touch with each other on the neutral platform offered by the Commission greatly helped to smooth over difficulties by informal negotiation (Popper, 1943):242).” The conventional approach to the EDC’s rules for participation did not provide such opportunities to manage conflict. In fact, their purpose was to stabilize the contemporary regime and prevent Russia and Germany from having a more significant say in decisions on the river. Ultimately, the limited rules for participation contributed to the EDC’s demise as a forum for multilateral negotiation.
The new technical committees greatly expanded knowledge about the river for navigation. In some regards their work epitomizes the conventional approach to uncertainty. The committees were comprised of engineers, scientists, and other technical experts who sought to resolve uncertainty about the natural system. Their objective was to improve the river system for navigation, which translated into engineering projects to alter the river’s morphology and reduce variability in its water level and current. This is understandable because seasonal variation reduces the economic advantage of river transport in comparison to road or rail. For example, if the current is too strong or the water depth too low, ships cannot carry heavier cargo, which must then wait until conditions or improve or be transported by alternate means. Therefore, the approach to improving navigation conditions on the Danube was primarily concerned with making the river system more stable and predictable. However, in many cases there was little knowledge about how the river would respond to proposed engineering projects. In these cases the engineers had to take an adaptive approach: implement the projects despite significant uncertainty, monitor the results, and adjust as needed (Popper, 1943). However, due to the limited authority of the IDC such adaptive strategies to implement projects were taken primarily by individual riparian countries and were therefore outside of the scope of international cooperation. The approaches to uncertainty and conflict of the institutional arrangements of the second Danube navigation regime are summarized in Table 4.
Table 4 Approach to Conflict and Uncertainty of the Institutional Arrangements of the Second Danube Navigation Regime

<table>
<thead>
<tr>
<th>DNR₂</th>
<th>Adaptative: Addressed most of the navigable river system, many issues, and multiple uses</th>
<th>Adaptive/Conventional: Technical groups included participation from many countries but limited to experts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conventional: Limited authority of IDC, made it difficult to highlight tradeoffs when most of implementation under individual riparian control</td>
<td>Adaptive/Conventional: Technical groups included focus on non-navigational issues (HSC), but focused on stabilizing the river system and minimize variability</td>
</tr>
<tr>
<td></td>
<td>Conventional: EDC’s participation rules made it hard to manage conflict among stakeholders / Adaptive: Broad participation of riparians and non-riparians in IDC and technical groups, forum for managing conflict</td>
<td>Adaptive/Conventional: Authority of EDC to adjust some arrangements through majority vote with no additional ratification procedures, made it easier to adjust arrangements / authority eroded over time</td>
</tr>
<tr>
<td></td>
<td>Adaptive: Ad-hoc dispute resolution forum could address disputes between uses, including non-navigational uses</td>
<td></td>
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</tbody>
</table>

World War II: Dissolution of the second navigation regime

In the years leading up to World War II the IDC was dominated by Nazi Germany, which limited the Commission’s authority and geographic scope. In 1934 Bavaria and Württemberg lost their autonomy to Germany, which replaced their two IDC delegates with two German delegates. The other IDC members protested against Germany having two representatives when every other state had only one. However, these members successively lost their independence to Germany, and with it their representation on the IDC. The IDC’s geographic scope was limited to the length of the Danube from the Hungarian-Yugoslav border to Braila. In 1936 Nazi Germany denounced the IDC and the

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50 Please note: “DNR₂” indicates the second Danube navigation regime from 1919-1936.
principle of freedom of navigation, and moved to a policy of bilateral agreements within
the territory it controlled. Austria withdrew from the IDC in 1938. At the same time,
Germany sought membership on the EDC. Germany wanted the ability to influence and
monitor the EDC, which it thought provided the non-riparians with a source of
information about economic conditions in the Danube region by virtue of its headquarters
and activities in the basin (Gorove, 1964). The Sinaia agreement between Romania, Great
Britain and France revised the EDC, accommodating Germany and giving control of the
delta to Romania (Johnson, 1964). Despite the growing hostilities within Europe and
German antipathy to international cooperation, both commissions continued to meet and

Then, in August, 1940 Germany called a new conference to create a replacement
organization for the IDC. Germany invited Hungary, Italy, Romania, Slovakia, and
Yugoslavia to participate. In 1940 the Soviet Union regained control of Bessarabia, but,
to its consternation, was not invited to participate. In a Provisional Arrangement, the
conference dissolved the IDC and created a Council of the Fluvial Danube, under
German control. Following the 1940 conference, the Soviet Union proposed an alternate
arrangement to the Germans. The proposal would dissolve both the IDC and the EDC,
and create a single commission in their place made up of only riparian states: Germany,
Slovakia, Hungary, Yugoslavia, Romania, Bulgaria, and the Soviet Union. The Soviets

51 After gaining control of Bessarabia, the Soviet Union quickly located guns, airplanes, ships and
submarines at the mouth of the Danube. Bessarabia’s location gave the Soviet Union control over the
shipment of oil up the Danube to Germany, provided the opportunity for the Soviets to shape navigation
regulations, and was a basis from which to expand Soviet political and economic influence over Central
and Eastern Europe. The Soviet Union also signed bilateral treaties with Romania, Yugoslavia, Hungary,
Bulgaria and Slovakia covering commerce and navigation, creating favorable conditions for Soviet trade
were arguing for a geographical basis for determining control over the river, which narrowed the opportunity to participate to only riparian states and excluded others who had previously participated in river governance based on their economic interests in the river. Although this proposal went against some German interests, it also provided an opportunity to expel France and Britain from the EDC (Gorove, 1964).

Recognizing Soviet interests in the Danube, the arrangement was agreed on. It dissolved both the IDC and the EDC. It established a unified Danube Commission with authority over the Danube from Bratislava to the Black Sea and representatives from Germany, the Soviet Union, Italy, and the smaller riparian states. A provisional administration, made up of only Germany, the Soviet Union, Italy, and Romania, would continue to regulate the maritime Danube. Britain refused to acknowledge the arrangement, considering it a violation of existing treaties. As a result of the changes, control over the Danube effectively returned to the pre-1856 system of riparian control (Teclaff, 1991a). The Soviet Union considered the new arrangement more just than the Versailles arrangement, as it thought the Danube Commission should naturally be made up of riparian states or those states closely connected to the river, which did not include Britain (Gorove, 1964). Based on this reasoning, the Soviets were displeased by Italy’s participation in the new Danube Commission, but Germany insisted on Italy’s inclusion.

Even with the new arrangement, the Germans and Soviets could not agree on the actual operating procedures for the new regime, and the Commission met only once before open hostilities began between the two countries in 1941. Although the Commission continued
to operate until 1944, it was completely under German control. As a result of World War II, commercial shipping on the Danube came to a standstill. Instead of tradable commodities, ships on the Danube transported German arms and troops eastward. Boats were sunk, bridges bombed, ports destroyed, and the river bed mined, further impeding navigation (Donaukommission, 2004; Gorove, 1964).

Toward the end of the war the Soviet Union extended its authority over the Danube basin through military and diplomatic victories. The Soviet army gained territory eastward into Austria and the American army gained territory westward into Austria. Armistice agreements with Romania, Bulgaria and Hungary put much of the Danube, its ports, meteorological stations and fleet at the disposal of the Soviet Union. Between the 1945 Yalta Conference and 1948 Stalin won concessions from Great Britain and the United States, which effectively gave the Soviet's the control over the Danube territories they had sought earlier from Hitler, i.e. from the Black Sea to the Austrian-Hungarian border, with the addition of a military presence in Austria (Costa, 1981; Pachova & Jansky, 2008). Allocation of zones of occupation in Austria gave the Soviets some additional control, which now extended over the northern bank of the Danube between Passau and Linz, and all of the Danube between Linz and the Black Sea. However, ideological differences between the Soviet Union and the West, evident in disputes over post-war reparations including river vessels and navigation infrastructure, increasingly hampered attempts to reach a comprehensive agreement for post-war administration of the Danube (Gorove, 1964).

52 From Linz to Passau the United States controlled the southern bank of the Danube (Gorove, 1964).
The Soviet Union recognized that securing riparian authority to regulate the river would not be sufficient to fully develop its economic interests. Transporting goods on the Danube was limited by the total number of barges available and the inability of larger barges, those transporting over 600 tons, to navigate the Iron Gates, forcing goods to be unloaded onto smaller barges and increasing both the cost and time needed to ship goods ("Transport in Danubia," 1939). The Soviet Union needed barges, navigation enterprises and shipping facilities in order to realize the potential benefits of navigation for its national economy (Gorove, 1964).

At the end of the war the United States held between 570-670 river vessels, about one third of the total Danube fleet, which were captured from the Germans at the end of the war in what became the American zones in Germany and Austria. These ships originally came from a variety of countries, such as Germany, Hungary, Yugoslavia, Romania, Bulgaria, and Czechoslovakia ("Danubian Coup?," 1946; Gorove, 1964). A number of countries sought the return of their vessels, even though it was unclear how navigable some post-war sections of the Danube were. They thought the river could play a significant role in rebuilding the Danube economies as a potential replacement for lost transportation due to the damaged railroad network. Based on Yugoslavian, Czechoslovakian, and Greek requests, the United Nations Economic and Social Council (ECOSOC) considered the issue.

The United States submitted its own resolution, which claimed that Soviet restrictions on free navigation were the main barrier to Danube traffic. Therefore, the USA asserted,
negotiations on these two issues, the principle of freedom of navigation and the
restitution of the Danube vessels, should be linked in any future negotiations (Gorove, 1964). The Americans wanted to hold the ships until the Soviets agreed to a broader
interpretation of freedom of navigation. As one American official commented, “We are
tired of giving and not receiving anything substantial in return. We have the boats and
they [the Russians] have the river, but the boats can be traded for concessions ("Danubian
Coup?,” 1946).”

The USA called for a conference to be convened under the United Nations with
representatives of all interested states. The Americans hoped for a broad agenda, under
the United Nations, with participation open to all states who owned vessels active on the
Danube before the war. The participation of non-riparians would undermine any Soviet-led attempt to dominate the conference with riparian votes. The objectives would be to
remove barriers to international traffic on the Danube and establish regulations for
navigation, including information exchange, channel maintenance, and operating
agreements between states and the Danube shipping companies. Moscow strongly
opposed linking freedom of navigation to restitution of the Danube vessels. Although the
Soviets were outvoted in ECOSOC and the United States’ proposal was adopted, the
riparians, the Soviet Union, Czechoslovakia, and Yugoslavia refused to participate and
the conference could not be held (Gorove, 1964).

Ultimately, the United States released the ships without exacting anything in return. This
move surprised many. The US may have released them in part because continuing to
refuse to do so was engendering ill will among Danube riparians. Releasing the ships may have been intended as a symbolic olive branch, offered to the Russians with the hopes they would reciprocate with a broader interpretation of freedom of navigation on the Danube. After the release of the vessels the Soviets did pledge to include freedom of navigation in any Danube regime and to call a conference to create a new Danube regime. However, the Soviet Union knew it could interpret these vague pledges however it wanted (Gorove, 1964).

After securing the release of the Danube vessels held by the United States, the Soviets attempted to gain control over various shipping businesses and infrastructure on the Danube. After the war, both the United States and the Soviets were entitled to take possession of German foreign assets within their zones of occupation as reparations. The Soviets interpreted this as including all assets ("The Austrian Scene," 1946). The United States excluded assets which had been seized by the Germans through force in other countries. Some of the valuable navigation businesses and infrastructure included the Austrian firm Schoeller-Bläckmann Iron Works, oil producing areas in Austria, and Austria’s largest shipping company, Blue Danube Schifffahrt (DDSG). Soviet seizure of these assets would have ruined Austria’s economy and undermined its sovereignty, which the West was unwilling to allow ("More Negotiations on Austria," 1948). The Soviet Union did ultimately take control of some of the Austrian assets it demanded. However, the assets remained under Austrian law and were only partially transferred to the Soviet Union. The Soviets took control of similar assets, including the navigation companies, in Hungary, Romania and Bulgaria ("Fruitless Talks on Austria," 1949; Gorove, 1964).
Moscow then created joint companies and secured control of the infrastructure needed for navigation. The first joint company was the Soviet-Romanian Navigation Company (Sovromtransport), created in 1945. Sovromtransport was given a monopoly over river and maritime traffic on the Danube. This meant it had exclusive rights to use ports, port facilities, ship-building, and ship-maintenance infrastructure. A Soviet general manager was in charge of daily operations. In 1946 a similar Hungarian-Soviet navigation company was established, Meszhart. Significant portions of all profits were transferred to the Soviet Union. Similar joint companies were established in Bulgaria and Yugoslavia (Gorove, 1964; Spulber, 1954).  


The United States and the Soviet Union agreed to convene a conference to establish a regime for regulating the Danube from July 30th to August 18th of 1948 in Belgrade.  

Cavendish Cannon, Chairman of the U.S. delegation to the 1948 Danube Conference, described the situation on the Danube at the time:

> Embarkation stations, factories, houses, warehouses, grain elevators, railway and communication routes have been placed under the control of these companies. It is clear that this true monopoly can be used in order to put or not put the essential

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53 However, in 1948, shortly after the Soviet Union secured control over the region, Marshal Tito opposed Stalin’s policies. Yugoslavia was expelled from Cominform, a Soviet led organization of Communist parties lasting until 1956. With the departure of Yugoslavia, the Soviet Union lost its unbroken control of the region. In 1956, after Stalin’s death and during Khrushchev’s Soviet leadership there was a rapprochement between Yugoslavia and the Soviet Union, which brought the end of Cominform.

54 This was the first time in the Danube’s 90 year history of international law that this kind of conference was held on the river’s banks (Donaukommission, 2004).
installations in the great Danubian ports at the disposition of the ships of other nations, including the riparian nations. (Cited in (Spulber, 1954):237, fn2.).

The West entered the Conference with the main goal of securing an expansive interpretation of the principle of freedom of navigation. The Soviet Union sought to maintain "the Danube for the Danubians", i.e. riparian control of the river, and to secure a mantle of legitimacy for its economic and political control of the Danube (Gorove, 1964).

Non-riparians at the Conference included the United States, Great Britain and France. Riparian participants included the Soviet Union, Bulgaria, Hungary, Romania, Ukraine, Czechoslovakia and Yugoslavia. Germany was not represented and Austria participated as a non-voting observer ("Danube for the Danubians," 1948). The West agreed to participate, even though the Conference violated the provisions for revision of the 1921 Treaty of Paris. According to its provisions two-thirds of the signatories had to request the revision, which had not happened. Also, according to the provisions all signatories should have been invited to the Conference, but Belgium, Greece, and Italy were not invited. Austria, supported by the West, sought to participate fully in the negotiations. However, the Soviet Union opposed Austria's full participation pending resolution of its State Treaty, which led to Austria participating as a non-voting observer (Cattell, 1960).

The main issues on the negotiating agenda included the range of activities included in the scope of international cooperation, participation in and the new river basin organization, its institutional affiliation, for example whether or not it would be under the framework of the United Nations, and the status of the 1921 Convention (Gorove, 1964). The American and Soviet delegations introduced proposals addressing these and other issues.
The proposals are compared in Table 5 and discussed in detail in the section that follows.

Although the proposals agreed in theory on a number of points, including on adopting freedom of navigation as a basis for international cooperation (Kunz, 1949), they differed on the interpretation and implementation of this principle and most other issues on the agenda.

A statement by Vyshinsky, the chief Soviet negotiator, to the Western delegates illustrates the mood of the Conference, “The door was open for you to come in; the door is open for you to leave, if that is what you wish (Kertesz, 1984:223).” The Soviets, suspicious of the non-riparians’ intentions, labeled even the Austrian observer a saboteur and threatened him. An early vote taken at the Conference excluded English as a working language, even though two of the sponsoring governments were English speaking. This decision was decided by a split vote, seven to three, which became a familiar pattern throughout the Conference (Gorove, 1964). During fifty-seven contentious votes the seven riparian states voted together to either accept Soviet proposals or reject Western proposals. The non-riparians objected to what they considered the Soviet’s refusal to negotiate. Nevertheless the riparians adopted the Soviet proposal almost word for word in the final Convention (Kunz, 1949).

However, the apparent consensus from the Communist states’ votes masks some differences. For example, in 1946 a Hungarian delegation to Washington discussed Hungary’s interests in maintaining international authority over the Danube and creating a strong international commission, with the participation of non-riparians (Kertesz, 1984). The American delegation referred to these notes at the Belgrade Conference:

It is interesting to note that the postwar government of Hungary on November 12, 1945, addressed a note to the United States, British, and Soviet Governments, giving its views on the Danube question. It called attention to the great importance to Hungary of a regime which guarantees full freedom of navigation. It suggested that the prewar system of international navigation be reconstituted with provisions for changes required by new conditions. The Hungarian Government did not envisage elimination of nonriparian representation, for it suggested consolidation into one Commission of the Danube. Both Commissions, as the Conference is aware, had nonriparian representation. There have been changes since 1945 but we believe the long-term economic interests of Hungary remain the same (Quoted in (Kertesz, 1984):91).

However, the Western Powers did not provide strong support to such dissenters. Instead, the Communists, with Soviet support, increased their control over the central and eastern Danubian states, seizing power in Hungary in 1947. As a result, the Danube states were unable to resist the Soviet proposals in the Belgrade Conference (Kertesz, 1984).

In another example of dissension, according to a New York Times foreign correspondent, Politika, a Yugoslavian newspaper, reported Tito, who had recently split with Stalin, threatened to dissent from the Soviet plan. This forced a secret negotiation between the Soviets and Yugoslavians in Moscow in the summer of 1948, before the Conference, so the riparians could present a united front in Belgrade (Raymond, 1952).
Table 5 Provisions of the American and Soviet Proposals at the Belgrade Conference\(^56\)

<table>
<thead>
<tr>
<th>Geographic scope</th>
<th>American Proposal</th>
<th>Soviet Proposal / Final Convention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entire international Danube River system in accordance with the 1921 Paris Convention</td>
<td>Navigable part of the main stem of the Danube between Ulm and the Black Sea through the Sulina arm, with outlet to the sea through the Sulina channel (Art 2)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range of activities</th>
<th>American Proposal</th>
<th>Soviet Proposal / Final Convention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulations for navigation without discrimination between ships of riparian and non-riparian flags; Maintenance and improvement of conditions for free navigation (including port facilities) along the entire Danube River system</td>
<td>Free navigation applies on the main stem of the Danube subject to regulation by the riparian state (Art 23)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participation</th>
<th>American Proposal</th>
<th>Soviet Proposal / Final Convention</th>
</tr>
</thead>
<tbody>
<tr>
<td>11: Austria full member or can join immediately (Germany joins as 12(^{th}) full member after peace treaty) members: 8 riparians and United States, France, Great Britain</td>
<td>7 Conference riparians with possible accession by Austria after its national treaty question is settled (Art 5, Annex 1); No mention of Germany</td>
<td></td>
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<tr>
<th>Authority of implementing organization</th>
<th>American Proposal</th>
<th>Soviet Proposal / Final Convention</th>
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<tbody>
<tr>
<td>Single new commission: EDC and IDC cancelled</td>
<td>Single new commission: EDC and IDC cancelled (Art 5)</td>
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<tr>
<th></th>
<th>American Proposal</th>
<th>Soviet Proposal / Final Convention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assure freedom of navigation and uniformity of regulations over internationalized river system</td>
<td>To be determined by the riparians; establish uniform regulations; coordinate and publish hydrological data (Art 3, 8)</td>
<td></td>
</tr>
</tbody>
</table>

\(^{56}\) Sources: (Kunz, 1949; "Red Danube," 1948; Spulber, 1954; "Übereinkommen über die Regelung der Schifffahrt auf der Donau," 1948)
Decisions by 2/3 majority | Decisions by simple majority (Art11)  
---|---
Institutional affiliation: under the United Nations | No mention of United Nations  
Dispute Settlement: According to UN Charter through the International Court of Justice | Dispute Settlement: By *ad hoc* Conciliation Commission (Art 45)  
Past treaty rights respected | Nullifies 1921 Paris Convention and all former acts for a Danube regime (Supplementary Protocol)  
**Entry into force** |  
Deposit of ratification by all ten Conference participants and Austria | Deposit of six ratifications (Art 46)  

The Soviet-led riparian majority was determined to create a new Convention, regardless of non-riparian opposition. The American proposal would have required all Conference participants and Austria to ratify the treaty before it would enter into force, enabling non-riparians to block a treaty they did not agree with. However, the Soviet proposal required only six ratifications for the Convention to enter into force. The final agreement, "Übereinkommen über die Regelung der Schifffahrt auf der Donau,"[^57] entered into force without the consent of any of the non-riparian countries or Austria. The 1921 Treaty of Paris was officially dissolved, violating its requirement for revision by consent by 2/3 of its signatories[^58]. Although Great Britain, France, and the United States protested, they had already weakened their hand when they agreed to the Belgrade Conference without the invitation of the other non-riparian signatories to the Paris Convention, including Italy, Belgium and Greece (Kunz, 1949).[^59]

[^57]: Convention Regarding the Regime of Navigation on the Danube, also referred to as the Belgrade Convention.
[^58]: Only five of the twelve signatories to the 1921 Convention signed the Belgrade Convention, short of the two-thirds consent rule (Gorove, 1964). In principle the rules for revision meant that neither the non-riparians nor the riparians could call for the Statute's revision without support from at least one state from the other group.
[^59]: Despite Belgrade Convention’s entry into force, those countries not party to it continued to consider the Belgrade Convention an illegal nullification of the 1921 Convention. Representatives from France, Italy,
The Belgrade Convention narrowed the geographic scope for international cooperation, limited the range of activities included under freedom of navigation, restricted participation to some Danube riparians and, in comparison to the previous navigation regimes, limited the authority of the implementing organization. Although the Belgrade Convention created a new navigation regime organized in principle along the entire river, in practice the nascent regime was severely divided by the Iron Curtain. A representative from the Austrian Foreign Ministry described cooperation in the Commission during the Cold War as bilateral because it was divided along east and west alliances (Interview Danube 01, 2006). Beginning around 1953 and again in 1998 changes in the DC mark significant shifts in the regime, which this research characterizes as three stages of the regime’s development. The next section discusses the first stage from 1948 to around 1953 and the second stage, which lasted until 1998. The section following describes the third stage of the regime from 1998 until today.

**Geographic Scope**

The American proposal at the Belgrade Conference was to regulate navigation on the entire Danube River system in accordance with the 1921 Paris Convention, the river from Ulm to the Black Sea and all navigable international tributaries and canals. The Soviet...
proposal restricted the scope in the final Convention to the navigable main stem of the Danube from Ulm to the Black Sea, along the Sulina branch and canal, or 2588 kilometers (1019 miles). Tributaries, canals and the other mouths of the river were excluded. In comparison to the second regime, the third regime narrowed the geographic scope of cooperation. Separate bilateral Special River Administrations were created for the Lower Danube (between the mouth of the Sulina branch and Braila) and the Iron Gates sections. As a result, these areas were excluded from multilateral international cooperation. For example, the River Administration of the Lower Danube was given primary authority over the delta area, including tributaries and canals within that geographic area and two of the three mouths of the river (Margesson, 1997). Austria did not become a full participant in the Danube Commission until 1960. Therefore in practice the geographic scope under the first stage of the regime was limited to the part of the main Lower Danube outside of the Special River Administrations (from Braila to the Iron Gates) and from upstream of the Iron Gates to the border between Austria and Czechoslovakia. Not until 1960 did the regime’s geographic scope expanded to include the Danube flowing through Austria, and not until 1998 would it extend to Ulm in Germany.

Range of Activities

In the Belgrade Conference the non-riparians sought to ensure freedom of navigation on the river for ships of all nations with equal treatment, in accordance with the 1921 Paris Convention, and representation of all stakeholders on the Danube Commission (Gorove,
President Truman earlier declared the United States’ position on this, “One of the persistent causes for wars in Europe in the last two centuries has been the selfish control of the waterways of Europe...The United States proposed at Berlin that there be free and unrestricted navigation of these inland waterways ("Internationalised Waterways," 1945).”

However, the Soviet proposal and Belgrade Convention applied a freedom of navigation to a narrow range of activities. Article 1 states:

> Navigation on the Danube shall be free and open for the nationals, vessels of commerce and goods of all States, on a footing of equality in regard to port and navigation charges and conditions for merchant shipping. The foregoing shall not apply to traffic between ports of the same State ("Übereinkommen über die Regelung der Schifffahrt auf der Donau," 1948).

Compare the above language from the Belgrade Convention to the language establishing the second regime (Johnson, 1964):

> On the waterways declared to be international...the nationals, property and flags of all Powers shall be treated on a footing of perfect equality, no distinction being made, to the detriment of the nationals, property or flag of any Power, between them and the nationals, property or flag of the riparian State itself or of the most-favoured nation ("Treaty of Peace between the Allied and Associated Powers and Austria (St. Germain-en-Layé, 10 September 1919)," 1919).

Both Treaties allow ships from non-riparian states to access the river, and therefore support freedom of navigation. The second regime made navigation and the facilities needed for trade open to non-riparian and riparian ships on an equal basis. However, the Belgrade Convention omits the words “no distinction being made”. Similar to the first regime the Belgrade Convention therefore leaves ambiguous the extent to which navigation by non-riparian ships could be subjected to riparian regulation. The non-riparians had cause for concern given the Soviet position that placing the river under
international authority was a form of intrusion on the riparians’ sovereignty. Removing any ambiguity, Vladimir Clementis, the Foreign Minister of Czechoslovakia explained the principle of freedom of navigation did not necessarily mean the equal treatment of ships of all flags:

There is a substantial difference between free navigation and an internationalized river. Internationalization means equal treatment for riparians and nonriparians and this is a principle we cannot accept. As far as we are concerned, there is no longer any internationalization of the Danube. There can be no equal treatment for riparians and non-riparians. When we speak of free navigation, we mean navigation under the control of the riparians. The internationalized system is a system of the past, and we are replacing it with riparian control (Clementis, as cited in (Gorove, 1964):126).

Similarly a Bulgarian delegate explained the only reason the Danube was originally subjected to international authority was because the Ottoman Empire could not maintain the delta conditions to allow shipping ((Ninov, 1948) as cited in (Gorove, 1964)).

It was therefore clear that the meaning of freedom of navigation under the third navigation regime was very different from its meaning under the second regime. A statement by Kertesz, a representative in the Hungarian Foreign Ministry, confirms the change. Kertesz said the Belgrade Convention “...abolished the international regime of the Danube which was institutionalized by the Treaty of Paris in 1856 and further developed by the Danube Convention of 1921 (Kertesz, 1984):223).” In addition, freedom of navigation would cover a narrower range of issues. The shipping activities necessary for trade, including access to riparian ports, loading and unloading of vessels, were no longer included in multilateral cooperation. Instead these activities were contingent on agreement with the joint shipping companies within the riparian countries, which were under Soviet control.
As the regime developed in the 1950s, the Soviet Union gave the Austrian Danube Steam Navigation Company and Soviet-Hungarian Shipping Combine Meszhart permission to navigate within each others’ national sections of the Danube. This action was a necessary because the Soviet Union and other Communist states continually lacked suitable vessels for trade on the Upper Danube. As a result of the extending this permission to navigate, timber, coal, wheat and maize were transported up and down the middle Danube despite the divide of the Iron Curtain. The Soviet Union later liquidated the joint navigation companies altogether in 1954, transferring their shares to the national shipping companies (Gorove, 1964). Despite these changes, these activities for trade remained under riparian control and outside of the range of issues addressed by the DC.

In 1967, the Danube Commission formed a Working Group for Scientific Hydrology under its mandate to coordinate hydrometeorological services and collect statistics relevant to navigation along the entire length of the river. Although some countries abstained from participating under the DC’s framework, some countries, Czechoslovakia, Hungary, Bulgaria and the Soviet Union, continued to share data and cooperate within the Working Group until 1986.\(^{60}\)

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\(^{60}\) For a detailed discussion see the section in chapter 3 on Joint Environmental Monitoring: International cooperation before the first Danube water protection regime.
Participation

At the Belgrade Conference the western Powers sought the full participation of Austria in any organization for implementing international cooperation on navigation, eventual inclusion of Germany, and inclusion of the United States, France and Great Britain. They also wanted any interested member of the United Nations to be able to participate as an observer. The non-riparians justified their participation in the future regime based on their significant economic interests, and responsibilities and rights expressed in roughly a century of existing treaties. However, the Communist states successfully opposed full participation of any of these countries, accusing the Western Powers of imperialism and of violating the sovereignty of the Danubian states. In the Belgrade Conference the riparian states successfully limited participation in the DC to the seven riparian countries participating in the Conference: Bulgaria, Czechoslovakia, Hungary, Romania, the Soviet Union, Ukraine, and Yugoslavia. This was part of their “Danube for Danubians” approach, in which the Danube was claimed as the property of the riparians, although at the time participation was limited to those riparians under Soviet influence (Gorove, 1964; Teclaff, 1991a). The Convention was created as a closed treaty, open only to Austria pending finalization of its national treaty. There were no provisions for adding

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61 Ukraine participated in the Conference and signed the Convention, but was represented in the authority by the Soviet Union.
62 Soviet insistence on waiting until Austria’s State Treaty amounted to a delay tactic, as both the Soviet Union and the West were holding up finalizing the Treaty. Although Austria declared its own independence from Germany in 1945, after World War II Austria was occupied by American, British, Soviet and French authorities. Austria became a Cold War battleground and negotiations on a new State Treaty stalled. The West refused to conclude the State Treaty, which required unanimous support from the four occupying powers, until it was confident Austria could protect itself against Soviet takeover. The Soviets took over much of the Austrian economy within its zone, which the West demanded be released. The Soviets made the negotiations on a Treaty for Austria contingent on negotiations to reunify a demilitarized Germany, which the West did not support. Stalin’s death and Khrushchev’s rise led to a change in policy and the
any other countries to the Convention’s signatories, including no provisions for German participation.

After its entry into force, the DC became a forum in which conflicts between Cominform countries and Yugoslavia were aired. Records of the DC’s proceedings show contests over three issues of participation and representation in the DC: electing officers, determining the rules of procedure and the organization of the DC secretariat and services. However, the majority voting rules enabled the Soviet Union to largely disregard Yugoslavian proposals. For example, according to *The Economist* “At this first meeting of the new commission they [the Soviets] have succeeded in stripping Yugoslav participation of everything except its nuisance value ("Red Danube," 1949).” Yugoslavian proposals, for example to rotate services and recruit personnel based on equal national representation, were routinely voted down in favor of Soviet proposals. There was no provision for providing delegates with information about the Commission’s work or for establishing standing working groups with equal representation. Instead, committees were appointed on an *ad hoc* basis. Yugoslavia was excluded from all sixteen major positions in the DC. However, Yugoslavia’s objections that the Soviets were violating the intent of the Belgrade Convention were countered with Soviet accusations that Yugoslavia was interfering with free navigation (Gorove, 1964).

During the DC’s fourth session in 1951 the Soviet’s proposed to increase the DC’s authority over investigating vessels involved in collisions in other riparians’ waters and

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63 See footnote 65 above.
decrease the riparians’ own ability to assess damage. This was the final straw. Yugoslavia walked out of the session and declared its intent to repudiate the Soviet-dominated regime and create its own navigation regulations. It had little other option to protect its interest because the majority voting rules meant it could be out voted by the other Soviet-led states. However, during the next session the Soviets struck a more conciliatory tone with the Yugoslavian delegation, which did continue to participate in the activities of the DC (Gorove, 1964).

Beginning in 1953 changes to the DC’s rules for equal representation in staffing signal the beginning of significant changes in the regime. The Soviets introduced revised rules for the DC, including hiring of most staff (but not the Secretary) and rotation of all DC staff positions based on equal national representation. Yugoslavia’s right to equal participation in staffing positions was recognized and decisions were made unanimously for the first time. As a result of these changes, a Yugoslavian was elected to the post of Secretary and the seat of the DC was moved from Galatz to Budapest based on a Yugoslavian and Hungarian proposal (Gorove, 1964). In rules that continue today, each of the contracting parties is represented in the DC by its ambassador to Hungary and full sessions are held twice a year.

64 At the same time the Soviets created another permanent Danube commission for navigation, hydropower and irrigation under the Council for Mutual Economic Assistance ("A la Commission Europeenne du Danube," 1953; MacCormac, 1956), raising Yugoslavian fears that this was an attempt to subvert the DC. However, in practice the Soviets used this new forum to further international cooperation on shipping among its satellites and did not conflict with the DC, which as we have seen was largely a coordinating body for riparian actions (Cattell, 1960).

65 As of mid-2009 the DC has held 72 such sessions. Further development of the rules led to the structure and rules of the Danube Commission, which remain in effect today. The Commission is led by a President, a Vice-President and a Secretary who are elected from any of the delegates to the DC for a three year term. In addition a Secretariat supports the DC, staffed by eleven international civil servants (one from each of the contracting parties), including the Director General, and nineteen employees (appointed by the Director
In 1955, the Soviets agreed to conclude the Austrian State Treaty and allowed Austria to send observers to the DC as of 1957, which paved the way for Austria’s full participation in 1960. As of 1957 Germany also began sending observers to the DC’s working groups (Cattell, 1960; Interview Danube 32, 2006). However, the DC twice rejected Germany’s application for membership, in February 1966 and again in April 1967, both times with lone support for Germany’s membership coming from Austria ("Germany and East Europe 2: But not everyone looks pleased," 1967).

**Authority of the International Organization**

The third navigation regime created the Danube Commission to implement cooperation on most of the navigable portion of the main river. The American proposal gave the river authority the mandate of assuring freedom of navigation and uniformity of regulations over the whole internationalized river system. In contrast, the Soviet proposal left the organization’s mandate vague. It would generally coordinate uniform regulations, which were left up to individual states to enact, and coordinate navigation relevant information. However, specifics were left to be determined later by the riparians. Gorove (1964) identifies the heavy use in the Belgrade Convention of action words, such as “make recommendations”, “prepare”, “consult”, and “co-ordinate”, in describing the DC and concludes the DC’s competency is primarily advisory, in comparison to the previous

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General). When at least five members of the DC are present, most decisions can be made through a simple majority. Exceptions requiring unanimous consent include passing the budget (which member states contribute to equally), adopting large projects, and harmonizing rules for regulating the current. The Commission convenes expert working groups or ad hoc groups to focus on specific issues, such as law and finances, pilot’s licenses, and as of more recently waste from ships (Donaukommission, 2004).
commissions’ ability to create and implement regulations (Gorove, 1964). For example, a Soviet attempt to increase the DC’s authority to investigate navigation accidents in individual riparians’ waters was successfully resisted by Yugoslavia (Gorove, 1964). In practice, during the early years the DC took little action regarding joint technical regulations or improvements for navigation (Cattell, 1960).

As part of the development of the third Danube regime, over time the DC took a more active role in coordinating a general plan for navigation works. For example, the DC began to take more of an interest in developing joint technical and planning (Cattell, 1960). Cooperation within the DC improved and the states even cooperated toward developing an, ultimately unsuccessful, long-term “Grand Plan” for improving navigation (Cattell, 1960). Yugoslavia persuaded Romania to discuss navigation problems in the Iron Gates section of the Danube and, in accordance with the provisions of the Belgrade Convention, created a Special River Administration for bilateral administration of this part of the Danube. In 1953 a second bilateral agreement was signed between Romania and the Soviet Union and a Special River Administration was created for the portion of the river from Braila to the mouth of the Sulina channel. In the Belgrade Conference,

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66 The Soviet satellite states were reluctant to implement the plan as they were unsure of the share of benefits they would reap in comparison to the costs they would have to bear. The Grand Plan was dropped in 1956.
67 This was the first instance in which the Soviets allowed one of their satellite states to engage in bilateral discussions with a non-Cominform state (Shepherd, 1954).
68 The River Administration of the Lower Danube has authority to “maintain the minimum navigation depths by maintenance dredging, to assure coastal and floating signaling, to carry out topo- and hydrographic measurements, to make construction and repair works of hydrotechnical constructions, to assure piloting of sea-going ships on the Romanian Danube section from Sulina roadstead to Braila and in the harbours situated on this sector, to put the naval infrastructure at the disposal of all users, as well as to fulfill some obligations incumbent on the Romanian state according to the international conventions and agreements to which Romania is part, obligations that were delegated...by the Ministry of Transports and Infrastructure (AFDJ Company a).” The property of the EDC was transferred to the River Administration
the United States opposed creation of these bilateral Administrations as they excluded other riparians and removed these portions of the river from multilateral regulation. Although technically under the DC’s authority, in practice the DC had little control over the Special River Administrations (British Institute of International and Comparative Law, 1948; "Übereinkommen über die Regelung der Schifffahrt auf der Donau," 1948).

After 1953 the DC took on a greater interest in river development policies, which could foster trade with the West. For example, in 1958 the DC began considering linking the Danube with other European rivers, such as the Rhine and Oder, and with the Soviet Dón and Volga Rivers via the Black Sea to increase trade. Recall the Belgrade Conference rejected the American proposal for affiliation between the Danube Commission and the United Nations. In a reversal of the Soviet position in Belgrade, the DC began increasing contacts with other international organizations, including the United Nations.

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69 In order to meet its obligations under the Belgrade Convention Romania signed bilateral agreements with the Soviet Union in 1953, Bulgaria in 1955 and Yugoslavia in 1976 (AFDJ Company). With these agreements the River Administration for the Lower Danube River came, and remains, entirely under Romanian control. Therefore, this part of the river is outside the scope of the Danube navigation regime. 70 As part of this plan, the Romanians began construction on a canal between Cernavodă, on the lower Danube, and the Black Sea. The Danube-Black Sea canal was intended to shorten the route from the main Danube to the Black Sea by 400 km and allow ships to bypass the delta and the navigation problems there. These plans would allow bulky goods to be transported between Central and Eastern Europe and the Soviet Union: grain, timber, iron ore and coal from the Soviet Union and machinery, bauxite, and petroleum from Europe (Spulber, 1954). Political prisoners were forced to work on the canal’s construction. Many died and the canal was dubbed the “Death Canal”. Construction ran into numerous troubles and was suspended in 1953. Ceauşescu restarted construction and the canal’s two branches were opened in 1984 and 1987. 71 According to the American proposal the affiliation would have provided for information exchange and allowed the United Nations states to participate in DC meetings as observers. Disputes would also have been settled according to the UN Charter, for example through the International Court of Justice. The Soviets were concerned this could have provided non-riparians with some control over the Danube. Therefore the Belgrade Convention excluded any affiliation with the United Nations and left the settlement of disputes to an ad hoc Conciliation Commission.
Although these changes in the DC can be seen as a warming in the Soviet’s approach to engaging the West, they can also be understood as effort to engage Austria more in East Europe and weaken its ties with the West (Andras, 1967). Some DC participants used the DC as a way to improve their relations with western Europe. However, it was difficult for cooperation within the DC to spread to broader issues because of its limited scope of activities, the involvement of only legal and technical experts in its administration, and its limited authority. For example, *The Economist* criticized the DC as an “exclusive mercantile club” ("Gates Of Iron," 1970). Nevertheless, the DC provided a forum for engaging the West through Austria and the German observers. In 1967 the Hungarian press reported

It is worth noting that Budapest is the seat of the Danube Commission. The Commission, it is true, is exclusively concerned with questions of Danube navigation, but its mere existence directs the attention beyond the Danube Valley in the narrower sense, towards the prospects of closer cooperation in the Danube Basin itself...No other area in Europe is so varied, in all senses of the word, which is one more reason-and opportunity-for the peoples of this region to unite in making a model area of European coexistence ((Petho, 1967) as quoted in (Andras, 1967):72).72

Austria and the West encouraged the DC’s changes as a way to increase trade and improve cooperation. For example, Dr. Leopold Figl (Chancellor of Austria between 1945 and 1953) declared

Remember that the unity of our Danube area is an inescapable force which only mounts up if it is held back and which will one day break through any artificial political barrier. All of us Austrians, Yugoslavs, Czechs, Hungarians, Rumanians and Bulgarians- have a vital common interest in working together and I believe that, at least economically, nothing on this earth can, in the long run, keep us

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72 Hungarian politicians and the press distinguished between the Danube basin and the Danube valley. The valley was taken to include only “genuinely” Danubian countries, Austria, Czechoslovakia, Hungary, Yugoslavia, Romania, and Bulgaria. The German Federal Republic was excluded because it was affected by pressures originating largely from outside of the basin. The Soviet Union was excluded because of its massive size, again with the expectation many of its interests and primary pressures stem from outside the basin ("Dunavolgyi Egyuttmukodes," 1967) as cited in (Andras, 1967):69).
apart. As far as is possible in the present difficult circumstances we must therefore try and develop our mutual trade without bothering unduly about political forms. The political contrasts in the Danube Valley at the moment are severe and it is too early to say how or when any tolerable balance will be reached. But the very effects of economic co-operation will help to lessen these differences, for each of us needs his neighbor irrespective of what regime he possesses (Quoted in (Shepherd, 1954):240-241).

The West’s broader Cold War policy was to use non-confrontational informational exchanges to contain the Soviet’s influence and foster a “limited Russian withdrawal from the Danube Basin (Shepherd, 1954):229).” Improving cooperation with the DC was one way to try to increase the West’s influence in the basin.

As a result of interactions within the Danube Commission and changes made to the river system, some measures of international cooperation along the river improved. For example, the cargo volume of shipping goods transported on the Danube between 1950 and 1980 increased by more than ten times (Jansky et al., 2004). The Iron Gates dam was opened in 1972, which included improvements to navigation, increasing the tonnage ships could carry while passing through the gorge and also decreasing the time needed to do so. Although Romania and Yugoslavia requested financial assistance to construct the dam, the other riparians refused. The ad-hoc dispute resolution procedures of the DC were unable to resolve this dispute.3 Outside of the scope of cooperation of the Belgrade Convention, in 1992 Germany opened the Rhine-Main-Danube canal. This canal creates

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3 Austria argued it had built three hydropower dams with navigation improvements and born the full costs on its own. The Soviet Union, which accounted for seventy-five percent of traffic on the Danube and whose shipping stood the most to benefit from the project (“Gates Of Iron,” 1970), argued the costs could not be as high as the estimates. When the countries could not agree, the dispute was referred to the Danube Commission’s arbitration court (Andras, 1967; “The Danube: Breaking down the Iron Gates,” 1967). Three years later, the dispute was still resolved due to Soviet opposition. One possible source of revenue to cover the cost of the project that was considered was the membership fee that could be obtained by granting West Germany full participation in the DC. However, West Germany’s application was denied (“Gates Of Iron,” 1970).
a new continuous waterway between ports from the North Sea to the Black Sea and beyond. 74

The 1998 Protocol to Today (1998 - the present)

The 1998 Protocol

The end of the Cold War created an opportunity to expand cooperation on navigation. Between 1993 and 1997 the DC held meetings to discuss international cooperation on a broadened scope of issues: navigation, business, environmental protection, culture and tourism. Germany and new Danube riparian countries, Moldova and Croatia, joined as observers the DC preparatory work to adapt the Belgrade Convention. The most difficult issue was how membership in the DC would be determined. Unable to reach consensus on a new convention, the delegates negotiated a protocol based on a German proposal, which did not require a radical revision of the Belgrade Convention and therefore preserved the navigation regime (Donaukommission, 2004).

This new protocol was signed in 1998 and covers the 2411.5 km of the Danube from Ulm to the Black Sea, including the Sulina canal, which can be navigated by international ships carrying heavy cargo. The Protocol did not expand the DC’s authority beyond its existing coordinating responsibilities. The DC’s weak authority illuminates a description

74 Planning for a new canal began in the 1890s when the earlier Ludwig Canal was recognized as too narrow to accommodate the new transport ships (see footnote 32), which could now be built larger to compete with rail transport. The work on the new Rhine-Main-Danube began in earnest in the 1950s. Environmental and rail interests combined forces in the 1970s and 1980s to oppose completion of the canal, whose path ran through a protected area, the Altmühl Valley Nature Park. Despite the protests, the canal was completed and opened in 1992.
of it by one of its legal functionaries as a technical, not political, body, even though its
delegates are ambassadors and the discussions political (Interview Danube 32, 2006). The
1998 Protocol declares eleven countries members of the Belgrade Convention, including:
(1) the existing contracting parties, Austria, Bulgaria, Hungary, Romania, and Ukraine;75
(2) two new members, Germany76 (a member of the European Community) and
Moldova; (3) the successor states to Czechoslovakia and Yugoslavia that are riparian to
the main stem of the Danube, Slovakia, Croatia, and Serbia; and (4) Russia. Without
admitting new non-riparians to the Commission the new protocol does allow for Russia’s
continued participation, despite no longer being riparian to the Danube. The protocol
therefore does not exactly follow the 1948 principle that navigation be regulated among
only those countries riparian to the main stem. Russia’s membership can be justified
based on its history in the DC, as it is the successor state to the Soviet Union, a signatory
of the Belgrade Convention,77 and its continued significant interest in the Danube. Other
nations with major international shipping interests and international organizations can
participate as observers in the DC. Today these observing nations include Montenegro,
the Czech Republic, and six non-Danubian countries: Belgium, Greece, Cyprus, the
Netherlands, Turkey and France (Donaukommission, 2004).78 For technical work the DC
has a Chief Engineer and nine Counsels, staff members who give advice in nine areas:

75 Although also a successor state to the Soviet Union, Ukraine is included here because the Ukrainian
Soviet Socialist Republic was an original signatory of the Belgrade Convention
76 The protocol also added German to the other two official languages of the DC, Russian and French.
Although it is not the national language of any Danube riparians, French was considered the language of
diplomacy and had been one of the original official languages of the DC. English was deliberately excluded
from the start by the Soviets as a rebuke to America and the non-riparian states (Kunz, 1949).
77 Critics might note that being a signatory to an existing international agreement did not prevent the Soviet
Union from excluding non-Danubian signatories of the 1921 Treaty of Paris from the post-Belgrade
Convention Danube Commission. Consistent application of the same “Danube for Danubians” principle
advocated by the Soviet Union in Belgrade would now require Russia’s exclusion.
78 Indicating the significant strides the DC made in achieving international acceptance, recall that at the
time of the Belgrade Conference Greece and France considered the Conference and subsequent Convention
an illegal termination of their existing treaty rights in the Danube.
administration, financial matters, legal matters, nautical issues, technical matters related to ships, maintenance of the navigation channel, economic and environmental issues, economic analysis and statistics, and public relations and publications. 79 During its annual meeting the DC participants create ad-hoc working groups as needed.

Under the Protocol the DC’s authority remains limited. It is empowered to promulgate international norms for shipping traffic, safety, customs, and sanitary inspection, which the states then implement through domestic law. The DC provides technical expertise to assist states with implementation (Donaukommission, 2004), coordinates data from national hydrometeorological services and publishes statistics about navigation on the Danube. The riparian states retain executive, legislative, administrative, and judicial control over all river activities as long as they respect freedom of navigation on the river’s main stem (Costa, 1981). So far, the DC has attempted to stay out of bilateral disputes and have the states resolve those between themselves. For example, according to one delegate to the DC, Romania asked the DC to help resolve the issue but the DC delegates consider the Bystroe dispute bilateral and have been unwilling to engage in the issue (Interview Danube 32, 2006).

Despite the limited authority of the DC, overall the changes introduced by the 1998 Protocol enable the DC to be a forum for the riparian countries to cooperate, removing a

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79 Historically the DC has been involved in publishing hydrologic reference works. However, an expert at the DC says this should now properly fall under the authority of the International Commission for the Protection of the Danube River, not the DC (Interview Danube 32, 2006). This is seconded by an expert from the Regional Cooperation of the Danube Riparian Countries in the Framework of the International Hydrological Programme of UNESCO (IHP Danube), who says that the DC doesn’t have much relevance for hydrology because they are only competent for the main stem of the river (Interview Danube 12, 2006). Nevertheless, the DC has continued this work because it feels it is contribution it can make to the countries (Interview Danube 32, 2006). This issue will be discussed more in the next chapter.
significant barrier to improving long-distance navigation along the Danube. The removal of debris from the Kosovo War at Novi Sad,\(^8\) Serbia provides an example. Shortly after the end of the war experts from all of the Danube countries participated in a trip to Novi Sad. One participant in the DC’s negotiations to fund the removal of the debris described the effort:

During these meetings nobody has asked his neighbors “Is your country member of EU?” No, because we are in very bad situation and there is no time for politics. How we can help for the Danube to be free? It was a very nice time. Germany with Russia. Croatia with Bulgaria. Romania with Austria. How to help? It was wonderful. And I think it’s maybe the best example for common work, for cooperation (Interview Danube 31, 2006).

This example illustrates the significant improvements in cooperation along the main stem of the Danube.

However, the dominant shipping patterns along the river have remained regional and divided, rather than long-distance.\(^8\) In the western part of the river ships move cargo primarily westward and, in the eastern part, primarily eastward toward the Black Sea (European Commission DG: Regional Policy, 2000). The volume of goods and number of cargo containers shipped along the Danube stubbornly remains well under German

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\(^8\) During the Kosovo War the NATO bombed three bridges in Novi Sad, Serbia, destroying them and blocking navigation on the Danube in 1999. The removal of the debris through the 2000-2003 project “Clearance of the Fairway of the Danube” cost 26 million Euros, 85% or 22 million of which was paid for by the European Union on the condition that the DC would come up with the remaining 15% or 4 million Euros and the fund would be located in a bank within an EU member country. After extensive entreaties by the DC, almost the full remaining 15% was donated by a combination of Danube countries (Germany and Austria contributed 1.7 million Euros; all other Danube countries contributed, with the exception of Yugoslavia and Moldova, which supported the efforts but could not afford to contribute), and non-riparian countries (the Netherlands contributed 430,000 Euros; Switzerland and Canada contributed; the United States refused) (Interview Danube 31, 2006). After the bridge debris was removed, a pontoon bridge, the final obstruction to navigation remaining from the war, was disassembled in 2005.

\(^8\) Recall that shipping has been primarily regional or local through much of the Danube’s history (East, 1932).
projections from the end of the Cold War. Both measures of shipping declined in the second half of the 2000s (BR-Online, 2008).

Shipping interests consider several “bottlenecks” the main barriers to increasing the tonnage of goods shipped along the Danube. The most significant barriers are the river stretches between Straubing to Vilshofen in Germany, and from Vienna to Bratislava, along with others in Hungary, Romania and Bulgaria. The DC and other interested groups have set their sights on addressing these, with support from the European Union, which wants to develop the Danube as a major artery for European transportation. The EU designated the Danube River as Corridor VII under the framework of the Trans-European Network for Transport (TEN-T). Achieving this objective will require work on several of the bottlenecks to improve navigation conditions, some of which are planned to be completed by 2015 (Via Donau, 2006). A German environmental official commented on the changing prospects for long-distance shipping.

The transport capacity of the Danube has been reassessed quite recently and it turns out that it would be tremendous. Ok. But the actual transport capacity is much lower because there seems to be no need really for ship-based transport so far. The shipping lobby says, ‘Well, this is due to the unfavorable transport conditions along the Danube’ and now some engineering measures are in preparation to satisfy the criteria on which we agreed for navigation. The downstream countries...don’t have the money now to provide reasonable shipping conditions. Maybe EU, if they say transboundary transportation networks or whatever, then maybe major funds will be made available for improved shipping conditions (Interview Danube 02, 2006).

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82 A broader effort was begun at the end of the 1980s, the Trans-European Network (TEN), which includes energy and telecommunications in addition to transport. In 1996 the European Parliament and Council adopted guidelines for the development of TEN-T. The goal is to integrate the national transport networks of roads, railways, inland waterways, airports, seaports, inland ports and traffic management systems, which carry most of the long distance traffic and link the EU’s regions more closely together (European Commission, 2009).
With cooperation now improving along the main stem of the Danube from Germany to the Black Sea and financing from the European Union, the potential exists to significantly improve the conditions for long distance transport on parts of the Danube. However, there are questions about whether factors other than the bottlenecks may be more important barriers to increasing shipping. The DC’s projects are coming into conflict with environmental protection interests in the Danube basin, which emerged as an issue for multilateral cooperation after the Belgrade Convention was concluded. Although originally outside the DC’s mandate, the DC expanded its range of issues to address the environmental impacts of navigation, which overlaps with the mandate of the International Commission for the Protection of the Danube River. The two Commissions are now cooperative on sustainable waterway planning and have developed a mechanism for sharing information and monitoring implementation (discussed in the next chapter).

Current Renegotiation of the Navigation Regime

The 1998 Protocol was essentially a stop-gap measure enabling the DC to expand to include new riparian members. However, it did not resolve the fundamental policy question of how to adapt the Belgrade Convention to contemporary circumstances. Since 2002 the Contracting Parties have formed a Preparatory Committee with the objective of preparing a new diplomatic conference to do so. The participants are negotiating on each

83 For example, the height of the many bridges on the Rhine-Main-Danube canal prevents ships from passing with containers stacked higher than two layers. Although transporting heavy goods by ship is relatively inexpensive, in comparison to rail and road transport, shipping along the canal is also slow due to the sixteen sluices regulating almost 243 m (797 ft) of elevation changes (BR-Online, 2008; Wasser- und Schifffahrtsverwaltung des Bundes, 2007).

84 The next chapter will discuss the environmental protection regime and how the conflict between navigation and environmental protection interests in the Danube are being addressed.
of the four institutional arrangements on which this research focuses (Donaukommission, 2009; Interview Danube 31, 2006). One issue is to more clearly define the territorial scope. The only navigable passage between the Danube and the Black Sea covered by the Belgrade Convention is the Sulina canal. In comparison, the second regime covered all international navigable canals, the delta and areas adjacent to the delta. Negotiators are now considering whether the navigation regime should expand again to include canals, which would include the Rhine-Main-Donau canal and the Bystroe canal currently under construction in Ukraine.

A second issue is to define more specifically which activities are covered under freedom of navigation. As seen in the second regime and 1948 Belgrade Conference negotiations, the western European countries interpreted freedom of navigation as providing equal access to shipping, as well as to the infrastructure and activities necessary to engage in trade and passenger transport. However, the Belgrade Convention applied freedom of navigation only to passage for ships between non-Danubian and Danubian ports. Negotiators are now working to develop uniform rules for the mutual recognition of ships and crew documents and regulations for loading and unloading of cargo. These negotiations are a step toward expanding the range of issues to which freedom of navigation and multilateral cooperation apply.

The DC is also reconsidering the question of membership. So far, Turkey, France and the European Community, among others, have expressed their desire to become full members. The European Union is poised to invest significant resources in the TNE-T
projects on the Danube. As of 2001 the European Commission expressed its interest in acceding to the Belgrade Convention because several EU member countries and accession countries are members of the Danube Commission, and acceding is a way to improve enlargement preparations be involved in inland waterways (EUROPA, 2003). Turkey continues to have significant interests in the Danube and navigation on it due to its location on the Black Sea. The canal linking shipping along the Rhine and Danube to other markets gives Rhine countries, including France, a significant interest in Danube shipping. Despite, its history of participation in the Danube navigation regimes, Russia is no longer a Danube riparian. It would therefore be excluded by the organizing principle of “Danube for the Danubians” in place since the Belgrade Convention. As a result there are significant reasons to reconsider the rules for participation and possibly create a mixed commission of riparians and non-riparians.

A fourth issue under negotiation is the DC’s authority. One proposal would make the DC’s decisions legally binding for Contracting Parties, giving the DC authority similar to the Central Commission for Navigation on the Rhine (Interview Danube 31, 2006). The development of the institutional arrangements of the third Danube navigation regime are summarized in Table 6.
**Table 6 Development of the Third Danube Navigation Regime’s Institutional Arrangements**

<table>
<thead>
<tr>
<th>Institutional Arrangements</th>
<th>DNR₃ᴬ</th>
<th>DNR₃ᴮ</th>
<th>DNR₃ᶜ</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Geographic scope</strong></td>
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<tr>
<td>In principle navigable main river between Ulm and the Black Sea via the Sulina branch, excepting the Iron Gates and maritime Danube up to Braila (under bilateral Special River Administrations); In practice only extended upstream to the border between Czechoslovakia and Austria</td>
<td>In principle navigable main river between Ulm and the Black Sea via the Sulina branch, excepting the Iron Gates and maritime Danube from Braila (under bilateral Special River Administrations), In practice only extended upstream to the border between Austria and Germany</td>
<td>Navigable main river between Ulm, Germany and the Black Sea via the Sulina branch, excepting the Iron Gates and maritime Danube from Braila (under bilateral Special River Administrations)</td>
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<tr>
<td><strong>Range of activities or issues addressed</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Regulations for navigation; Maintenance and improvement of conditions for navigation; Navigation relevant information coordination</td>
<td>Regulations for navigation; Maintenance and improvement of conditions for navigation; Navigation relevant information coordination</td>
<td>Regulations for navigation; Maintenance and improvement of conditions for navigation; Navigation relevant information coordination</td>
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<tr>
<td><strong>Participation</strong></td>
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<tr>
<td><strong>Fluvial Danube:</strong></td>
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<tr>
<td>7 Riparians:</td>
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<tr>
<td>Bulgaria, Czechoslovakia, Hungary, Romania, the Soviet Union Yugoslavia, Ukraine*</td>
<td>Bulgaria, Czechoslovakia, Hungary, Romania, the Soviet Union Yugoslavia, Ukraine*</td>
<td>Bulgaria, Czechoslovakia, Hungary, Romania, the Soviet Union Yugoslavia, Ukraine*</td>
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<tr>
<td>*Ukraine was an original signatory but was represented by the Soviet Union</td>
<td>*Ukraine was an original signatory but was represented by the Soviet Union</td>
<td>*Ukraine was an original signatory but was represented by the Soviet Union</td>
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<tr>
<td><strong>Fluvial Danube:</strong></td>
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<tr>
<td>8 Riparians:</td>
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<tr>
<td>Austria, Bulgaria, Czechoslovakia, Hungary, Romania, the Soviet Union Yugoslavia, Ukraine*</td>
<td>Austria, Bulgaria, Czechoslovakia, Hungary, Romania, the Soviet Union Yugoslavia, Ukraine*</td>
<td>Austria, Bulgaria, Czechoslovakia, Hungary, Romania, the Soviet Union Yugoslavia, Ukraine*</td>
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<tr>
<td>*Ukraine was an original signatory but was represented by the Soviet Union</td>
<td>*Ukraine was an original signatory but was represented by the Soviet Union</td>
<td>*Ukraine was an original signatory but was represented by the Soviet Union</td>
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<tr>
<td><strong>Fluvial Danube:</strong></td>
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<tr>
<td>10 Riparians:</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Austria, Bulgaria, Croatia, Germany, Hungary, Moldova, Romania, Serbia, Slovakia, Ukraine</td>
<td>Austria, Bulgaria, Croatia, Germany, Hungary, Moldova, Romania, Serbia, Slovakia, Ukraine</td>
<td>Austria, Bulgaria, Croatia, Germany, Hungary, Moldova, Romania, Serbia, Slovakia, Ukraine</td>
<td></td>
</tr>
<tr>
<td>1 Non-riparian:</td>
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<tr>
<td>Russia</td>
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</tbody>
</table>

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85 Please note: “DNR₃” indicates the third Danube navigation regime from 1948 to the present. It is subdivided into three stages of regime development: DNR₃ᴬ lasted from 1948 to around 1953, DNR₃ᴮ from around 1953 to 1998, and DNR₃ᶜ from 1998 to the present.
### Institutional Arrangements

<table>
<thead>
<tr>
<th>Role of the international authority</th>
<th>DNR_{3A}</th>
<th>DNR_{3B}</th>
<th>DNR_{3C}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinate uniform regulations and coordinate navigation relevant information</td>
<td>Develop uniform regulations, Provide assistance to riparians to enact rules as requested; Coordinate and publish hydrological data</td>
<td>Develop uniform regulations, Provide assistance to riparians to enact rules as requested; Coordinate and publish hydrological data</td>
<td></td>
</tr>
</tbody>
</table>

### Discussion

The third Danube navigation regime has passed through three stages of development and current negotiations will likely result in a fourth stage or a new navigation regime. In the first stage of this regime many institutional arrangements indicate a conventional approach to conflict and uncertainty. In principle, for the first time the regime created a unified river administration for the Danube. However, in practice this was not the case as the geographic scope of multilateral cooperation extended only from the Black Sea to the border between Czechoslovakia and Austria and excluded some other critical parts of the river. So, the regime could not consider the river as an integrated unit and manage the tensions between the stakeholders along it. In addition, the rules for participation excluded significant riparian and non-riparian stakeholders, preventing the DC from managing conflicts between their interests. The inflexible rules were a significant barrier to developing this capacity because there was no opportunity for new participants to join, regardless of how circumstances in the basin changed. The majority voting rules enabled the Soviet-led majority to ignore the interests of other stakeholders, such as the non-riparians in the Belgrade Conference, and Yugoslavia’s objections within the DC. The
unequal rules for representation within the DC were another mechanism by which the Soviets could ignore minority interests. The narrow range of issues addressed by multilateral cooperation was another mechanism to ignore conflict between different uses of the river. The institutional arrangements for the geographic scope of cooperation, the range of issues and, in particular, for participation and decision-making took a conventional approach to conflict.

Similarly most arrangements took a conventional approach to uncertainty. Developing regulations for navigation was left to the riparians, which in theory would increase the participants’ flexibility to enact regulations as needed. However, the DC was given little authority beyond coordinating actions among the riparians, which made it difficult for them to respond to new circumstances as they arose. Making matters worse, no standing working groups were created. Instead working groups were designed to be created on an ad-hoc basis. This would have made it difficult for scientists and technical experts to develop any long-term research plan.

Stalin’s death in 1953 and Khrushchev’s rise to power mark a the beginning of significant changes in the regime. Importantly, the rules for participation were changed to provide equal representation, require some decisions be made by unanimous vote, and include Austria’s full participation. These changes expanded the geographic scope of cooperation in practice. More significantly, they meant a majority of DC participants could no longer ignore minority interests within it. Writing in 1954 Shepherd remarked

Austria, Yugoslavia, and their Cominform neighbors seem indeed to have adapted their approach to the quiet but insistent flow of the Danube itself, moving
patiently from one obstacle to the next. Yet in doing so they are slowly filling one
of the biggest economic breaches between Eastern and Western Europe- and
filling it not with fire but with water (Shepherd, 1954).

The changes to the third navigation regime meant the DC could serve as a forum for
managing tensions among its members. However, the rules for participation in the DC
still took a conventional approach to conflict because they continued to exclude
significant stakeholders, Germany and the non-riparians. Because they were not part of
the DC, the DC could ignore their interests. The regime’s rules were also fixed and did
not provide any flexibility to adjust to changing circumstances. Therefore, the
participants could only move “patiently from one obstacle to the next”, but the
participants were unable to anticipate such obstacles and develop procedures to address
them.

The 1998 Protocol marks another interim stage in the third navigation regime. In general
the institutional arrangements continue to be fixed and therefore provide little opportunity
for adjusting to change. The rules for participation were amended to include Germany,
Croatia, Moldova and Serbia. As a result the geographic scope of multilateral cooperation
now extends along most of the river. However, the rules for participation remain fixed
and do not provide a mechanism for addressing the interests of non-riparians (other than
Russia). The European Community’s interest in becoming a Contracting party and
developing the Danube as a Trans-European Network for Transport create the likelihood
the current navigation regime will be significantly renegotiated. Ongoing negotiations
will determine the extent to which the regime’s approach to uncertainty and conflict
continues become more adaptive. The institutional arrangements of the third Danube
navigation regime indicative of an adaptive or conventional approach to conflict and uncertainty are summarized in the table below.

<table>
<thead>
<tr>
<th>Regime</th>
<th>Approach to Conflict</th>
<th>Approach to Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNR3</td>
<td>Conventional: In principle created a unified river administration, but in practice excluded non-riparians, Germany, and Austria (didn’t have to manage tensions) and rules for participation not open to changes</td>
<td>Adaptive: Regulations to be determined by riparians</td>
</tr>
<tr>
<td>DNR3A</td>
<td>Conventional: Although covered all navigable main river in principle, in practice applied to only part of river due to exclusion of Germany and Austria</td>
<td>Conventional: DC given little authority beyond coordinating actions, made it difficult to respond quickly</td>
</tr>
<tr>
<td></td>
<td>Conventional: narrow range of issues</td>
<td>Conventional: Working groups created on an ad-hoc basis (made it difficult to develop long-term research plan)</td>
</tr>
<tr>
<td></td>
<td>Conventional: did not provide for equal representation in DC</td>
<td>Conventional: Working groups did not include equal participation</td>
</tr>
</tbody>
</table>

Please note: DNR3 is the third navigation regime, lasting from 1948 to the present. It is subdivided into three stages of regime development. DNR3A lasted from 1948 to around 1953, DNR3B from around 1953 to 1998, and DNR3C from 1998 to the present.
<table>
<thead>
<tr>
<th><strong>DNR_3</strong> (cont)</th>
<th>Conventional: In principle created a unified river administration, but in practice excluded non-riparians and Germany and rules for participation not open to changes</th>
<th>Adaptive: Standing working groups with equal participation; collaborated on system wide data collection and sharing with all riparians, including those not party to the Belgrade Convention</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNR_3B</td>
<td>Conventional: narrow range of issues (but a little broader)</td>
<td>Conventional: Working groups focused on stabilizing the river system and minimizing variability</td>
</tr>
<tr>
<td></td>
<td>Adaptive: Equal representation in DC staffing</td>
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<tr>
<td></td>
<td>Adaptive: Some decisions in DC made unanimously (had to consider minority interests)</td>
<td>Conventional: DC given little authority beyond coordinating actions, made it difficult to respond quickly</td>
</tr>
<tr>
<td></td>
<td>Conventional: No participation in decision-making by non-DC contracting parties (Germany and non-riparian stakeholders)</td>
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<tr>
<td></td>
<td>Conventional: Fragmented geographic scope, continued to exclude Germany and therefore its portion of the river, Created Special River Administrations for parts of the Lower Danube with little coordination with DC, tributaries excluded</td>
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</tr>
<tr>
<td>DNR_3C</td>
<td>Adaptive: Geographic scope includes cooperation for entire navigable river, although parts of Lower Danube remains under Romanian authority and tributaries are excluded</td>
<td>Conventional: DC given little authority beyond coordinating actions, makes it difficult to respond quickly</td>
</tr>
<tr>
<td></td>
<td>Conventional: No participation in decision-making by non-riparians (except for Russia), can send observers to DC meetings</td>
<td>Adaptive: 1998 Protocol seen as interim measure pending new diplomatic conference</td>
</tr>
<tr>
<td></td>
<td>Conventional: Narrow range of issues, but broader than in past</td>
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</tbody>
</table>

The institutional arrangements across the three Danube navigation are summarized in Table 8.
Table 8 Summary of Institutional Arrangements of Danube Navigation Regimes87

<table>
<thead>
<tr>
<th>Institutional Arrangements</th>
<th>DNR₁</th>
<th>DNR₂</th>
<th>DNR₃</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geographic scope</td>
<td></td>
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<tr>
<td>Fluvial Danube:</td>
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<tr>
<td>In principle, navigable</td>
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<tr>
<td>length of main river.</td>
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<tr>
<td>In practice under riparian,</td>
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<tr>
<td>not international</td>
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<tr>
<td>regulation. Dissolved in</td>
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<tr>
<td>1958 (end of DNR₁)</td>
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<tr>
<td>Maritime Danube:</td>
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<tr>
<td>Main river from Issacea to</td>
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<tr>
<td>the Black Sea and littoral</td>
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<tr>
<td>areas adjacent to the delta;</td>
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<tr>
<td>Later expanded to Galatz,</td>
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<tr>
<td>then unsuccessfully to</td>
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<tr>
<td>Braila and the Iron Gates</td>
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<tr>
<td>Maritime Danube:</td>
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<tr>
<td>Delta from Braila to the</td>
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<tr>
<td>Black Sea, canals, and</td>
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<tr>
<td>adjacent littoral areas</td>
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<tr>
<td>Range of activities or</td>
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<tr>
<td>issues addressed</td>
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<tr>
<td>Fluvial Danube:</td>
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<tr>
<td>Regulations for navigation</td>
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<tr>
<td>(under riparian control</td>
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<tr>
<td>according to 1857 rules,</td>
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<tr>
<td>freedom of navigation</td>
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<tr>
<td>applied only to ships</td>
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<tr>
<td>trading between river ports</td>
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<tr>
<td>and the sea)</td>
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<tr>
<td>Maritime Danube:</td>
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<tr>
<td>Regulations for navigation</td>
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<td></td>
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<tr>
<td>Maintenance and</td>
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<tr>
<td>improvement of conditions</td>
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<tr>
<td>for navigation; Dispute</td>
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<tr>
<td>resolution</td>
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<tr>
<td>Maritime Danube:</td>
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<tr>
<td>Regulations for navigation</td>
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<td>Maintenance and</td>
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<tr>
<td>improvement of conditions</td>
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<tr>
<td>for navigation;</td>
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<tr>
<td>Navigation relevant</td>
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<tr>
<td>information coordination</td>
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</tbody>
</table>

87 Please note: “DNR” indicates a Danube navigation regime over a particular time period. DNR₁ is the first international navigation regime for the Danube from 1856-1914. DNR₁ can be further subdivided into two stages of regime development (for details of these two stages please see the above discussion and Table 2). In this table DNR₁ summarizes the institutional arrangements over the entire regime. DNR₂ is the second navigation regime for the Danube from 1919-1936. DNR₃ is the third, from 1948 to the present. DNR₃ can be further subdivided into three stages of regime development (for details of these three stages please see the above discussion and Table 6). In this table DNR₃ summarizes the institutional arrangements over the entire regime.
<table>
<thead>
<tr>
<th>Participation</th>
<th>Fluvial Danube: 7 riparians: Austria, Bavaria, the Ottoman Empire, Moldavia, Serbia, Wallachia, Württemberg</th>
<th>Fluvial Danube: 8 riparians and 3 non-riparians Riparians: Austria, Bavaria, Bulgaria, Czechoslovakia, Hungary, Romania, the Serb-Croat-Slovene State, Württemberg Non-riparians: Great Britain, France, Italy</th>
<th>Fluvial Danube: Riparians (currently 10) and Russia* Riparians: Austria, Bulgaria*, Croatia*, Germany, Hungary*, Moldova, Romania*, Serbia*, Slovakia*, Ukraine*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maritime Danube: in DNR 1A 2 riparians and 5 non-riparians, In DNR 1B became 4 riparians and 4 non-riparians Riparians: Austria, the Ottoman Empire (not riparian as of 1878), Romania as of 1878 Non-riparians: Great Britain, France, Prussia (riparian as of 1871), Russia (riparian as of 1878), Sardinia</td>
<td>Maritime Danube: 1 riparian and 3 non-riparians (open to others with significant interests) Riparian: Romania Non-riparians: Great Britain, France, Italy</td>
<td>*indicates original signatory of the Belgrade Convention or successor state to an original signatory</td>
</tr>
<tr>
<td>Role of the international authority</td>
<td>Fluvial Danube (Riparian Commission, not implemented): Create uniform rules for navigation and its security, coordinate river navigability improvements, assume EDC’s responsibilities after 2 years</td>
<td>Fluvial Danube (IDC): Executive: Coordinate, Supervise, raise money for and implement navigation improvement projects if riparians need assistance; Reject riparian projects interfering with navigation (in practice limited)</td>
<td>Develop uniform regulations, Provide assistance to riparians to enact rules as requested; Coordinate and publish hydrological data</td>
</tr>
<tr>
<td></td>
<td>Maritime Danube (EDC): Executive: Coordinate,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domain</td>
<td>Function Description</td>
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<td></td>
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<tr>
<td>-----------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legislative</td>
<td>Issue and enact uniform regulations for navigation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrative</td>
<td>Hire its own staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Judicial</td>
<td>Settle disputes involving captains or delta regulations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maritime Danube</td>
<td>(EDC): In principle: Coordinate, maintain and develop improvements for navigation; Raise funds for delta works</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In practice: over time authority was limited and subject to Romanian veto.
Discussion

This chapter began with Teclaff’s description of the river’s morphology as an axis around which cooperation on navigation tends to be organized, East’s claim that continuing divisions have, however, prevented full utilization of the Danube for navigation, and Macartney’s description of World War Two as providing the necessity for a new political form for the river. These three comments shed light on much of the Danube’s history. There is a long history of international cooperation converging around navigation on the Danube river. At the same time political conflict, natural river conditions and other barriers have impeded the development of navigation. A series of wars provided the opportunities for renegotiating the institutional arrangements of multilateral cooperation. The end of the Cold War led to significant changes in the third regime, which continue to be renegotiated currently.

In the first stage of the first navigation regime the lack of long-term mechanisms to manage conflict between non-riparians and riparians doomed the efforts to develop a regime for the entire river. The second regime took an adaptive approach to managing uncertainty, but the rules for participation meant a majority could ignore minority interests. They also did not provide for the inclusion of new stakeholders, whether riparian or not. Conflict over representation simmered as new countries emerged and others increased their ability to influence navigation in the Danube. The existing arrangements could not adjust to these changes and were replaced after World War I.
In the second regime authority over navigation on the river was divided between the fluvial and maritime organizations. The rules of participation for the maritime organization were so inflexible as to exclude all but the four initial members, three of which were not riparian states. Therefore, the maritime organization could not effectively manage conflict among the stakeholders. The fluvial organization included a broad range of participants. However, in practice its authority was limited to little more than approving riparian projects, which meant the organization could also do little to manage conflict between the stakeholders.

The rules for participation under the third navigation limited its ability to manage conflict among the stakeholders. They initially excluded non-riparians and some riparians and included no mechanism for any new stakeholders to join the DC. The rules continue to exclude non-riparians. Similarly the early voting rules and rules for representation in the DC enabled the majority to simply ignore the interests of the minority. However, over time these were changed. Some decisions require unanimous agreement, and therefore compel the participants to consider all their interests. The narrow range of issues addressed by cooperation contributes to the DC’s overall limited authority. As a result, the DC is reluctant to become involved in disputes in the basin and also has limited flexibility to respond to changing circumstances.

When the authority of the implementing organization has been limited to coordinating actions on a narrow range of issues, it has restricted the participants’ ability to respond flexibly to changing conditions. Most significant across the regimes is how frequently the
rules for participation have been a barrier to adjusting to change. Despite a history of changes in the rules for participation, such changes have been made on an ad-hoc basis, without envisioning how to adjust in the future when circumstances again changes.
Chapter 3 The Danube Water Protection Regime

Chapter Overview

Integrated River Basin Management

Joint Environmental Monitoring: International cooperation before the first Danube protection regime


Recent Developments of the Danube Water Protection Regime From the EU Water Framework Directive to Today (2000-Present)

Discussion

Watershed planning and decision making is not as easy as “we know and can tell you what to do, all you need is the will to do it.” Very often it is not clear what should be done (Loucks, 1998):40).

Chapter Overview

Integrated river basin management emerged as a concept guiding international river governance in response to the development of new river uses, which competed with navigation and required international cooperation, and a change in knowledge and ideas about how rivers should be managed.
The first section below discusses the meaning of integrated river basin management, which provides a basis for understanding the development of the Danube water protection regime.

The second section describes the history of the Danube water protection regime, including three stages of regime development: from the Bucharest Declaration to the 1994 Danube River Protection Convention, from the Convention to the 2000 EU Water Framework Directive, and from 2000 to the present. The institutional arrangements in each stage are described, including who should participate, what range of activities should be addressed, what geographical areas should be covered and what should be the role of the watershed authority, and how these changed over time. Finally, the chapter discusses the approach to conflict and uncertainty and how these helped the participants overcome obstacles to adjusting cooperation over time.

**Integrated River Basin Management**

In a group of mountains a small river has its source. A dozen or a score of creeks unite to form the trunk. All these streams combined form the drainage system of a hydrographic basin, a unit of country well defined in nature, for it is bounded above and on each side by heights of land that rise as crests to part the waters. Thus hydraulic basin is segregated from hydraulic basin by nature herself, and the landmarks are practically perpetual... Such a district of country is a commonwealth by itself. The people who live therein are interdependent in all their industries. Every man is interested in the conservation and management of the water supply, for all the waters are needed within the district. The men who control the farming below must also control the upper regions where the waters are gathered from the heavens and stored in the reservoirs. Every farm and garden in the valley below is dependent upon each fountain above.

All of the lands that lie within the basin above the farming districts are the catchment areas for all the waters poured upon the fields below. The waters that control these works all constitute one system, are dependent one upon another,
and are independent of all other systems. Not a spring or a creek can be touched without affecting the interests of every man who cultivates the soil in the region....

Thus it is that there is a body of interdependent and unified interests and values, all collected in one hydrographic basin, and all segregated by well-defined boundary lines from the rest of the world. The people in such a district have common interests, common rights, and common duties, and must necessarily work together for common purposes. (J. W. Powell, 1890)

The concept of integrated river basin management tries to use advances in understanding of the river as a system to address the potential for conflict between different uses and users of international river basins. Early examples of river management already tried to integrate water development across the entire river, across different uses and across different user groups.¹ However, an understanding of the hydrological relationships

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¹ Records of water management in the ancient irrigation civilizations along the Nile, Tigris-Euphrates, Indus, Yellow and Yangtze (Newbegin, 1924) reveal an appreciation of the river system as an interlinked hydrologic system. These ancient civilizations used their understanding to develop more extensive projects to expand the benefits of river use. For example, water developers in the Nile considered and monitored the impacts of different parts of the natural river system on one another and the impacts of engineering projects on the natural system (Teclaff, 1996). Management plans took into consideration the impact of upstream works, such as irrigation canals, dikes, and dams, on downstream parts of the system. Water gauges provided information on the upstream part of the river system. Power for controlling the water system was consolidated in centralized order to enable rulers to carry out more extensive irrigation projects (Newbegin, 1924; Teclaff, 1996).

The Roman Empire left behind aqueducts and other large-scale water works demonstrating their understanding of interlinked water systems. Vitruvius had an early conception of the hydrologic cycle, which included water running down mountains and into rivers. Another Roman, Hero of Alexandria, similarly recognized the contribution rainfall made to springs and, perceiving the significance of cross-sectional area and velocity in determining discharge, made the first accurate measurements of stream flow (Biswas, 1970).

Ancient traditions of organizing communities of water users also demonstrates an appreciation of the interdependence between water users. For example, farmers in the 8th and 9th centuries BC in the Land of Israel developed and shared groundwater. These farmers limited direct access to the water to a group of extended families living in a village, who joined together to constructing spring-flow tunnels and had a shared interest in constructing and maintaining the water supply system (Benvenisti, 1996). Limiting participation in the community to water users with shared interests minimized the opportunity for conflict. The Roman and medieval systems of water rights recognized the differing interests of different communities of water users. Both system of water rights saw the potential for new uses to conflict with existing uses, and tried to minimize the potential for conflict by restricting the development of new uses (Teclaff, 1972, 1996). Roman law allowed for different communities with different shared interests. For example, the landowners along a river formed one group, which was allowed to use the water freely as long as the use did not interfere with the interests of a larger group, the public, in navigation. The riparian rights doctrine in medieval Europe recognized the landowners along a river as a group with the right to use the river's water, subject to authorization from the aristocracy (Teclaff, 1972). Similar to the Roman and feudal riparian rights systems, contemporary international water law restricts to riparian states the legal rights for non-navigational uses of surface water (Benvenisti, 1996).
between precipitation, land and river flow didn’t develop until the 17th and 18th centuries in Europe. This new knowledge of the river system contributed to revived interest in Europe and elsewhere in developing and managing the river as a single unit (Wescoat, 1992), in contrast to fragmented approaches based on administrative and political units. Technological developments at the beginning of the industrial revolution made it possible to develop rivers for multiple uses and, in international rivers, with the potential to affect one another’s territories more substantially than ever before. For example, the invention of reinforced concrete allowed engineers to build much larger dams for electricity

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2 Pierre Perault proved that rainfall over a catchment could produce streamflow in a sub-catchment of the Seine in his 1674 book *De L'Origine des Fontaines*. Philippe Buache, a French geographer, described drainage basins separated by mountains as natural regions (Biswas, 1970; Wescoat, 1992). According to Wescoat (1992) most Western geographers through the Middle Ages did not understand the relationship between precipitation and riverflow. They viewed water as analogous to the human circulatory system, as a system of surface arteries and underground veins of flowing water. With exceptions, such as the Romans mentioned above, many early geographers viewed rainfall and soil moisture (the ‘sweat of the earth’ according to Aristotle) as insignificant in the hydrological cycle (Biswas, 1970; Wescoat, 1992).

3 For example, during the 1815 Congress of Vienna Wilhem von Humbolt, the Prussian delegate, argued in favor of considering international rivers “a unity” (Berber, 1959) as quoted in (Bourne, 1969)). Already at the end of the 18th century the Congress of Rastadt tried to apply free navigation to the river system, not only the main river.

The emphasis on the unity of the river system and cooperation can also be seen as a reaction against other theories promoting unilateral and fragmented development, for example the theory of absolute territorial sovereignty (Bourne, 1969). According to the theory of absolute territorial sovereignty, also referred to as the Harmon doctrine, states have the right to use water flowing in or through their territory however they see fit and without regard for the impact on other riparians. This theory has never been implemented in practice, but does appear in limited form in some agreements. (For a complete review of the Harmon doctrine, see (McCaffrey, 1996b).) In contrast the absolute territorial integrity theory, also called the riparian rights theory or natural water flow theory, contends that each riparian state has a right to the quantity and quality of water which would naturally flow through their territory unless they agree otherwise. This theory essentially gives downstream riparians the power to veto any proposed upstream water uses, similar to the approach discussed in the next chapter in the 1929 agreement between Egypt and Great Britain, negotiating on the part of Sudan, in which Egypt was given the ability to veto new upstream consumptive water uses. Most international water agreements adopt a third approach, the principle of limited territorial sovereignty, which gives each riparian the right to use water, but also a corresponding duty not to cause significant harm to other riparians. From this idea comes the principle of equitable apportionment or utilization, which gives each state sharing an international basin a right to a reasonable and equitable share of benefits from use of the water (Bourne, 1969). A fourth principle views the river basin as a unified economic unit in which the states share the international river and the benefits from its use as a community. The benefit sharing approach, discussed in the next chapter, follows from this principle (Salman, 2007, 2009).
generation, flood storage, irrigation, navigation and other purposes. In addition to corridors for transporting goods and sources of water to grow crops, rivers became drivers of national economic growth. The concept of integrated river basin management provides guidelines for cooperative institutional arrangements on the range of activities, the geographic scope or territory, who participates and authority for implementing cooperation on international water management (Ferrier, Jenkins, & Blackstock, 2010).

The following section discusses how the integrated river basin management concept relates to uncertainty and conflict, and the related developments of international water law.

Contemporary disputes on international rivers, such as the Indus, Nile, Jordan and Columbia, underscored the need for new rules governing the use of international rivers to prevent conflict (Bourne, 1969). In response the International Law Association developed guidelines for international cooperation, the Helsinki Rules on the Uses of Waters of International Rivers (Helsinki Rules). The ILA has continued to work on

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4 The development of alternating-current, new generators, transformers, and other innovations made it possible to transmit electricity long distances (Hughes, 1993). As a result, industries no longer had to be located next to power sources, such as rivers. In 1902, twenty years after the British took control of Egypt, the first Aswan Dam was completed to manage the Nile for irrigation, flood protection, and navigation. Similar projects were proceeding in the United States to irrigate the West, and conservationists, such as the Sierra Club, were increasingly concerned about the impact of resource use for industrialization on nature and other uses (Teclaff, 1996). The development of alternating-current, new generators, transformers, and other innovations made it possible to transmit electricity long distances (Hughes, 1993). This electricity powered far-flung industries, which were now no longer tethered to power sources and could be located anywhere.

5 The watershed approach was first articulated in international law in the 1911 Madrid Declaration of the Institute of International Law (a non-governmental organization), which asserted that geography, not national borders, should provide the basis for developing rules for rivers crossing state borders (Bourne, 1969; Whiteman, 1964).

6 The ILA is a non-governmental organization of academic and practicing jurists who participate in their individual capacity and not as representatives of a government or organization (Bourne, 1996). The International Law Association (ILA) first established “The Committee on The Uses of the Waters of International Rivers” (The Rivers Committee) to study the legal aspects of developing and using freshwater
clarifying the Helsinki Rules and its latest guidance is found in the 2004 Berlin Rules on Water Resources (McCaffrey, 1998). Nevertheless when Bolivia and Finland introduced resolutions requesting the United Nations to develop international water law in 1959 and 1970 respectively, the Sixth Committee (the committee addressing legal questions) of the UN General Assembly rejected the proposal to use the Helsinki Rules as a model in a divided vote. In 1970, instead of building on the Helsinki Rules, the UN commissioned the International Law Commission (ILC) to develop guidelines for states riparian to an international watercourse. Despite concerns over the feasibility of developing guidelines relevant for something with so much variation as that between unique international watercourses (McCaffrey, 1996a; Wescoat, 1992), the ILC released a draft convention in 1994. A UN Working Group adapted it to accommodate the rights and obligations of watercourse states and in 1997 the UN General Assembly adopted The Convention on the Law of Non-Navigational Uses of International Watercourses (UN Convention) (Caflisch, 1998). Despite broad support in the UN General Assembly, the Convention has still not received sufficient ratifications to enter into force.

resources. In 1966 the ILA adopted the Helsinki Rules on the Uses of Waters of International Rivers (Helsinki Rules) based on the River Committee’s work. After the River Committee finished its work, the ILA continued its work on developing international water law in the Committee on International Water Resources Law (Manner Committee) between 1966 and 1986 and in the Committee on International Water Resources (WRC) between 1990 and 2004. Countries opposing using the Helsinki Rules were concerned that, as a non-governmental organization, the ILA did not represent state interests, not all UN member countries participated in developing the Helsinki Rules and some, such as Ethiopia, wanted to the flexibility to consider new approaches, and they were concerns over using a drainage basin approach (Wescoat, 1992).
Uncertainty

The above quote by John Wesley Powell, nineteenth century American scientist and geographer, describes what is commonly called a catchment, river basin, drainage basin or, in the United States, a watershed. Powell identifies two characteristics of a river basin:

9 In other parts of the world the term “watershed” is more commonly used to describe the divisions between river basins. The term watershed came into common scientific use in the 1800s as a water parting, the line that separates the waters flowing into different rivers or river basins (“watershed,” 1989) Rev. Dr. Walker used the term in 1803 to describe “a very high inland tract, being the water-shed of the country between the two seas (Rev. Dr. Walker, 1803):20.” Huxley (1877) notes that the word watershed originates from the German geographical term Wasserscheide, literally the water partition (Wasser = water, Scheiden = to separate). “The high land which forms the divisional line between two contiguous river basins is called the water-parting. Instead of “water-parting,” some writers employ the term watershed (Huxley, 1877):18.” This definition is consistent with its definition as a turning point, as in a watershed event. Huxley notes that in common usage “watershed” was associated with the English word shed. It therefore came to mean the surface from which waters were shed or the slope down which water flowed and as something distinct from the divide. Huxley made an effort to clarify the distinction, “To avoid all ambiguity, it is perhaps best to set aside the original meaning of “watershed,” and employ the term to denote the slope along which the water flows, while the expression “water-parting” is employed for the summit of this slope (Huxley, 1877):19.” However, compounding the confusion, “watershed” took on yet a third definition in the United States, “the country or basin drained by any stream of water and its tributaries (Webster, Goodrich, & Porter, 1880).” Huxley refers to this latter landscape unit as either a river-basin, “...water partings may be drawn on a map of any country, so as to divide the entire region into a series of river-basins (Huxley, 1877):19,” or a catchment-basin, “...all that part of a river basin from which rain is collected and from which therefore the river is fed (Huxley, 1877):34,fn1).”

Catchment-basin and delta of a river. Source: Fig. 36 in (Huxley, 1877): 145.

In the United States the term “watershed” now commonly conveys only this third meaning. For example, a simple Google English word search of “watershed” returns a definition in ubiquitous use attributed to John Wesley Powell from 1895 (EPA, 2009, personal communication), “…that area of land, a bounded hydrologic system, within which all living things are inextricably linked by their common water course and where, as humans settled, simple logic demanded that they become part of a larger community.” (Despite trying, I could not locate the source of this quote. I consider it more likely a quote by Lee W. Forbes in (Forbes, 2006):7) summarizing what Powell wrote in Canyons of the Colorado, published 1895 by Flood and Vincent, republished as The Exploration of the Colorado and its Canyons (J. W. Powell, 1961)). In
basin. First, a river basin is a natural geographical unit. Second, a river basin is an interconnected system of physical resources, such as rivers and land that drain to a single outlet, and the human uses of them. According to Powell the river basin is a self-contained system of interdependent resources and activities. In comparison to the changeable and artificial political and economic boundaries drawn by humans for management units, the borders of the watershed are stable, natural, and objective criteria for dividing land and resources.

Conservationists were concerned that engineers and resource managers would use the advances in river system management to optimize river development for irrigation, drinking water supply, hydropower, navigation, industrial waste disposal and other objectives, but ignore the negative impacts of these uses, such as pollution and damage to the environment. Taken to its logical conclusion, optimal river development could mean a river, “...would fluctuate in its main channels only to meet fluctuating human demands, the natural variations having been evened out (White, 1957):158).” Conservationists were

other parts of the world “watershed” more commonly conveys its original meaning as a geographic divide. Instead, “catchment”, “river basin” or “drainage basin” are frequently-used as the equivalent to the American “watershed.” In this research watershed, catchment, and drainage or river basin are used interchangeably.

10 Anthropogenic elements of watersheds include (1) morphological alterations of watercourses, such as dams, dikes, canals, pipes used to transport water, and sewer outfalls, (2) physical structures, such as homes and farms, and (3) activities, such as industries and land management practices, that affect the water quality and quantity. Their natural features include hydrologic elements, such as streams, wetlands, springs, lakes, and groundwater, as well as vegetation, soils and surface slopes. However, groundwater drainage basins often do not correspond to surface water basins. Groundwater does not necessarily flow according to the boundaries of the surface water’s basin, but may leave the watershed through points other than the outlet through which the surface water exits. For example, a significant quantity of water flows out of the upstream part of the Danube watershed into the Rhine watershed, but these two basins are considered distinct. International agreements usually delimit the watershed according to the hydrology of the surface water, even though the legal definition of a watershed encompasses both surface and groundwaters (Teclaff, 1967). The same rules apply to international groundwaters and international surface waters, regardless of whether or not the groundwater is actually hydrologically connected to surface water (Bogdanovic, 2001; Bourne, 1996).
worried stabilizing the river system in this way could provide maximum benefits for economic growth for some users, but could ignore the impacts on other parts of the river basin or on the environment. According to this thinking, the two main problems for managing rivers are, first, most political and administrative units do not correspond to watersheds, and second, decision-makers focus myopically on only the resources within their own political unit and ignore negative externalities passed along to downstream areas. For example, a local administrator striving to reduce flood damage by armoring river banks may contribute to increased flood damage further downstream.

Powell’s concept of the river basin as a natural and objective unit seemed to provide a basis for better river management and planning (Teclaff, 1967).

The general view is that a watershed-based approach provides one of the best units for intergovernmental management because: (a) they are meaningful ecologically; (b) they are defined spatially; (c) they can be nested hierarchically, in that small watersheds are part of larger watersheds; and (d) the health of an entire watershed generally can be measured by the health of the aquatic system. (McGinnis, 1999:498)

In comparison to fragmented approaches, resource managers using the watershed approach resource take an integrated ecosystem approach to developing the whole river in a way that reduces negative externalities (Blomquist & Schlager, 2005). Protocols for

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11 There are exceptions, such as when the edge of a mountain range forms both the watershed divide and a political border. However, more commonly large rivers have been used to easily delineate territories, such as national borders, because they can be readily observed, usually change their course only very slowly over time, and form a protective barrier that may be hard to cross (Swallow, Garritya, & Noordwijk, 2001). In such cases the political border may bisect the watershed. Where national borders are designated by straight lines, they can be crossed more than once by the same meandering river.

12 The watershed can be used as an indicator of the health of the larger watershed. The sources of aquatic problems are activities within the basin that ignore connections within the system (Lavkulich & Ulazzi, 2008) and surrounding ecosystem (Naiman et al., 1992).

13 Grumbine’s (1994) review of the literature identifies ten dominant strategies for resource managers to implement ecosystem management:
- focus on defining ecological boundaries at appropriate scales and work across administrative and political units;
integrated river basin management therefore begin with defining the watershed and its elements, including all natural resources, land uses, population, the population's income distribution, and stakeholders. They then assess the problem, its severity, causes (through a pathway analysis of pollutant fate in the ecosystem), and hotspots of substantial contamination and impacts resulting from the problem. They identify alternatives for addressing the problem, consider which policy option is more likely to lead to better outcomes, and build an implementation plan, including mechanisms for feedback and evaluation (Heathcote, 1998; Randhir, 2007).

Recommendations to manage water resources at the watershed scale are now ubiquitous. For example, Principle 1 of the 1992 Dublin Statement states\textsuperscript{14}: "Effective management links land and water uses across the whole of a catchment area or groundwater aquifer (International Conference on Water and the Environment (ICWE), 1992)." The 1992 UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki Convention) contains watershed-based objectives, such as protecting transboundary surface and groundwater from pollution and promoting

- focus on systems, the connections between different scales of ecosystem organization;
- protect ecological integrity by focusing on natural diversity and variation;
- collect more data and manage data better;
- monitor the results of interventions;
- use an adaptive approach by recognizing the limits of scientific knowledge and pursuing management as a learning process;
- cooperate across agencies and between different stakeholders to integrate management goals;
- change the structure of organizations where needed;
- view humans as fundamentally embedded in nature;
- appreciate the role of human values in defining ecosystem management goals (Grumbine, 1994).

\textsuperscript{14} This statement was developed in January 1992 by world leaders and representatives from intergovernmental and non-governmental organizations at the International Conference on Water and Environment and presented at the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro. Not surprisingly the prescriptions for integrated water resources management in UNCED's Agenda 21 also advocate adopting a watershed approach (Teclaff, 1996).
ecologically sound and rational water management, and aims for ecosystem conservation and restoration.  

The Riparian Parties shall cooperate on the basis of equality and reciprocity, in particular through bilateral and multilateral agreements, in order to develop harmonized policies, programmes and strategies covering the relevant catchment areas, or parts thereof, aimed at the prevention, control and reduction of transboundary impact and aimed at the protection of the environment of transboundary waters or the environment influenced by such waters, including the marine environment. ("Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki Convention)," 1992): Article 2)

The ILA jurists saw the river’s natural hydrology as a simple and elegant basis for defining a geographic unit and developing rules for governing the interdependent interests within it. The Helsinki Rules define an international drainage basin as “a geographical area extending over two or more States determined by the watershed limits of the system of waters, including surface and underground waters, flowing into a common terminus (Committee on the Uses of the Waters of International Rivers, 1967): Article II).” The 2000 European Union Water Framework Directive (EU WFD) builds on the Helsinki Convention and also adopts an integrated river basin management approach.

International agreements, such as both the UNECE Helsinki Convention and the EU Water Framework Directive, contain formidable data requirements. According to the

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15 In a 1989 Meeting on the Protection of the Environment of the Commission on Security and Cooperation in Europe Austria, Finland, Sweden and Switzerland put forward a proposal recommending the United Nations Economic Commission for Europe (UNECE) elaborate a framework convention on the protection and sustainable use of transboundary watercourses and international lakes. A Working Group was created under the UNECE’s Chief Counselors’ Board on Environmental and Water Management. Following a three year study, the Working Group drafted a framework agreement intended to catalyze neighboring riparians to conclude bilateral and multilateral agreements to manage transboundary river basins. (Szilagyi, 1993). The UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki Convention, not to be confused with the 1966 Helsinki Rules) was signed in Helsinki in 1992.
Helsinki Convention the riparian parties must enter into agreements, create joint bodies, conduct monitoring of the condition of the water, exchange information and cooperate on research. Riparian parties need to share data with one another and the public including: information on the environmental condition of transboundary waters, including emergency warnings; experience, research and development on environmentally sound technologies; pollution sources; and information on planned measures and how the Party intends to limit or prevent transboundary impacts from them (Bosnjakovic, 2000; "Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki Convention)," 1992; Kittinger, 1997; Wouters, 1996). The EU WFD requires EU Member States sharing an international river basin to develop a coordinated river basin management plan to protect their waters and achieve a “good status” for them. The river basin management plan is expected to describe the features of the river basin, summarize significant pressures of human activities on waters, identify and map protected areas, map the monitoring network, and list environmental objectives for basin waters. The EU WFD adds a focus on integrating national and international water protection, including surface and groundwaters, through chemical emission limits, water quality standards, biodiversity and aquatic health standards, and standards for morphology or habitat change. While requiring EU member countries to cooperate and sharing responsibilities, it does not specify the form of cooperation. It does, however, require public consultation and information (Bloesch, 2005; Bogdanovic, 2005; Bressers & Kuks, 2004; Dutu, 2008; Moss, 2006; van Rijswijk, Gilissen, & van Kempen, 2010).
Significant gaps in scientific understanding often make it difficult for countries to come up with the data required in these agreements. As a result the countries need to develop arrangements for environmental monitoring and joint fact finding. Environmental monitoring is a process in which stakeholders define policy-relevant information needs, design a monitoring strategy and develop a monitoring network, collect and process data, and analyze and report findings. As information needs evolve over time it is expected the design of the monitoring program will be continuously revised (Jansky et al., 2004).

Objectives of environmental monitoring include detecting changes, for example providing early warning if hazardous substances have been released into a river, assessing the effectiveness of a proposed policy or legislation, evaluating compliance with regulations, and assessing long-term trends (Goldsmith, 1991).

In creating a monitoring program policy-makers are faced with the same kinds of questions other resource managers face: Where should monitoring stations be located (determining the geographic scope of the network)? For example, at borders? At major tributaries? Near significant point sources of pollution? What should be monitored, how intensely, according to what procedures and how will data quality be controlled (determining the range of issues or activities monitored)? Who should conduct the monitoring (determining participation)? How should information be communicated, integrated to make data from different sources comparable, analyzed and transformed for policy-analysis (determining the role of an implementing authority)? For example, what preselected criteria will be used to evaluate the results? Will information be communicated monthly or annually to other participants? Will information be shared
with others, such as policy-makers? If so, how will large data sets, such as statistical analyses and monthly averages, be transformed into something policy-makers can use to make decisions (Goldsmith, 1991; Helmer, 1997)?

Joint fact finding is a process by which policy-questions are answered so environmental monitoring (or other science intensive problem-solving efforts) avoids degenerating into adversarial science, in which different parties advocate for or against their own view of the “right” way to organize the research program or interpret results. Advocacy science obscures the technical basis for scientific disagreements, separates the political consideration that drive stakeholder involvement from scientific inquiry, and undermines scientists’ credibility (Andrews, 2002; Ozawa, 1991). Joint fact finding assumes information gaps and scientific uncertainty are part of policy-making and parties with different interests can reasonably interpret the same material differently (Ehrmann & Stinson, 1999). In a joint fact finding process all key stakeholders are involved in designing a research program open to change, all key stakeholders participate in the scientific inquiry, all key stakeholders participate in answering questions about policy implications while maintaining scientists’ credibility, a professional neutral manages the discussions, and the convener of the process commits to implement decisions reached (Rofougaran & Karl, 2005). The participants can also define the geographic scope for addressing specific problems, which may or may not be the watershed.

Such a flexible approach is necessary because rivers are highly complex systems which vary in their size, natural features and anthropogenic elements. In contrast to Powell’s
contention that river basins are "bounded" they are open systems. Water flows through the system and the global hydrological cycle. Water enters the watershed system from outside, usually from the atmosphere in the form of precipitation, and exits the system, flowing into some kind of receiving body, such as a sea, or returning to the atmosphere through evaporation or plant transpiration. In some cases defining environmental problems according to the watershed scale may be overly rigid and ineffective. For example, nutrient runoff from a local farm may contribute to low dissolved oxygen levels in the water of a small stream, which could pose risks to aquatic fauna. However, when this water mixes with water in the main river it may no longer present a problem. Other issues, such as nutrient cycling, may not cause problems locally but cumulative effects may be cause for regional or even global concern.

Watersheds are also subject to change, yet the watershed approach assumes its boundaries are stable. For example, rivers meander and can change their course in response to extreme hydrological events, such as floods. Engineering works, such as canals, can also change the natural boundary of the river system. It is unclear how or whether the geographic for cooperation should be adjusted to account for such changes. Therefore, some flexibility is needed in determining the geographic scope of cooperation.

Bower (1963) suggests conceptualizing a water resources system not as one unit, but as any number of areas defined by different uses or outputs.

A water resources system does not encompass a single geographic area, but rather a set of overlapping, but not necessarily coincident, areas. Each area corresponds to the demand area of one of the outputs from the system. These overlapping
areas are centered on, but are not necessarily coincident with, the drainage basin. (Bower, 1963):220).

This approach is quite different from Powell’s, in which the drainage basin is a stable and well defined unit. According to Bower the watershed concept creates a space for negotiating responses to specific water policy questions, but hydrology does not have to define the space. The hydrology of the basin is only one factor among many to be taken into consideration in those negotiations. As conditions or issues change, the geographic scope of cooperation needs to be able to change. International water law provides some support for adopting such a flexible geographic scope in practice.

For example, the Helsinki Rules suggest considering a variety of factors when negotiating how to develop international water resources, only one of which is geography (Bourne, 1969; Committee on the Uses of the Waters of International Rivers, 1967):Article V).\(^{16}\) However, some criticize international water law for neglecting hydrologic reality (Eckstein, 1998; Falkenmark, 1999). Like the Helsinki Rules, the UN Convention does not provide answers on how to address natural or human-caused changes in the channel or river system. Nor does it provide advice on how the impacts of larger systems, such as climate change, acid rain deposition, or the movement of invasive species, on rivers should be considered (Boon, 2005; Wescoat, 1992). Boon suggests the EU Water Framework Directive’s river basin district approach may be more flexible by allowing individual river managers to define the geographic scope beyond the watershed as needed (Boon, 2005).

\(^{16}\) See footnote 26 in this chapter for a complete list of the factors.
In summary, integrated river basin management and its application in international water law generally adopt an adaptive approach to uncertainty. The watershed is the recommended unit for understanding the river system, but there is flexibility in defining the scope of cooperation. The river system is considered dynamic and approaches, such as environmental monitoring and joint fact finding, try to anticipate change and surprise. These approaches also encourage the participation of a broad range of stakeholders in a dialogue about understanding the river system. Although neither explicitly seeks to reduce uncertainty by testing hypotheses, both seek to include practical monitoring results and a variety of experiential knowledge.

Conflict

Integrated river basin management seeks to catalyze a dialogue among a broad range of stakeholders (Heathcote, 1998; Randhir, 2007). According to Powell, the boundaries of the watershed define a community of interdependent water users and are therefore an objective basis for defining the stakeholders who participate in river management decisions. At the international scale, if your country has territory in the watershed you are "in". If you do not, then you are "out" (Blomquist & Schlager, 2005). Using the watershed to define stakeholders can be understood as an effort to minimize conflict over who participates. However, the watershed boundary is only one among many ways of defining groupings, around which social and economic groupings "...define their relationships to each other, including ideas about legitimate access and control over

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17 Article III of the Helsinki Rules defines a basin state as “a State the territory of which includes a portion of an international drainage basin (Committee on the Uses of the Waters of International Rivers, 1967).”
resources (P. A. Walker & Peters, 1998):3).” The watershed boundary should then be seen as only one among many boundaries which create spaces for social contests over resource policies.

One critique of using the watershed to define participation and minimize conflict is that planning at the macro scale can resemble “top-down planning” initiatives. Therefore there may be reasons to manage specific water objectives at subbasin scales. For example, larger watersheds are made up of smaller watersheds, which may be independent of one another, even though they all contribute water to a common downstream point. For example, the White Nile, Blue Nile and Atbara subbasins all contribute water to the Main Nile, but no water flows from one subbasin into another. The different subbasins may have different priority issues of concern and, therefore, in some cases it may make sense to define the community of stakeholders according to the subwatershed. However, doing so gives those countries riparian to the subwatershed more say than other countries who are part of the larger watershed, but not part of the

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18 Powell notes the historical use of large scale watershed planning as a means to subjugate people in pursuit of a despot’s objectives.

In the practice of agriculture by irrigation in high antiquity, men were organized as communal bodies or as slaves to carry on such operations by united labor. Thus the means of obtaining subsistence were of such a character as to give excuse and cogent argument for the establishment of despotism. The soil could be cultivated, great nations could be sustained, only by the organization of large bodies of men working together on the great enterprises of irrigation under despotic rulers. (J. W. Powell, 1890)

Some early critics of the watershed approach were concerned about the increasing power of the central government and its bureaucracies, which accompanied the development of watershed approach (Wescoat, 1992). Swallow, Garritya, and Noordwijk (2001) also see the potential for watershed management to privilege the objectives of some stakeholders over others. Referring perhaps to the early emphasis on the meaning of “shed” in “watershed” (see footnote 9 above in this chapter), they interpret “watershed management” as emphasizing the use of upper watershed areas to protect water quality and quantity for downstream ecosystem services. According to the authors, watershed management can therefore be the basis for “top-down management approaches by outside agencies (Swallow et al., 2001):459).” Suspicion about the implications of the term “watershed management” for different stakeholders is one reason some prefer to use “catchment management.” (See (Lal, 2000) and footnote 9 above in this chapter).
subwatershed. What happens if the priorities in the subwatershed priorities conflict with those of the larger watershed participants?

Another critique of minimizing conflict by limiting participation to the watershed is that doing so sows the seeds of conflict by privileging some interests, those of basin countries, over others, non-basin countries (Ingram, Mann, Weatherford, & Cortner, 1984), even though non-basin states may have a significant interest in water development within the basin. For example, a non-basin country may rely heavily on hydropower produced by the river system, food imports irrigated by the basin, or on the ability to ship goods along the river, or its industries may be significant users of the water for industrial or food purposes. Should companies or international organizations be able to participate in decision-making? Agricultural pollution from the watershed is discharged by the river into receiving water bodies, such as enclosed seas and open gulfs, and can impair their water quality. Similarly inter-basin water transfers, irrigation diversions, and diversion of virtual water though the export of agricultural goods can alter the quantity of water flowing into receiving seas and their quality. Should the states around the receiving body of water also have some say in river basin management? This question was raised in the ILA’s discussions, how should the use of water from a particular basin in areas outside of the basin fit into the watershed approach? In 1976 the ILA developed recommendations for riparian states to consider inviting non-basin states and international organizations to participate in river administration if the non-basin states have an interest through treaty,

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19 See for example (John Anthony Allan, 1997) for a discussion of virtual water.
custom, or other arrangements (Bourne, 1996). The ILA recommendations take an adaptive approach by providing an opportunity to manage tensions between basin states and stakeholders excluded by the watershed approach. However, in practice, international river basin arrangements limit participation to countries with territory in the basin.

Critics of the watershed approach were also skeptical of the notion Powell expressed that the people within a watershed have “common interests”. For example, Professor Andrassy argued that there are not only common interests, but divergent interests as well (Bourne, 1969) and significant hydrological differences among basin states (recall the hydrological groupings introduced in Chapter One). Some states with territory in the basin may have little interest in participating in decision-making, for example, if their primary water resources come from another river basin. Some states may contribute very little water to the basin, while others contribute significantly. Some states may have almost all of their territory within the basin, while others have only a small portion. Despite their differences, should all the countries have an equal vote in making decisions, as is common practice in international forums? For countries with only part of their territory in the basin, how should national issues be taken into account, such as national energy plans of which river basin development may be a component. What about regional economic areas which are bisected by watershed divides? A strict application of the

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20 Article 3 of the Articles on International Water Resources Administration adopted by the ILA in 1976. Some legal experts considered this suggestion radical as non-navigable uses of river water have been historically limited to riparians. Others were concerned about the opportunity this would give third parties to interfere in the affairs of riparian states. The chairman of the drafting sub-group, Dr. Caponera defended the ILA recommendation by pointing to the significant activity of the World Bank in international river basin development, such as in the Mekong (Bourne, 1996).

In comparison, the UN Convention does not address how international organizations, including financial institutions such as the World Bank, should be included, nor does it address the role of non-governmental or international scientific organizations (Wescot, 1992).

21 There are exceptions, such as the weighted decision-making procedures of the World Bank.
watershed approach is impractical because it ignores such considerations and provides no way to manage the tensions that arise. The decision of which countries should participate in integrated river basin management is therefore one that cannot be resolved by looking at the watershed. As Blomquist and Schlager state, “There is a basic political tension in the management of watersheds...The determination of which communities to include in watershed governance is not resolved with a topographical map any more easily than with a political one (Blomquist & Schlager, 2005):105.” Institutional arrangements determining participation need to be negotiated, and, as circumstances change, conflicts between different stakeholders need to be managed on an ongoing basis.

Based on such considerations, the ILA decided not to use the concept of the river as an “integrated whole” for its recommendations in the Helsinki Rules on international river basin management. The Helsinki Rules generally support the watershed approach, but recommends also using other considerations, in addition to geography and the physical unity of the basin, to determine institutional arrangements. For example, the Helsinki Rules recommend considering factors from outside the basin, such as the economic and social needs or population of a state not wholly within the watershed (Bourne, 1996).

Faced with divided support for the drainage basin approach, instead, in the UN Convention, the ILC decided to use the international watercourse as the basis for determining institutional arrangements. The UN Convention defines international

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22 When the ILC took up the question of defining an “international watercourse” the ILC circulated a questionnaire to UN member countries asking their views on the appropriateness of using the drainage basin concept to study the legal questions of non-navigational uses and pollution of international watercourses. The respondents’ views were divided. Despite the contention by Teclaff (1991a) that support for the watershed approach broke down according to geographic position, with downstream countries supporting and upstream countries opposing in favor of a narrower definition, data on the actual positions countries took on this issue do not provide clear support for this division. While some countries, such as
**watercourse** as, “A system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus (United Nations, 1997): Article 2).” It therefore focuses on the water in the system, a more limited approach than the Helsinki Rules’ general watershed approach. For example green water, such as water falling within the drainage basin that is used to grow crops before it ever reaches a watercourse, would be included in the range of issues for cooperation under the Helsinki Rules. However, it would be excluded under the UN Convention (Abu-Zeid, 2001). In comparison, the UNECE Helsinki Convention adopts a broader ecosystem approach, including even the soil in addition to transboundary waters (Bosnjakovic, 2000). Using the ecosystem to define the range of issues for cooperation is an adaptive approach to managing uncertainty by considering natural diversity and variation (Loucks, 1998). Some international basin agreements have further broadened the range of activities to include regional cooperation, such as the Niger, Zambezi, Great Lakes and Nile (Teclaff, 1991b), and the ecosystem approach, which could be used to coordinate land and water management (Reynolds, 1985), or all natural resources (Wengert, 1957).

Wescoat sees the UN Convention’s use of the international watercourse as a positive step away from the watershed and toward a “problemshed” approach (Wescoat, 1992). A problemshed is a geographic area for addressing a particular issue (Loucks, 1998), which

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Brazil, consistently opposed the watershed approach, others, such as Greece, Canada, and some African countries, changed their positions over the years (McCaffrey, 1996a; Wescoat, 1992).

23 Articles 20-23 of the UN Convention on Protection and Preservation can be broadly interpreted as providing a legal basis for habitat protection (Wescoat, 1992), but this is focused only on the ecosystem of the watercourse (Korhonen, 1996; McCaffrey, 1996a).

24 See footnote 13 above in this chapter.
“seeks to internalize externalities and encompass opportunities to efficiently manage environmental problems by large scale regional measures (Kneese, 1968:126).” The problemshed is a negotiated scale, which is flexible depending on the issue at hand. Similarly, Wengert suggests using an adaptive approach to determining participation according to the specific issue under consideration (Wengert, 1957). In such cases, it could make sense to base participation on other geographical units, such as climate and vegetation zones (Teclaff, 1996). There is therefore some support in international water law and the literature for adopting an adaptive approach to managing tensions through negotiations over participation and the geographic scope of cooperation.

There are also guidelines for an adaptive approach to determining the range of issues for cooperation, including what waters should be shared and how they should be shared. According to integrated river basin management cooperative efforts should address a broad range of issues as all activities within the basin affect one another. As Powell stated in the above quote, “Not a spring or a creek can be touched without affecting the interests of every man who cultivates the soil in the region.” The ILA River Committee also thought international cooperation should address all uses of all water from the watershed. So far as possible, riparian States should join with each other to make full utilization of the waters of a river both from the viewpoint of the river basin as an integrated whole, and from the viewpoint of the widest variety of uses of the water, so as to assure the greatest benefit to all. (((International Law Association, 1957):242) as cited in (Bourne, 1969):65).”
Beyond the recommendation for countries to participate there are few guidelines on how to determine the range of issues for cooperation and the authority of the joint organization to administer cooperation.25

The Helsinki Rules do provide guidelines for how countries should share the benefits of water use according to the principle of equitable utilization. “Each basin State is entitled, within its territory, to a reasonable and equitable share in the beneficial uses of the waters of an international drainage basin (Committee on the Uses of the Waters of International Rivers, 1967): Article IV.” The Helsinki Rules only recognize a state’s right to share in the benefits derived from using the transboundary waters, and not to a specific portion of the waters themselves.26 According to the Helsinki Rules what equitable utilization means in practice should be negotiated on a case by case basis based on specified factors.27 By considering a broad range of issues the negotiators have the ability to

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25 The ILA’s 1976 Articles on International Water Resources Administration provide only very broad guidelines that co-basin states negotiate to establish an international water resources administration dealing with conservation, development or utilization of water (Bourne, 1996). Even more broadly, the Helsinki Convention exhorts joint bodies within the same watershed to coordinate their activities to reduce transboundary impacts (Teclaff, 1996).

26 The Helsinki Rules guidelines were interpreted by some as a rights-based approach, which could be used to determine specific quantities of water (Salman, 2007).

27 According to Article V these are:

1. The geography of the basin, including in particular the extent of the drainage area in the territory of each basin State;
2. The hydrology of the basin, including in particular the contribution of water by each basin State;
3. The climate affecting the basin;
4. The past utilization of the waters of the basin, including in particular existing utilization;
5. The economic and social needs of each basin State;
6. The population dependent on the waters of the basin in each basin State;
7. The comparative costs of alternative means of satisfying the economic and social needs of each basin State;
8. The availability of other resources;
9. The avoidance of unnecessary waste in the utilization of waters of the basin;
10. The practicability of compensation to one or more of the co-basin States as a means of adjusting conflicts among uses; and
highlight tradeoffs between alternative policies and manage tensions between different users. If the negotiators focus only on a narrow range of activities, such as navigation, there will be little opportunity to evaluate tradeoffs between policies, for example between policies to improve navigation and flood protection.

However, what happens if new proposed uses are incompatible with existing uses? How should harm to existing uses be evaluated against the potential benefits of new uses? Under what circumstances should one or the other be given priority? Again the Helsinki Rules explicitly try to manage such conflicts. They provide for a process for countries to notify one another of new proposed water uses, to negotiate, to collect, exchange and disseminate relevant and reasonably available data on the basin waters and assessments of potential or actual impacts, for dispute resolution with help from a third party. In the event no agreement can be reached or negotiations are unduly protracted, the riparian proposing the new use has flexibility to proceed unilaterally, but must be able to show its objectives are reasonable and equitable (Bourne, 1996). Therefore under the principle of equitable utilization existing uses should not confer a veto on potential future uses. The Berlin Rules revise the Helsinki Rules in favor of an obligation for riparians to manage the international water resources in a reasonable and equitable way, with an equal obligation of not causing significant harm to other riparians. The revision is intended to emphasize the need for negotiators to resolve the relationship between their obligations in order to share in the benefits of water use (Salman, 2007). The UN Convention negotiators took a similar approach, specifically trying to provide flexibility to states

11. The degree to which the needs of a basin State may be satisfied, without causing substantial injury to a co-basin State. (Committee on the Uses of the Waters of International Rivers, 1967):Article V)
trying to negotiate a strategy to implement the principle of equitable utilization (McCaffrey, 1996a).²⁸

If negotiators reach an agreement on how to share the benefits of water use, they face the dilemma of what to do when what is considered equitable use changes. For example, the availability of a river’s water fluctuates within the year, for example in response to rainfall patterns and temperature. Water availability also fluctuates across years, as mentioned in Chapter One according to the Joseph and Noah effects. However, resource managers systematically under-predict both the duration and severity of extreme events even when data on past runoff are available (Bras & Rodríguez-Iturbe, 1993). How should negotiators of international agreements consider short- and long-term variation in future water availability in their decision-making? The problem of considering future demand is even more daunting (Bower, 1963). New uses of the river may develop as new industries emerge or environmental needs are recognized. The economic needs of a country may change. The needs of the population within the basin may change in response to population growth, migration, or new technology (Molden & Samad, 2005). How should negotiators consider the impacts of current development on the future? How will future industries affect water needs? How will future technologies affect the water needs of current industries? What factors may impact the water needs of the population in the future, such as health, diet and wealth? How will the population’s water related recreation needs change? Will future political disputes or wars affect water need?

²⁸ The wording of the relevant Articles (5-7) is neutral enough that proponents of either prioritizing no-harm or equitable use could interpret the intent as supporting their position (Caflisch, 1998). For example, Salman (2007) contends the prevailing interpretation prioritizes equitable utilization over no harm. In contrast, McCaffrey (1996a) interprets the UN Convention as giving some priority to the no-harm principle.
This is the dilemma facing policy-makers seeking to implement the principle of equitable utilization, to apply the principle in a way that is useful and acceptable to the riparians and also flexible to accommodate changing circumstances. “The legal term...must be flexible enough to cover the changing condition of the different factors, and it must also be precise in securing a fair and just utilization of the waters among the riparian states (Fahmi, 1967):50).” The Helsinki Rules recommendations require negotiators to think about change and uncertainty. For example, the factors to be considered in determining equitable utilization include some which are constantly changing: economic and social needs, populations dependent on the water, resource availability, and practicability of compensation and changes in climate. The Helsinki Rules then include a logic of change by allowing for the development of new water uses, including those incompatible with existing uses (Teclaff, 1991a), and also in the factors negotiators used to determine what is equitable utilization. Equitable and reasonable use should therefore be understood as a flexible standard (Dellapenna, 2001), permitting reallocations during the lifetime of an agreement. “The application of the standard of ‘equitable and reasonable use’ means that all allocations are subject to future adjustment: whenever an allocation becomes inequitable or unreasonable, the standard mandates reallocations adjusted to the new circumstances (Benvenisti, 2002):145).”

In summary, the watershed approach can be a useful guide for negotiating water resources development around the idea of the river system, but not always according to its literal geographic borders. Rather than providing a static, deterministic framework for
water resource management, the watershed approach and international rules for non-navigational uses of international waters are embedded in politics and change. If the states sharing an international basin agree to adopt an integrated river basin approach, they must still define the geographic scope for cooperation in their particular negotiations, who participates in negotiations to develop and use the water, the range of activities that will be addressed and the form, the authority of the administrative organization created to implement their cooperation, and consider what to do when the conditions on which they reached their agreement change. The next section will look at how negotiators in the Danube basin resolved these issues to address environmental protection.

**Joint Environmental Monitoring: International cooperation before the first Danube protection regime**

Water resources departments normally have no time for a coordinated elaboration of hydrological fundamentals of the entire catchment basin. However, there are many important questions going beyond the events of the day, which require a thorough analysis of the hydrological properties of a river basin. How else could one give answers to questions such as the influences of dying forest on streamflow conditions, the influence of climate change on runoff etc. (Hofius, 1991b):27).

Whether explicitly or implicitly, the design of operating rules makes some assumptions as to the nature and precision of forecasts of future hydrological conditions. It is preferable for both sets of assumptions to be made explicitly and to be well founded (Serban & Askew, 1991):358).

Cooperation on scientific knowledge production provided the early basis for international cooperation on protecting the Danube, and these activities continue today. Researchers and other stakeholders saw a need for knowledge about the whole river system. For
example, cooperation on navigation requires knowledge about hydrology, the study of the quantity of water moving through the basin at different times. Hofius observed, “[Navigation] requires not only knowledge of the hydrological properties of the Danube river itself but also of its tributaries in the entire catchment basin (Hofius, 1991a):37).” Researchers needed to cooperate with another on collecting, sharing, and analyzing data in order to obtain information from across the system. The following section will discuss two scientific organizations that stand out for identifying gaps in understanding of the basin and creating shared knowledge: the International Working Group on Danube Research (IAD) and the Regional Cooperation of the Danube Riparian Countries in the Framework of the International Hydrological Programme of UNESCO (IHP Danube).

**International Research on Danube Limnology: IAD**

The International Arbeitsgemeinschaft Donauforschung (IAD) or the International Working Group on Danube Research was founded in 1956 by an Austrian scientist, Reinhard Liepolt, within the framework of the global Societas Internationalis Limnologiae (Society of International Limnology, SIL). Some scientists within SIL were interested in Danube issues and formed a working group, the SIL International Research Committee for the Danube (Benedek & László, 1980). At first participation in this precursor to the IAD did not include people from Communist countries, who were unable to travel to attend (Interview Danube 30, 2006). In response, the group decided to create a forum for scientific exchange within the Danube basin with participation from all Danube countries.
IAD was founded as a result of Dr. Liepolt’s efforts, an Austrian scientist, and those of other prominent hydrobiologists and water quality experts (Wachs, 1996). With Austria recently declared a neutral country and its location at the nexus between East and West, Dr. Liepolt, an Austrian scientist was the ideal person to spearhead the multinational effort.

With persistence, Liepolt followed his goals through the Academy of Sciences, national committees, ministries, and scientific institutes, and linked Danube scientists from Austria, Switzerland, Germany, and all the riparian countries downstream, to the former Soviet Union in cooperative activities (Bloesch, 2009):S117).

Although the field of limnology, the study of inland waters, and the basin wide approach to studying the Danube and its ecology were not very well established at the time (Interview Danube 04, 2006), the scientists were able to build support for this idea. Western countries were interested in basin-wide initiatives as they saw the sharing of data as one way to reduce Soviet influence in the Danube (Shepherd, 1954). The dissolution of Cominform, the Communist Information Bureau coordinating activities among Communist states under Soviet leadership, in the 1956 Belgrade Declaration, Stalin’s death in 1953 and the rise of Khrushchev as leader of the Soviet Union provided a window of opportunity for sharing data across the Iron Curtain (Interview Danube 04, 2006; Interview Danube 30, 2006). At the time IAD was created, it was the only coordination body between the East and the West on water issues (Interview Danube 30, 2006).30

29 The Austrian State Treaty was signed in 1955.
30 Although the Danube Commission on navigation already existed, no western country participated in the DC until neutral Austria joined in 1960.
IAD was set up via ministerial decisions and could therefore be considered a form of inter-governmental cooperation. However, it was intended as a forum for communication among scientists, not as a binding agreement on the states, and therefore is a non-governmental organization (Interview Danube 04, 2006). Participation was open to scientists from the eight riparian states, through their national academy of sciences or, more recently, through their ministries of environment. Participation conferred prestige and a rare opportunity for scientists from Communist countries to travel.

At the beginning IAD was quite an elite association. It was not easy to join. Only highest academicians were eligible, could attend. They had a fixed budget, so money was not a problem. But it was related to a kind of position. Because when people traveled at that time, they had certain privileges. So, it was a sign you were very high in the hierarchy when you were allowed to travel (Interview Danube 30, 2006).

Its seat was located in Austria within the Federal Institute of Water Quality. In practice, the Austrian government paid for the secretary general, whose main task was to organize the annual meeting and conference, at which about a hundred people gave presentations. Some staff also received salaries to conduct research (Interview Danube 30, 2006).

National representatives coordinated each country’s participation in the expert groups’ work long-term research. Research was developed and implemented by people from both the east and the west (Interview Danube 30, 2006).

Initially, scientists from each country followed their own methodologies to collect and analyze data on the ecological state of the river system and then compared the data in expert groups. In 1967 IAD published “Limnology of the Danube” a monograph with data from each of the eight participating riparians (Liepolt, 1967). This was the first
publication to bring together aquatic data for the entire watershed. Some of the topics included in the Monograph were hydrology, climate (Frey, 1966), hydrochemical and hydrobiological elements (Benedek & László, 1980), as well as the economic importance of the Danube ecology, including fisheries, hydropower production, navigation, flood control and agriculture (Loffler, 1969).\(^{31}\) However, the scientists did not have enough data to evaluate changes in the river system and, therefore, intended to establish continuous monitoring of the river (Benedek & László, 1980).

IAD continued to function generally as originally established until after the Cold War. Gradually, IAD has changed its structure and the range of issues it addresses.\(^{32}\) Currently, IAD has twelve expert groups working on research projects on both the main river and along its tributaries. These working groups cover chemical, biological and ecological issues. Specific research topics include development of ecological river concepts and models, eco-morphological mapping of the river Danube and its tributaries, preservation or promotion of biodiversity by habitat improvements, studies of interactions between river system, floodplains, and wetland areas, studies on data standardization, studies on improving water quality monitoring, long-term studies on changes in the riparian

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\(^{31}\) Later studies published by IAD have taken the form of reports, books and a journal. IAD also publishes the proceedings of its annual conferences.

\(^{32}\) IAD's numbers expanded to thirteen as countries in the basin divided to include Austria, Bosnia i Herzegovina, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Moldova, Romania, Serbia, Slovakia, Switzerland and Ukraine. Individuals can participate since 2001 in addition to the official country representatives (IAD- International Association for Danube Research, 2005). Since 2002 IAD is a non-profit, non-governmental association according to Austrian law and no longer receives financial assistance from the Austrian government. In 2010, IAD terminated its affiliation with SIL after SIL ceased providing financial support. The loss of these sources of support significantly limits IAD's budget. It no longer employs salaried staff to conduct research, but does continue to fund small research projects as possible.
ecosystems, and studies on nutrients in the Danube, its delta and the adjacent part of the Black Sea (IAD- International Association for Danube Research).

International Research on Danube Hydrology: IHP Danube

In 1967, the same year as the IAD published its first basin-wide monograph, the Danube Commission for navigation formed a Working Group for Scientific Hydrology under its mandate to coordinate hydrometeorological services and collect statistics relevant to navigation along the entire length of the river. In 1971 either a Soviet (Domokos, 2004) or a Yugoslavian (Hofius, 1991a; Pavel Petrovic, 1998) delegate proposed that the group compile a water balance of the Danube catchment. A “water balance” or “water budget” describes the flow of water into and out of a system. The stated purpose of the Danube water balance was to “collect, harmonize, and publish information characterizing the multiannual mean water circle of the Danube Catchment (Domokos, 2004).” From the perspective of the downstream countries who elected to participate, Czechoslovakia, Hungary, Bulgaria and the Soviet Union, developing a water balance would enable them to obtain data about the upper part of the basin (Interview Danube 26, 2006). However, Germany (at the time the Federal Republic of Germany), Austria, Yugoslavia and Romania all abstained from participating, “due to political consideration contesting the competency of the DC for the Danube River Basin (Domokos, 2004:3).” These countries contested the DC’s competency because legally the DC authority extended only to the

33 Information on these studies is available from the IAD, for example in its publication series “Large Rivers” and its predecessors “Donauforschung” and “Archiv für Hydrobiologie”. See the IAD library at http://www.iad.gs/content/library/publications.php.
34 In comparison, the countries of the Rhine basin had begun a similar cooperative effort in 1970.
international waters of the Danube’s main stem and not to the waters of the whole watershed. However, from a hydrological perspective, conducting any kind of hydrologic analysis must be based on the whole hydrological system, i.e. the watershed. This political divide also contributed to resistance against the DC and what the non-Communist countries perceived as an attempt to further extend Soviet dominance in the basin. Germany was also not a member of the DC and therefore did not want to engage in international interactions under the DC umbrella. Czechoslovakia, Hungary, Bulgaria and the Soviet Union went ahead and published an incomplete water balance, in part to shame the other four into participating and eventually completing a joint effort (Interview Danube 12, 2006).

In 1974 the eight major Danube states negotiated a compromise agreement to work on a joint publication of hydrologic data, in which separate secretariats coordinated their work and provided separate locations for meetings. The four existing participants (Czechoslovakia, Hungary, Bulgaria and the Soviet Union) continued their work under the Working Group for Scientific Hydrology of the Danube basin of the DC, coordinated by the Water Research Institute (VUVH) in Bratislava, where they also held their meetings. The four new countries (West Germany, Austria, Yugoslavia and Romania) participated in the joint effort through their National Committees of the International Hydrological Programme (IHP) of the United Nations Education, Scientific and Cultural Organization (UNESCO), which seeks to improve water management and regional and international cooperation in hydrology. The work of these four countries

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35 From 1964 to 1974 this was under the UNESCO International Hydrological Decade (IHD), which subsequently became the IHP.
was coordinated by the IHD/IHP National Committee of Yugoslavia in Belgrade, where they also held their meetings (Domokos, 2004; Hofius, 1991a). Each technical secretariat had a coordinator and the two coordinators organized the collective work with one another. The objectives for the two working groups were to share existing national data, agree on a way to process them, and then publish the results as a Hydrological Monograph, which could be used to in water resources development planning in the basin. Participants were primarily hydrologists from national research institutes and universities. Similar to the work in the Rhine, the idea was to produce this first major document and then produce subsequent minor reports (Hofius, 1991a; Interview Danube 12, 2006).

The proposed scope of cooperation expanded on that of the Working Group for Scientific Hydrology. However, given the difficulties for cooperation posed by the arrangement with dual coordinating centers and the countries’ expressed desire to accomplish something within a limited time frame, the participants chose to narrow their work. A German participant reported, “In setting up the programme it was of great importance that it should not be too comprehensive so that all the scheduled tasks could be completed within a foreseeable time period. Co-operation should be implemented in clearly identified steps (Hofius, 1991a:38).”

By 1975 a strategy for the work was agreed upon, such as which water gauges the countries would use to collect data. The joint publication would be made up of different sections, including (1) physical, geographical and water management characteristics of

36 One meeting was also held in Munich, Germany.
the river basin; (2) characteristics of the runoff regime; (3) hydrological balance; (4) and
data tables, water stages and discharges from forty-eight representative gauges; and (5)
an Atlas of Maps and Figures (Hofius, 1991a). This scope expanded the earlier effort,
which was limited to a water balance. Water quality was not included as it was not part of
the mandate of the navigation commission to study the hydrology of the river. It was also
outside the area of expertise of the cooperating scientists (Hock, 1987b).

Each country prepared individual contributions, made up of all kinds of information from
the agreed upon time period 1941-1970 (Pavel Petrovic, 1998). This led to a large amount
of data, tables, and texts, which then needed to be somehow transformed into something
coherent (Interview Danube 12, 2006). For example, the participants relied on a 1972
map, produced by the DC, to create contour maps for the three main elements of the
Hydrological Monograph. However, each country prepared its own contour maps and
contributions to the Monograph. Expert groups and bilateral discussions then resolved
discrepancies at the borders between different countries’ draft contour maps with isolines
(Domokos & Sass, 1986; Hofius, 1991a). Illustrative of the political nature of this work
in its early days, Germany’s observer was selected to participate because he spoke some
Russian. His role was “to monitor what those damned reds were negotiating between
themselves (Interview Danube 12, 2006).” However, without a technical understanding
of the issues, the German representative was compelled (after three days of negotiations

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37 Some of the other elements, the sediment regime, thermal and ice conditions and fluctuations of
interannual precipitation, were left out of work on the Monograph but became the first follow-up projects.
38 An isoline or contour line connects equal values, for example of elevation.
39 Germany was represented in this work only as an observer because it was not a member of the DC. This
delegates limited Russian was learned when he was shot down over Ukraine and held as a prisoner of war
during World War II.
over the contour maps) to ask another participant what in fact an isoline was (Interview Danube 12, 2006).

In another example of the difficulties of coordinating the research, some countries just didn’t have the data they had agreed to provide for the calculations of precipitation, evapotranspiration, and runoff in the basin (Domokos, 2004). Or, participants were skeptical of the data provided by others. For example, the participants agreed to calculate their “own” or internal surface water resources (water generated over the country’s territory through precipitation within the country), the relative percentage of their “own” or internal surface water compared to the total water generated in the Danube Basin, their “transit” water resources or water leaving the country, and the ratio of “own” to “transit” water resources (Domokos & Sass, 1986). However, lacking actual data, some countries were not able to follow the recommended methodology and submitted “not very correct” estimated data (Interview Danube 26, 2006).

VITUKI, the Hungarian Environmental Protection and Water Resources Research Institute, used the mass of provided data to create the water balance for the basin. Heinz Schiller in Munich, with help from an international working group, finished the work combining the countries’ contributions into a coherent document (Domokos & Sass, 1986; Hofius, 1991a). For his hard work compiling the Monograph, Schiller was

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40 Evapotranspiration includes evaporation, the movement of water to the air from the watershed soil, plant surfaces and waterbodies, and plant transpiration, the movement of water from basin plants to the air during photosynthesis.

41 Yugoslavia was the largest contributor (29.81%), then Austria (22.45%), Romania (17.21%), and West Germany (11.48%).

42 Of the countries with territories that make up at least 5% of the Danube basin, Germany and Austria have the highest ratios of own water to transit water. This means that a significant portion of the water they transmit is generated within their territories.
practically thrown out of the Bavarian State Office for Water Resources Management and accused of being a “peon of the reds.” Such was the atmosphere at the time (Interview Danube 12, 2006).

Twelve years after work began (or fifteen if you count the one-sided efforts in 1971) the working groups produced the Hydrological Monograph of the Danube Catchment in three volumes in their two working languages: in 1986 in German as “Die Donau und ihre Einzugsgebiet- Eine hydrologische Monographie” and in 1989 in Russian. The Danube Monograph and its follow-up volumes are seen as providing “an indispensable, mutually agreed and accepted information basis for integrated water resources management, water damage prevention and environment protection (Domokos, 2004):7.” These efforts were financially supported by the IHP National Committees of Germany and Russia, and UNESCO (Domokos). The water balance included water balances for forty-seven sub-basins and also for the national areas of the then twelve participating countries (Domokos, 2004).

Although in practice the methodologies used by each country were not uniform (Kovács, 2009), this was the first time hydrological data and maps had been produced which, according to two participants, could be considered “internationally co-ordinated basic information...useful for all further work aiming at water-resources development in the Danube basin (Domokos & Sass, 1986):128).” The final Monograph describes the state of the Danube’s hydrology. It provides information on how data were collected, selected and analyzed. It describes the physical features, such as geology, vegetation and surface

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43 An abridged version was issued in 1988 English, Russian, French and German financed by UNESCO.
waters, the regional climate, and changing human uses, such as hydraulic works, navigation. It describes low flows and high flows and how the system tends to behave under each. It therefore characterizes the Danube watershed as a dynamic system of physical and climatic features interacting with anthropogenic impacts (Schiller & IHP Danube, 1986).

Following this success, the countries met in 1987 in Budapest and agreed on a Working Plan and principles for organizing their on-going work. Principle 1 states that the cooperation would no longer be performed within the framework of the DC, and would instead shift to a unified structure under the IHP framework. According to one participant from a former Communist country who worked on the Monograph, “The DC...irritated the other 4 countries (Interview Danube 12, 2006),” and the shift in forum for cooperation amounted to something of a coup for the non-Communist countries. Principle 2 states:

The co-operation aim is to contribute by common efforts to seeking a solution of current hydrology and water management issues regarding individual parts of the entire Danube basin. To avoid work duplicating, hydrological and water management issues already being processed by international organisations will be taken into regard ("Principles of the Danube countries regional co-operation within the framework of the National Committees for International Hydrological Programme UNESCO," 1987).

The work would therefore continue to focus on the watershed and, while no longer under the DC framework, would avoid duplicating the DC’s work for navigation. The DC
therefore maintained its dominance over navigation on the main river and IHP Danube maintained its focus on the hydrology of the larger river basin. 44

Despite the history of disagreement over the forum for cooperation, there was virtually no debate about the new principles or structure of cooperation, according to one participant. Even though some countries could not send delegates to the meeting due to financial difficulties, and even though some delegates who did attend were not authorized to commit to changes at the meeting, all states agreed to adopt the meetings’ products (Interview Danube 12, 2006). Eventually thirteen Danube countries signed the principles: Germany, Austria, Czech Republic, Slovakia, Hungary, Slovenia, Croatia, Bosnia, Herzegovina, Serbia, Romania, Bulgaria, Moldova, Romania.

The countries agreed to develop several follow-up themes on the state of hydrology in the basin. 45 The first issues for cooperation were topics which had been left out of the Monograph in the interest of time, such as the Danube basin’s sediment regime and flooding. These studies were intended to be of practical use to river basin management. Each report describes the sources of data used, the methods by which the data were collected and processed, highlights gaps in the data, and provides an analysis. The follow-up publications focused on changes in the Danube’s hydrology and on defining critical uncertainties in the hydrological system, and therefore support an adaptive

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44 According to one IHP Danube participant’s impression, the DC continues to work on maps of the river channel and near areas, but these were intended to be used only for managing navigation and were not for common use (Interview Danube 26, 2006).

approach to governing the river. These volumes include one on changes in the sediment regime of the Danube which was aimed at establishing anthropogenic impacts on the sediment regime (IHP Danube & Rákóczi, 1993). Another volume focuses on long-term changes in water temperature over space and time in the Danube and major tributaries. Again, anthropogenic impacts, this time on water temperature, were a major concern (Stancíková & IHP Danube, 1993). A third, studies the coincidence of flooding in the Danube and its tributaries. One of the stated objectives was to help water managers allocate funds efficiently to protect flood-prone areas (Prohaska & IHP Danube, 1999).  

IHP Danube’s working procedures have remained the same, in principle, since they were established. Annual Working Meetings of the Regional Hydrological Co-operation of the Danube Countries are held once a year and, for practical reasons, extraordinary meetings are held on the side of the independent Conferences of the Danube Countries on Hydrological Forecasting and the Hydrological Basis of Water Management (Domokos). The main purposes of the IHP Danube annual meetings are to develop the

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46 Flood forecasting for the Danube remains an essentially bilateral process. Although the Danube states share data with one another for flood warning, there is no integrated flood forecasting system for the Danube. Instead, each country receives data from its upstream neighbor, uses them to run its own forecasts, and then provides the results to the downstream countries. Each country uses different sampling strategies and data processing methods. Some countries rely on manual calculations, while others use advanced automated computer programs (ICPDR Flood Protection Expert Group, 2004). In some federal countries, such as Austria, each province runs its own forecast (Interview Danube 02, 2006).

47 Based on a Soviet proposal, it was agreed that each country would take turns coordinating the group’s activities and the order should be determined by their relative positions along the Danube, i.e. in a downstream sequence beginning from the Black Forest in Germany and ending at the Black Sea. So far, IHP Danube has been coordinated by Germany, Austria, Slovakia, Hungary and Serbia. English has been added to German and Russian as a working language.

48 The first Conferences of the Danube Countries on Hydrological Forecasting and the Hydrological Basis of Water Management was held in 1961 in Budapest with all 8 major Danube riparians. It was also an effort to reach across the Iron Curtain and was convened by a Hungarian and an Austrian professor. Since then, the Danube Conferences are held every two years in a different country. The focus has been on hydrological forecasting, but since 1994 it was broadened to include other water management issues. Official languages were originally Russian and German, but since 1994 they were changed to English and German because no Danube countries had Russian as their national languages. The Working Meetings of
working plan, see how far projects have been realized, and include new initiatives. Projects are “...stimulated by scientific interests, but for sure they have also a clear objective with respect to application. So, it should be something useful for the member states, for decision-making (Interview Danube 02, 2006).”

Discussion

As new uses of the river emerged, so did other river system-wide organizations, intergovernmental and non-governmental, representing specific interests and stakeholders. For example, cooperation around tourism began between national tourism centers in the 1970s with establishment of the Danube Tourist Commission (DTC). A forum for subnational representatives, the Arbeitsgemeinschaft Donauländer (ARGE Donauländer), was founded in 1990. Since 1993 public water supply organizations...
dependent on the Danube cooperate in the Internationale Arbeitsgemeinschaft der Wasserwerke im Donaueinzugsgebiet (The International Working Group of Waterworks in the Danube Watershed, IAWD). In 1989 the Yugoslavian-based forum “Danube-River of Cooperation” began organizing international scientific conferences on transboundary issues in the Danube region, which continued despite armed conflict in Yugoslavia in the early 1990s and served as a platform for participants to appeal for peace (Interview Danube 24, 2006; Stojic, 1990).

More and more the Danube was used not only as an artery for shipping, but also as a source of electricity and for the disposal of waste from industry, agriculture and municipalities. At the same time there was a growing awareness of the threats these uses posed for the river environment. An industrial accident on the Rhine and visible algal blooms in the Black Sea provided evidence of the potential for significant transboundary harm and of actual deterioration in the Danube environment. Policy-makers increasingly understood that natural resource use within the river basin had impacts on other parts of the system and, therefore, water protection could not be achieved through unilateral actions. However, information about the actual status of the river was limited due to protection, business, transport, culture, science, sport, and navigation (without duplicating the Danube Commission’s work). It currently has 23 participants and 1 observer, which include cities, subnational units, regions, and nations. As such, its activities overlap with the DC and ICPDR on a number of issues including inland shipping, flood protection, water pollution control and environmental protection. More information is available at http://www.argedonau.at.

The IAWD is concerned with the quantity and quality of surface and groundwater as it affects the watershed’s drinking and industrial water. It was founded through cooperation between Vienna’s city water supply works and the International Working Group of Waterworks in the Rhine Watershed, which had already existed for 30 years. IAWD ordinary participants must be recognized legal entities in the field of public water supply and include 26 members from Austria, Bosnia i Herzegovina, Croatia, Czech Republic, Germany, Hungary, Romania, Serbia, Slovakia, Slovenia, Switzerland. It is open to all water works that depend on water from the Danube basin, even if they are located outside the basin. Its Secretariat is located in Vienna and it has permanent observer status in the ICPDR. Additional information is available at http://www.iawd.at/.

Information on past conferences is available at http://danubedita.tripod.com/about.htm.
differences between the countries of the basin, and especially due to the political divide between the East and the West.

The first experiences in basin-wide scientific cooperation, within the IAD and IHP UNESCO, showed the potential benefits of cooperation, but also highlighted the significant barriers such efforts faced due to the lack of comparable data on the state of the basin and institutional and political divides. Basin-wide scientific cooperation under the IAD produced *Limnology of the Danube*, the first publication bringing together aquatic data from the whole watershed. Similar cooperation under what became IHP Danube led to publication of the *Hydrological Monograph of the Danube Catchment*, which used data to develop the first water balance for the entire basin. Both publications are significant milestones for international cooperation on the Danube and provided water resource managers with information never before accessible to them. However, both efforts were hampered by a lack of information. Little information was available about the ecology, water quality and water uses of the tributaries, but there were also significant data gaps for the main river. Scientists did their best to fill in these gaps with estimates, but these were not given much credibility by other scientists. The data were very difficult to compare as they were collected according to different methodologies in each country. For *Limnology of the Danube* the scientists could only provide a snapshot of the state of the river system as they lacked data from continuous monitoring. Resource managers could therefore not use the publication to evaluate changes in the river system, as originally intended. The lack of a uniform methodology for collecting data also limited water resource managers’ use of the Hydrological Monograph for integrated water...
resources management or environmental protection. Cooperation on the *Hydrological Monograph* was also impeded by political and institutional obstacles. Some countries challenged the competency of the working group established under the Danube Commission for navigation to cooperate on information involving the parts of the watershed beyond the main river. As a result, the collaborators could not even have a common secretariat to compile the data.

Based on the experiences with IAD and IHP those involved in managing water resources could see they needed a new approach to dealing with basin-wide information and rules to govern their cooperation. Other policy-makers saw the potential for such a process to be a vehicle for broader regional cooperation between the East and West. The increasing awareness of transboundary risks posed to the environment and regional security from industrial accidents and the multiplying uses of water resources provided a sense of urgency to policy-makers to create a new water management regime for the Danube. In 1985 the *Declaration on the Cooperation of the Danube Countries on Water Management and Especially Water Pollution Control Issues of the River Danube* or *Bucharest Declaration* (Bucharest Declaration) formalized for the first time expectations for states’ behavior on the issue of water management.

The 1972 United Nations Conference on the Human Environment in Stockholm raised expectations for international environmental cooperation to take root in diverse fora across the globe. However, in Europe the Iron Curtain still presented a formidable obstacle to all kinds of cooperation. As a result, at the beginning of the 1980s the effort to cooperate on water quality at the watershed scale was considered “aborted” (Benedek & László, 1980):75), or incomplete. In the 1980s the countries in the Danube basin underwent significant political changes, some of which were driven by ecologically oriented political parties. Increasing in number in the late 1980s and early 1990s, these changes, including the eventual dissolution of the Soviet Union, created windows of opportunity for cooperation. Diplomats and government scientists wanted to broaden the existing scientific cooperation to include environmental issues, with the hope the East and the West would be able to agree about something.

Regional cooperation on transboundary waters, including the Danube, was already beginning to take shape at the end of the 1970s and early 1980s within the Conference for Security and Cooperation in Europe (CSCE) and the United Nations Economic

54 The CSCE was established during the Cold War to provide a forum for communication between the East and the West. The Soviet Union sought to solidify its control over Central and Eastern European countries (CEECs), while the West sought to erode Soviet dominance. The CSCE signed the Final Act of the Conference on Security and Cooperation in Europe (Helsinki Final Act) in 1975. The Final Act established areas for cooperation, referred to as Baskets: Basket 1 covers principles for security and cooperation; Basket 2 covers trade, finance, technology and the environment; and Basket 3 covers humanitarian cooperation and human rights. The Baskets were potential areas of cooperation upon which countries from the west and the east thought it would be realistic to arrive at some success (Interview Danube 03, 2006).
Commission for Europe (UNECE). This momentum for new political-environmental cooperation coincided with visible evidence of pollution in Europe, such as the Chernobyl nuclear accident in Ukraine, the accidental pollution of the Rhine from a fire at the Swiss Sandoz chemical warehouse, and algal blooms along the Black Sea’s western coast near the mouth of the Danube.

The preparatory meetings for the 1985 Declaration on the Cooperation of the Danube Countries on Water Management and Especially Water Quality Control Issues of the River Danube (Bucharest Declaration) were the first efforts to organize cooperation among the eight major Danube States on protection of the Danube from water pollution. The Declaration builds on the UNECE’s 1980 Declaration of Policy on Prevention and Control of Water Pollution, including Transboundary Pollution (Hock, 1987a). According to a German legal expert who participated in the negotiations, the history of technical cooperation under IHP was helpful in providing experience with technical cooperation. However, the range of issues addressed within the IHP forum was limited to purely water supply issues, weather and water run-off predictions, and navigation as it was under the framework of the Navigation Commission. Water protection, in terms of quality and the environment, was seen as something separate from the existing issues (Interview Danube 17, 2006).

55 The UN ECE was established in 1947 to promote European integration. It brings both European and non-European countries together to discuss a broad range of topics.
56 Austria, Bulgaria, Czechoslovakia, Germany, Hungary, Romania, the Soviet Union and Yugoslavia.
57 The Declaration focuses primarily on preventing pollution to rivers. It includes the idea of integrating prevention of surface and groundwater water pollution, of integrating this with air and land pollution reduction efforts, and integrating protecting the environment into other water use objectives. It also suggests States create basin level organizations to coordinate water management (Economic Commission for Europe, 1980).
Romania first officially suggested the Danube states should hold discussions about water protection and issued formal invitations to the Danube countries to participate in Bucharest. Before the meetings in Bucharest the Russians held preparatory discussions with the eastern countries. Representatives from the relevant German states, Bavaria and Baden-Württemberg, and from the West German federal government, held preparatory meetings with Austria and some of its states (Interview Danube 17, 2006). The participants knew their effort faced significant obstacles to reaching an agreement and, if one were reached, to implementing it. These included differences in financial and technical capacity, but also in domestic administrative structures and environmental priorities (Interview Danube 16, 2006).

During the multilateral discussions in Bucharest each of the Danube delegations was represented by both legal and technical experts, who participated regularly in all meetings. One early issue the negotiators faced was which language to use to negotiate. The Russians wanted Russian. The Romanian hosts wanted Romanian. The Germans insisted on German. There was also a suggestion to use French and English because the navigation agreements from the end of World War I were in those languages and French was a traditional diplomatic language. Although German and Russian were mainly used in the negotiations, sometimes issues came up in other languages, such as French. Sometimes this was easier than relying on translations, which were often “really awful and made it difficult to understand what was intended (Interview Danube 17, 2006).”

58 The Romanians and the Yugoslavians had already made several efforts to make contact with the upstream countries to discuss water management issues, and in the German participant’s opinion, also political issues. As an upstream country, water management was not such a priority. Still, Germany was generally interested in reestablishing contact to the eastern Danube countries to find out what was happening within the countries (Interview Danube 17, 2006).
Official versions of the Declaration were produced in Bulgarian, Czech, Hungarian, German, Russian, Romanian and the Serbo-Croatian language (Hock, 1987a).

A significant issue for the participants was the form their cooperation should take. Germany and Austria wanted to negotiate toward non-binding recommendations, similar to those of the CSCE, while Bulgaria, Yugoslavia, Romania, Hungary, and the Soviet Union wanted a binding agreement. As one German legal expert recalls:

The East would have liked a treaty, ...but at that time given the difficulties with the East we couldn’t monitor or look at anything... We had almost no opportunity to verify what was happening in the eastern countries in practice... Some Austrian water managers would have been more generous on this point, but for us it would have been unthinkable to bind ourselves one-sidedly, since by us the water conditions were much better than they were for the other side... So we made it easier, non-binding, you should do this when possible. (Interview Danube 17, 2006)

The German perception of a binding agreement was that Germany and Austria would be under obligation to take further actions to improve water quality within their borders, with little assurance that downstream countries would take similar actions and no opportunity to verify their implementation of the agreement one way or another. German concerns over the form of the agreement were linked to their concerns over downstream compliance, their lack of information about the river downstream of Austria, and their interest in reciprocal obligations, so the parties would be equally bound to one another.

Another issue for the negotiations was the range of issues the agreement would cover. It was agreed that issues already covered by other agreements would be excluded, such as

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59 According to Dutu, Germany and Austria would have agreed to a binding agreement only if the European Economic Community (EEC) could sign as a contracting party. However, the Communist countries rejected this proposal as not all of them acknowledged the existence of the EEC (Dutu, 2008).
navigation. Some of the Communist countries wanted to address a broad scope of issues, while Germany and Austria were in favor of a narrow range of issues on which all countries could agree. According to a German participant

We didn’t have a problem to discuss issues that were not already covered by other agreements. But the question is, what do we agree on or not. The question of agreement or declaration played a role in the discussions. But from the beginning we said, ‘We’ll gladly speak about everything but not about a treaty’...We didn’t know things would later change as quickly as they did (Interview Danube 17, 2006).

The issue of the range of issues was then closely linked to the issue of the form of the agreement, and over all to the significant uncertainty among upstream states about future implementation and cooperation.

In its final form the Bucharest Declaration is a non-binding agreement with a broad scope. It can therefore be understood as a trade across the parties’ preferences. The main issues addressed in the Declaration are water quantity and quality management. It excluded navigation, but included even some issues on which there was no consensus, such as issues related to water diversions (Dutu, 2008; Interview Danube 03, 2006; Interview Danube 17, 2006). For example, Germany had built diversions in the past and was unwilling to discuss them (although it was willing to provide data about them). Although the issue came up again and again, this aspect of water quantity could not be agreed upon (Interview Danube 17, 2006). Nevertheless, water quantity was one of the issues included in the Declaration and later addressed by a working group established by it.
According to some participants from the upper basin signing the Declaration carried little political risk for the parties, as it was not legally binding. In contrast, some participants from the downstream countries did consider the Declaration legally binding (Varduca, 1997), although of a different status than a Convention. According to one downstream participant, “The power is not the same...because the quality of the outputs, the pressure, the feedback is not quite the same. But it was just a beginning (Interview Danube 20, 2006).” Regardless of any differences in perception over the how binding the Declaration was, “it was just a beginning.” Even the upper basin states thought the Declaration conveyed the moral and political obligation to continue cooperating (Interview Danube 01, 2006; Interview Danube 04, 2006). An upstream legal participant considered the Declaration a kind of non-binding model for a future treaty (Interview Danube 17, 2006). Similarly, a Romanian participant attests that in his view, from the outset, a possible future objective of the Declaration was to create a step-by-step process toward an international convention (Varduca, 1997).

In the Declaration the Danube states acknowledged the need to integrate water pollution reduction efforts into other water use objectives. The parties agreed to the general objectives of water resources conservation and rational utilization through pollution prevention and control and continued long-term cooperation through bilateral and multilateral cooperation (Hock, 1987a; Varduca, 1997). According to Varduca, a Romanian participant, the Declaration linked water quality protection to river basin management, ecological protection, international water monitoring and international data comparison (Varduca, 1997). For example, the Declaration broadly states
The Governments of the Danube countries continue – among others by means of creating legal rules- with striving for taking measures for protecting, preserving and improving the environment and for the enforcement of increased responsibility, particularly in the field of protecting waters from pollution (Hock, 1987a: Article 5).

According to a German participant, although not very concrete, the broad objectives were those on which everyone could agree. For example, although there were more specific discussions of which water quality standards to abide by, “Nobody was willing to say, ‘we will abide by such a standard’ (Interview Danube 17, 2006).”

Specific actions the parties agreed to take were: the establishment of a uniform monitoring system, based on agreed upon methods, for water quality to detect hazardous and radioactive substances and provide flood warning; the exchange of the water quality and flood data from these systems; the development of a Danube water balance based on a harmonized method for comparing national water balances; and the joint organization of high level meetings of the relevant water and political authorities (Dutu, 2008; Hock, 1987a; Interview Danube 12, 2006; Varduca, 1997).  

Although the Declaration does mention bilateral cooperation on tributaries of the Danube and the delta, in practice the geographic scope of cooperation was primarily oriented to address the main river (Hock, 1987a). A Slovak participant in the negotiations recalled Slovakia represented Czechoslovakia at that time because on Danube there was much larger interests, specifically speaking of the main stream. Of course, if

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60 These actions were compatible with developments in international water law, specifically with Article 7 of the ILA’s 1982 Rules on Water Pollution in an International Drainage Basin, which recommend three areas for joint administration: (1) coordinating scientific and technical research programs to combat water pollution; (2) establishing harmonized, coordinated, or unified networks for permanent observation and pollution control; and (3) developing joint water quality objectives and standards for the whole or part of the international basin (Bourne, 1996).
you’re looking at the basin now, it would fall more under the territory of the Czech Republic. But at that time, because Bucharest Declaration was working only with the main stream and with the quality and the data of the transboundary sections of the river (Interview Danube 25, 2006).

For example, the network of thirteen monitoring stations were located primarily at national borders and not extended to tributaries (Hock, 1987a; Interview Danube 20, 2006).

The participants agreed to hold meetings of the ministers, who would evaluate the quality of any work completed and indicate new tasks, meetings of delegation leaders and meetings of working groups. Although the minister meetings were mainly political, the meetings of the delegation leaders included both technical and legal experts. All countries were represented at both of these kinds of meetings. The working groups included only technical experts, not lawyers. Although initially not all countries participated in these groups, over time technical experts from more and more countries did, for example from newly independent countries, such as Moldova (Interview Danube 16, 2006).

Three working groups were created to address the specific technical issues: floods, hazardous substances, and the water balance. As one German participant recalls, “The committees were international. They were put together very quickly. Because we said we shouldn’t just speak and create some papers...that was also always agreed, we needed to make progress (Interview Danube 16, 2006).” In between the full meetings of the delegation leaders, these technical groups met to try develop a joint direction and working program. Specific issues included where to monitor water levels for the flood alarm system, which level to make a threshold for reporting water levels, and where to
report the levels. Although the technical experts found common ground relatively easy, they found it much more difficult to develop a strategy that could be sold to their own political leaders and implemented in practice (Interview Danube 16, 2006).

A problem-solving atmosphere prevailed within the working groups. Nevertheless, sometimes progress stalled. As such times the German and Austrian delegations often took the lead. According to a German participant, at such times the Germans and Austrians would speak together about what to do.

Not because we were from the West, but because for decades we had been managing water and implementing it together. We said to the others, ‘We have to do it this way or else it won’t work.’ We took a lead function. We didn’t mean to steamroll the others, we wanted the others to see, ‘Aha these two, who should know about this, are in agreement.’ It was also easier because we had the same language, the same technical schools. So it was easier than negotiating with Moldova or Romania. When you say something you never really know whether the other understood it correctly as intended, as in detailed technical expressions, it is complicated. It doesn’t mean that we were always in agreement with Austria (Interview Danube 16, 2006).

Over time the discussion improved to the point delegates could speak about pollution problems or implementation difficulties in their own countries (Interview Danube 16, 2006).

The most successful joint projects were the flood monitoring system, which was the first to begin relaying information between countries, and the hazardous substances monitoring system. The monitoring system originally monitored flow, level, and some biological and chemical (but not bacteriological) indicators (Interview Danube 20, 2006). The Danube states agreed on some common strategies for how data would be collected: monthly, by boat, border countries would jointly collect water samples, border countries
would compare their analyses, some measurement of errors, and an annual congress for presenting the results. The monitoring network was intended to generate data that could be compared across the basin to establish a harmonized water balance and clarify the priority issues for cooperation and appropriate responses (Hock, 1987a). There were efforts to develop a uniform methodology, such as samples being collected at border monitoring stations by both of the bordering countries, but the data were then sampled and analyzed by national authorities, not jointly, and then self-reported (Hock, 1987a). As a result, some participants had little confidence in the quality of the data coming from the other countries (Interview Danube 20, 2006).

According to one technical participant

> What worked the least, what was the most difficult, was the water balance. How much water flows into the country on the border, how much water is used within the country, and what flows downstream under normal conditions...There was the question of clarifying preventing harm to the development of the downstream country because it received too little water. The issue was of course mostly in summer and also winter when it rains little and then there is low water flows. And there are a whole series of people on the Danube who use the water as cooling water...who are worried they won’t be able to generate electricity, so this was not agreed on. We made a first draft, but there were no actions. There was nothing that someone had to release water when someone downstream complained that I know of (Interview Danube 16, 2006).

Although this issue was included in the range of issues for the working groups even though there was no consensus about what to do about it, the technical experts within the group were unable to reach any practical agreement. Nevertheless, the working group at least provided a forum to discuss the issue.

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61 In response to pollution accidents such as the Sandoz fire, the system was also designed to help detect imminent risks, such as those from hazardous contamination caused by industrial accidents.
62 Many of the water quality scientists were either located in one of their national ministries or the national academies of sciences.
As cooperation developed under the framework of the Bucharest Declaration, within the meeting of the ministers, the delegation leaders, and the working groups, a series of other meetings were held, which would lead to significant changes for the Danube and usher in the second environmental regime. In 1989 the CSCE held a Meeting on the Protection of the Environment of the Commission on Security and Cooperation in Europe in Sofia. This was the first CSCE meeting focused on Basket II, the environment, which brought together foreign ministries and water management and environmental ministries from the East and West to talk about strategies to reduce security risks and improve the environment. Specifically there were three environmental issues on the agenda in Sofia: transboundary pollution from industrial accidents, management of potentially hazardous chemicals, and transboundary water pollution of lakes and rivers. Austria, Finland, Sweden and Switzerland put forward a proposal recommending: (1) the UNECE elaborate a framework convention on the protection and sustainable use of transboundary watercourses and international lakes, and (2) the appropriate States develop multilateral agreements and commissions for the Elbe and Danube Rivers. The suggested principles for the agreements focused on monitoring and controlling pollution, but included cooperation on the basin scale to identify priority uses of water and discuss water works with transboundary impacts. Hungary put forward another proposal to cooperate on

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63 Historically water and environment were managed separately in many countries. Therefore, discussing these topics together in an international forum required delegates from multiple ministries. For example, the Austrian delegation discussing basket three at the CSCE meeting in Sofia required the involvement of the Foreign Ministry, the Federal Ministry of Environment, Youth and Family Affairs and the Federal Ministry of Agriculture, Forestry and Water Management. Since 2000 these latter two are combined in the Ministry of Agriculture, Forestry, Environment and Water Management.
protecting the environmental aspects of water resources, which was co-sponsored by
Austria (CSCE, 1989). 64

Even though full consensus on the meeting’s final report could not be reached, 65 “...at this
Sofia conference the political willingness was declared to develop a regional river
agreement for the...River Danube (Interview Danube 03, 2006).” Unlike the Bucharest
Declaration, the future agreement was intended to be binding. The CSCE proposals form
the nucleus for future negotiations on three Conventions: the United Nations Economic
Commission for Europe Convention on the Protection and Use of Transboundary
Watercourses and International Lakes (Helsinki Convention), concluded in 1992 and
described earlier in this chapter; the Convention on Co-operation for the Protection and
Sustainable Use of the River Danube (Danube River Protection Convention, DRPC),
signed in 1994 and entered into force 1998; and the Danube Basin Nature Conservation
Convention (also referred to as the Danube Basin Ecological Convention, also the
Danube Basin Nature Conservation Convention), not concluded.

In 1990 European environmental ministers met in Dublin, which led to regular pan-
European meetings. The Dublin meeting was the first for the Hungarian Minister of
Environment and Regional Policy, Dr. Tarjan Anna. The Minister was concerned with
the slow rate of Danube cooperation since the Bucharest Declaration. He was also
concerned that the Declaration focused too much on the main river and not enough on the

64 This broad ranging proposal seems consistent with Hungarian enthusiasm for regional integration, for
example under a Danube federation (Gyarmati, 1999).
65 Romania, led by Ceausescu, vetoed the final report by objecting to two paragraphs on the human rights
content of a section on independent environmental activism (CSCE, 1989).
river basin and its environment. Therefore, Minister Anna called a Danube conference in
Budapest in 1991 to organize high-level political meetings (Interview Danube 12, 2006).
Out of this Conference of Experts came the official decision to begin the negotiations on
the two Danube conventions.

The Hungarian Minister took the lead on the Danube Basin Ecological Convention
negotiations between the Danube states plus Turkey. This was intended to be a
comprehensive environmental agreement, which would cover a broad range of ecological
issues, emphasize nature conservation, and integrate or extended existing bilateral and
multilateral agreements. However some countries did not support such a comprehensive
agreement.

As a result, the Austrian Federal Ministry of Agriculture, Forestry and Water
Management took the lead on negotiations toward a separate water protection convention.
This convention was intended to focus on water quality and pollution control, similar to
the recently signed Elbe Agreement, under the framework of the UNECE Helsinki
Convention. Although the States did not reach a consensus allowing them to pursue one
single agreement at the meeting in Budapest, they did agree to start negotiations toward a
legal basis for Danube environmental cooperation. The countries did not exclude the
possibility the two in-progress conventions could be merged in the future if there was a
consensus in support of doing so (Interview Danube 11, 2006).
The first Pan-European Environment Ministers Meeting was held in Dobris Castle in Czechoslovakia in 1991 and led to a series of reports on the state of the European environment. Danube participants decided to hold a meeting later that year in Sofia to coordinate a regional environmental program, the Environmental Programme for the Danube River Basin (EPDRB). EPDRB was intended to be a multilateral donor financed project to support environmental protection in the Danube river basin, including the work under the Bucharest Declaration. The EPDRB was supported by a Task Force and a Programme Co-ordination Unit (PCU), located in Brussels from 1992-1994 and transferred to Vienna in 1994. The Task Force included representatives from eleven Danube countries, Austria, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Moldova, Romania, Slovakia, Slovenia and Ukraine, as well as representatives from the European Commission DG Environment, NGOs and international donors. Donors included the EU PHARE Regional Environment Programme and TACIS, the European Bank for Reconstruction and Development, the Global Environmental Facility (GEF), the UN Environment Programme, the World Bank, the Netherlands, and the U.S. Agency for International Development (Zavadsky, 1993). According to one participant the European Union was interested in participating because the Danube presented a text book case for

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66 The EPDRB officially existed between 1992 and 2000. From 2001 to 2006 GEF continued its support of water protection through the Danube Regional Project.
67 Members of the Task Force included the participants at the 1991 Sofia Danube Conference who committed themselves to cooperate to protect the Danube’s water quality. These included states (for example, USA though USAid, the Netherlands, all internationally recognized major Danube riparians (not Serbia)), the World Bank, the European Bank for Reconstruction and Development (EBRD), the European Investment Bank (EIB), UN organizations (UNEP/GEF, UNDP/GEF, UNOPS, UN/ECE), and NGOs (the International Union for Conservation of Nature (IUCN), the Regional Environmental Centre(REC) – Budapest, the World Wide Fund for Nature (WWF), the Danube Environment Forum (DEF)).
68 PHARE, or Pologne, Hongrie Assistance à la Reconstruction Economique, was created in 1989 to support Central and Eastern European countries’ transition to democracies and market economies. Launched in 1991, the TACIS programme, or Technical Assistance to the CIS (Community of Independent States), supported transition to democracies and market economies in the states created as a result of the dissolution of the Soviet Union. In the Danube, Moldova and Ukraine were eligible.
strengthening transboundary cooperation among nations coming from the different histories of the former eastern bloc and the European Union (Interview Danube 25, 2006). GEF saw the Danube as a useful test for developing regional projects on international waters, one of its operational focus areas. “Again, because you have a large international basin, countries with different histories, economics, social background, environmental background, level of environmental regulation. So, this was again a very good example about how to promote a successful transboundary cooperation with countries with different backgrounds, different histories (Interview Danube 25, 2006).”

At the same time the European Parliamentary Assembly's Committee on the Environment, Regional Planning and Local Authorities took an interest in integrated management of the Danube and in developing a framework to support a regional planning policy approach to implementing it.

The problems of the Danube basin (tributaries included) in terms of environment, protection and management of ecosystems and spatial planning — all elements of which must be taken into consideration — transport polices, economics and ecology, call for a comprehensive approach covering the entire region (Council of Europe Parliamentary Assembly, 1994a).

The Parliamentarians saw an opportunity, in the dissolution of the eastern bloc, for a Danube economic zone. They envisioned developing the Danube as a link in an environmentally friendly European transportation system. This could relieve congestion on road and rail systems and spur economic growth, while also guarding against pollution of the river and its groundwater, harmful hydromorphological changes from engineering projects, and improving flood protection (Council of Europe Parliamentary Assembly, 1994a).

Following the early discussions, in 1992 the Austrian Federal Ministry of Agriculture, Forestry and Water Management officially initiated negotiations on the water protection convention, which would become the DRPC. All major Danubian states,69 with the exception of Yugoslavia due to its political isolation at the time on account of the Yugoslav Wars, participated. At the time Austria was the only politically neutral country in the basin and an Austrian delegate, Dipl.-Ing. Wilhelm Kittinger, led and facilitated many of the DRPC negotiations. Kittinger is often referred to as the “father of the Danube River Protection Convention.” Later, Kittinger became the Interim President of the Danube River Protection Convention.

In the negotiations each participating country was represented by one or more national ministries, in most cases its foreign ministry and its environment or natural resource ministry, which in some cases was part of a larger ministry such as agriculture. The negotiators used a single text procedure, starting with a draft agreement introduced by Austria and making changes to it. As already mentioned, the EPDRB provided critical support to central and eastern European countries, building capacity and funding their participation in negotiations. Other stakeholders, including nongovernmental

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69 Please see the section on participation for a more detailed description of what “major Danubian states” means.
organizations and international funding agencies, did not participate directly in the DRPC negotiations. They were however involved in the activities of the EPDRB.

A problem-solving attitude prevailed in which participants wanted to avoid the risk of no agreement or of a long, drawn out negotiation process, and wanted to develop practical solutions that could be implemented. The negotiators recognized that the issues they sought to address were complex and they knew little about transboundary pollution and the risks it posed. They agreed they wanted to reach an agreement within a realistic, but quick, time frame. According to a Slovak participant

Our intention was to solve the problems, not a complex way. That means the whole river basin, that was the first principle. And the second was not only in a structural method, but also non-structural methods directly in the field and also to find some solutions which are relatively cheap, which it is not necessary to be supported by huge investments. But not, of course, exclude investment activities, but to consider them together and find some solutions. Integrated approach (Interview Danube 27, 2006).

However, as emerged later, there were very different understandings of what adopting an integrated approach meant in practice.

The negotiators also wanted to arrive at unanimous agreement on all elements of the Convention. Therefore, considerations about political feasibility and reaching a consensus, were very important in setting the negotiating agenda and determining the range of issues they would address. As both Eastern and Western countries had already participated in the Helsinki negotiations, the Danube negotiators thought by using the UNECE Convention on the Protection and Use of Transboundary Watercourses and
International Lakes (Helsinki Convention), as a framework, they could conclude an agreement within a short time frame (Interview Danube 03, 2006).

Similar to the negotiations before the Bucharest Declaration, issues already covered by existing treaties were excluded, primarily referring to navigation. Although the negotiators could have tried to negotiate an agreement within an expanded mandate of the Danube Navigation Commission (Westing, 1989), Germany and some other countries were not parties to the Belgrade Convention. According to one Austrian diplomat, political leaders in the West also wanted to pull those water management sectors, which lay outside of the Soviet dominated navigation commission, into a new organization dominated by western Europe. Their political calculation was for the new organization could to oppose Soviet dominance, balance power in the Danube, and reduce security risks (Interview Danube 01, 2006). Other countries saw participation in the Convention as a step to strengthening Europe and joining the European Union. As a Slovak participant recalls

Europe is going to be joined whole for better political relationships, for social security, for political cooperation, for peace, for strengthening economic ties, so everything was linked together. So any ticket given to the country, like environment strengths, environmental transboundary cooperation, it was very much welcomed by the government (Interview Danube 25, 2006).

Despite interruptions due to the Yugoslav War, the framework agreement was signed in 1994 and ratified in 1998. Eleven countries signed the DRPC: Austria, Bulgaria, Croatia, the Czech Republic, Germany, Hungary, Moldova, Romania, Slovakia, Slovenia and Ukraine, and the European Community. With the addition of Serbia, Bosnia i
Herzegovina, and Montenegro there are currently 14 countries who are full members of the Convention.

The primary objective of the DRPC is to ensure that surface waters and ground water within the basin are managed and used sustainably and equitably.

The Contracting Parties shall strive at achieving the goals of a sustainable and equitable water management, including the conservation, improvement and the rational use of surface waters and ground water in the catchment area as far as possible. Moreover the Contracting Parties shall make all efforts to control the hazards originating from accidents involving substances hazardous to water, floods and ice hazards of the Danube River. Moreover they shall endeavour to contribute to reducing the pollution loads of the Black Sea from sources in the catchment area. (ICPDR, 1994)

The DRPC establishes regular meetings for the Contracting Parties, decision making procedures, cost sharing, and the International Commission for the Protection of the Danube River (ICPDR) to implement the DRPC, along with the Commission’s location and its procedures. The ICPDR’s permanent secretariat is located in Vienna, a compromise location on which both the West and the East were eventually able to agree. Nongovernmental organizations can become official observers to the ICPDR, and provide input into policy-making. For example, IAD has permanent observer status in the ICPDR since 1998, participates in several of its expert groups to support integrated water

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70 Within the ICPDR each contracting party can nominate up to five delegates and holds the chair for one year. During that year the nation holding the chair nominates the president, who sets the agenda. The order in which the agenda items are addressed is determined by majority vote. Decisions are voted on, with each delegation having one vote. Decisions are adopted if three-quarters of all CPs are present. Consensus is the desired decision-making method, but if it cannot be reached, a decision can be passed with a four-fifths majority of the delegations present. The decision is then binding for the parties who voted on it. However, if the decision has financial implications it can be adopted only by consensus. The budget is contributed to by all CPs (except the European Community), in equal parts, unless unanimously decided otherwise by the ICPDR. Disputes between CPs are settled with assistance from the ICPDR, the International Court of Justice, or by arbitration.

71 Austria was a neutral country at the time. The West (the EU and Germany) was trying to exert influence over the Danube and did not want the seat to be in the East, and the East did not want the seat to be in a NATO or EU country (Interview Danube 01, 2006). Romania also wanted the seat of the new Commission.
resources management and contributed significantly to the 2005 ICPDR Roof Report (Bloesch, 2009). In order to build flexibility into the agreement many of the specifics of how the ICPDR works were intended to evolve through its later decisions, (Interview Danube 04, 2006). In 2000 all work from the EPDRB Programme Coordination Unit was transferred to the ICPDR.\(^{72}\)

The ICDPR is supported by technical committees, whose experts come from a number of different disciplines and stakeholder groups. Many of these experts also work in national research institutes and participate in other basin-wide professional forums. Much of the actual information exchange and work takes place within the expert groups, which is compiled for the annual ICPDR meetings and common reports (Questionnaire Danube 02, 2004). Building on the monitoring system established by the Bucharest Declaration and further developed under the EPDRB, the first three Expert Groups were: AEWS (Accident Prevention and Emergency Warning System), which addresses accidents and emergencies, and manages an alarm system;\(^{73}\) EMIS (Emission), which deals with emissions, inventories and developing reduction actions; and MLIM (Monitoring, Laboratory Management and Information Management), which deals with in-stream water quality and the ‘Trans-National Monitoring Network (TNMN)’.

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\(^{72}\) The ICPDR had already taken over the activities of the working groups begun under the Bucharest Declaration.

\(^{73}\) Building on the Bucharest Declaration system for monitoring hazardous substances, this system was developed to detect the kinds of accidental spills the Rhine experienced from the Sandoz fire. In 2000 the system effectively alerted downstream countries of cyanide pollution coming from a failed tailings pond from a mining operation in Romania (ICPDR and UNDP/GEF, 2006).
Geographic Scope

At the outset of the negotiations, the participants didn’t know what direction an agreement would take (Interview Danube 03, 2006). The Austrians and Germany were eager to use the Helsinki Convention as the basis for negotiating the new Danube convention.\(^7\) According to one Austrian participant, Austria wanted the DPRC to “improve” on the Helsinki Convention’s definition of the geographic scope of cooperation in two areas: (1) the watershed area to be covered by the cooperative agreement, and (2) the extent of transboundary impacts for which countries are responsible (Interview Danube 03, 2006). Austria’s interest in these issues came from its desire to have reciprocal responsibilities, equal obligations binding the parties to one another.

The Helsinki Convention calls on riparian parties to cooperate to reduce transboundary impact from the catchment areas, *or parts thereof.*\(^75\) In the Helsinki negotiations there was some disagreement about what was meant by “parts thereof”. For some countries this meant cooperation could be limited to some parts of a transboundary catchment, excluding other parts. To other countries, including Austria (which has 96% of its territory within the Danube basin), it was understood that although there could be

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\(^7\) The Helsinki Convention contains a recommendation to develop bilateral and multilateral agreements to manage transboundary waters. Kittinger had also participated in the Helsinki negotiations and served as president of some negotiating meetings.

\(^75\) “The Riparian Parties shall cooperate on the basis of equality and reciprocity, in particular through bilateral and multilateral agreements, in order to develop harmonized policies, programmes and strategies covering the relevant catchment areas, or parts thereof, aimed at the prevention, control and reduction of transboundary impact and aimed at the protection of the environment of transboundary waters or the environment influenced by such waters, including the marine environment ("Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki Convention)," 1992: Article 2, Provision 6).”
cooperation on limited portions of the catchment, the sum of cooperation on those areas should cover the whole catchment area. During the DRPC negotiations some downstream countries, such as Romania, pointed to the Helsinki precedent and opposed the catchment concept. Upstream negotiators thought Romania wanted to exclude its ponds of mining wastewater from the agreement. The Austrians successfully stressed this was not a desirable solution for the Danube, which should include the whole catchment (Interview Danube 03, 2006).

The DRPC specifies, ""Catchment area of the Danube River means the hydrological river basin as far as it is shared by the Contracting Parties ("Convention on Cooperation for the Protection and Sustainable Use of the Danube River (Danube River Protection Convention)," 1994): Article 1)."" Therefore every Contracting Parties is responsible for cooperating on all of their territory within the basin, regardless of any specific conditions. The ambiguity in the Helsinki Convention over the geographical scope of cooperation was resolved in the DRPC in favor of integrating cooperation across the whole catchment area according to a principle of equality- the agreement would apply to all of the basin territory within each country's borders. In this way the Austrian delegates achieved their objective of integrating cooperation across the entire basin, or as much of it as practical, instead of managing water resources according to a piecemeal approach. The catchment approach bound the countries together more equally than if they could each cherry-pick which areas to include and which not to.
At the time, managing transboundary waters on a watershed basis was still quite a new concept. As one Czech participant in both the Helsinki and Danube negotiations recalls:

We started at the beginning of 1990\textsuperscript{76}...we had...the main task to cooperate...to base water protection on hydrologic basis. Not from political, administrative, but from hydrological point of view for this cooperation...It was quite new...Our feeling was that only bilateral cooperation based on transboundary waters is not enough for real water protection needs in such very sensitive areas like Central Europe. That means we were open to cooperation based on river basin principle (Interview Danube 07, 2006).

Many countries, but not all, already had bilateral agreements concerning their transboundary waters dating to the 1950s and 1960s (Hock, 1987b). However, for the most part these bilateral agreements covered only specific activities, such as maintenance of transboundary river courses, construction of structures, water supply, drainage and irrigation systems, pollution protection, hydrology, flood protection, and water monitoring (Questionnaire Danube 01, 2006). Some operational agreements required day-to-day immediate management issues and data exchanges. In some countries the scope of bilateral agreements expanded over time, from flood defense and needed data exchange, to water quality and then water resources management, which eventually expanded to included groundwater (Interview Danube 11, 2006).

The bilateral agreements provided some experience with cooperating. However, it was difficult to build on these experiences as they were limited to only the transboundary waters located on national borders and a small designated area adjacent to them. In addition, as one participant in the delegation of the former Yugoslavia recalled many of the people who had participated in developing the bilateral agreements were by then

\textsuperscript{76}Czechoslovakia's Communist government relinquished power in December 1989 and a non-Communist government took over at the beginning of 1990.
already retired or had left the government ministries due to regime changes. Their predecessors’ written documents provided only limited guidance to the new generation of water negotiators to figure out what it would mean to organize cooperation around the watershed concept. For the negotiators for whom transboundary cooperation was new the participation of negotiators from Germany and Austria was very important as the upstream countries participated in the Helsinki Convention and already had ideas about how the watershed concept should be applied (Interview Danube 06, 2006). Some other countries could draw on recent experiences negotiating watershed agreements in smaller basins. For example, in 1990 Czechoslovakia concluded its first international river agreement based on the watershed, the International Commission for the Protection of the Elbe River Agreement. This experience motivated Czechoslovakia to organized cooperation on the watershed in its other two international basins, the Danube and the Oder (Interview Danube 07, 2006).

The shift from managing transboundary waters around borders to managing transboundary waters around the whole basin was more than a semantic difference. It reframed the relationship of countries to the river. Countries were now managing not only the waters flowing across their borders, but were responsible for regulating activities on the land and waters which could impact the waters flowing across borders. This meant some non-riparian countries, such as the Czech Republic, were now expected to participate in managing the Danube even though they could only reduce their negative

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77 The Agreement was signed on October 8, 1990 between Czechoslovakia, Germany, and the European Union and is interesting historically. German reunification occurred on October 3, 1990. The Elbe Agreement, signed on October 8, was the first international agreement signed by reunified Germany. Following so closely on the transition in Czechoslovakia’s government, this was also the first agreement between Czechoslovakia and the European Union.
impacts on the river, but not benefit directly from improvements to the river. Similarly, upstream riparian countries could incur disproportionate costs from improving the river as compared to any direct benefits they could reap from those actions. However, the use of the watershed concept signified that such concerns were becoming less important. As a Czech participant explained, the effort was:

Not to look only if we had or had not any economic or other benefit from this. But to change it that if we are a country in the catchment area we have a duty to...manage our water...Our inland or national activities should not reflect only our national needs but also this international reflection...But I think that benefit is a little bit wider than direct economic reflection (Interview Danube 07, 2006).

Basing cooperation on the watershed meant that countries defined their relationship to the river not only in terms of what they could obtain from it, but also in terms of their reciprocal obligations to the river and the transboundary environment. The new relationship was manifested in activities, including drawing new maps of the basin, conducting new analyses to determine the condition of the basin, and developing an action plan for the basin. This shift in thinking reflects a change in how countries saw their relationship to international elements of the environment, such as rivers, and also a change in how they viewed the benefits of international engagement. Cooperating over international water resources could be seen as one step toward greater general international cooperation. For some Danubian countries it was also a step toward accession to the European Union.

An evolution of the relationships among Danube delegates accompanied the shift to a watershed approach. In the early meetings delegates tended to interact most with those they knew best. For the most part this meant delegates from their neighboring states.
Similar to the negotiations leading to the Bucharest Declaration as one German participant recounted early on the German and Austrian delegates tended to stick together, especially since they spoke the same language and many delegates did not speak English very well. Over time, different countries hosted meetings. Delegates from other countries were impressed by their hosts hospitality and did their best to reciprocate warmly when it was their turn to host a meeting. Visits were arranged so delegates could see both the delta and the spring at the Danube headwaters. People got to know one another better and became more comfortable speaking with one another. Technical expertise and language skills improved and other experts began to participate as much as the Germans and Austrians.\(^{78}\) A culture of open discussion developed, which was new to many of the CEECs (Interview Danube 15, 2006).

Although the delegates increasingly associated themselves with Danube representatives, this shift was not yet shared by many other stakeholders in the basin. For example, early efforts to build public participation among non-governmental organizations in the Danube Environment Forum (DEF) were hampered because most people living in the basin did not live near the Danube (most still do not) and did not feel united by the river.\(^{79}\) One participant in the DEF initiative recalls, “I can remember people saying, ‘Why are we in the Danube program? We’re not on the Danube.’...It is still hard...to convince people they need to do something for the Danube because they don’t feel to any degree connected to the Danube. They might not even feel connected to any water body

\(^{78}\) Before the end of the Cold War many people from the CEECs were not allowed to travel and did not speak English well (Questionnaire Danube 01, 2006).

\(^{79}\) In the 1990s NGOs developed in the central and eastern European countries, strengthening the existing participation of civil society in Danube environmental decision-making from NGOs in Germany and Austria. International NGOs, such as WWF and IUCN, also began participating in Danube issues.
at all (Interview Danube 29, 2006).” Such anecdotal evidence suggests politicians embraced the watershed concept before their constituents, in part because of their participation in the multilateral negotiations and activities, such as visits to different parts of the river. One effort to expand the general acceptance of the river basin approach was the Environmental Programme for the Danube River Basin’s clear emphasis on tributaries in addition to the main river (Task Force for the Environmental Programme for the Danube River Basin, 1994): Section 4.3).80

The second issue concerning Kittinger during the DRPC negotiations was the extent of transboundary impacts for which countries are responsible. The Helsinki Convention defines transboundary impacts as adverse effects on the environment within a Contracting Party caused by a change in transboundary waters; the change being attributable to human activity within the territory of another Contracting Party. Helsinki defined transboundary waters as surface waters flowing from one country to another. When transboundary waters flow directly into a receiving sea, the extent of the transboundary waters ends at the point of discharge to the sea.82 According to these

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80 However, as one upstream participant noted, even the EPDRB does not take a completely systematic watershed approach. Although in principle the whole basin is covered, the Programme used a hot spot approach to signify projects for urgent action, which concentrates on some issue, task or location (Interview Danube 30, 2006). For example, according to another EPDRB participant from an international organization it was not always clear how hot spots would be defined and whether the same criteria would be used to evaluate priorities for action in countries with different levels of existing water pollution control systems. A further problem with this approach was that a hot spot was also seen as something undesirable and nobody wanted to have a disproportionate share of them (Interview Danube 29, 2006).

81 "Transboundary impact’ means any significant adverse effect on the environment resulting from a change in the conditions of transboundary waters caused by a human activity, the physical origin of which is situated wholly or in part within an area under the jurisdiction of a Party, within an area under the jurisdiction of another Party ("Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki Convention)," 1992): Article 1).

82 "Transboundary waters’ means any surface or ground waters which mark, cross or are located on boundaries between two or more States; wherever transboundary waters flow directly into the sea, these transboundary waters end at a straight line across their respective mouths between points on the low-water
definitions, countries are responsible for regulating only those transboundary waters and impacts flowing directly to another country, but not to receiving seas. In the Danube this would have meant that the responsibilities of upstream and downstream countries were different. Although upstream countries would have been responsible for negative downstream externalities, downstream countries would not.

Some upstream countries politicians were concerned about the potential for differential obligations from the Helsinki approach. According to one Austrian negotiator there was concern the downstream countries would use environmental concerns as a way to obtain financial support from the West, but be unwilling to take actions themselves to protect the environment (Interview Danube 01, 2006). The Austrians thought if upstream countries were required to address their transboundary impacts, then downstream countries should be bound by similar commitments to regulate their own discharges. The DRPC negotiators wanted to protect themselves from accusations by Black Sea countries that the Danube countries were ignoring their impact on the Black Sea (Interview Danube 03, 2006).

The DRPC specifies, "'Transboundary impact' means any significant adverse effect on the riverine environment resulting from a change in the conditions of waters caused by human activity and stretching out beyond an area under the jurisdiction of a Contracting line of their banks ("Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki Convention)," 1992): Article 1)."

83 Similar concerns for equal responsibilities explain why the DRPC is structured differently than the Helsinki Convention (Interview Danube 03, 2006). The Helsinki Convention contains two parts, one with provisions for all parties and one for riparian parties, which could lead to different responsibilities for countries in non-riparian and riparian countries in the catchment. The DRPC has the same provisions for all Contracting Parties.
Party ("Convention on Cooperation for the Protection and Sustainable Use of the Danube River (Danube River Protection Convention)," 1994): Article 1). Therefore, the Danube states agreed that Contracting Parties are responsible for all transboundary aquatic impacts exceeding their territories. This decision expands the geographic area for cooperation to the watershed plus impacted areas of receiving seas and elevates the principle of equal responsibility over even the watershed approach (as defined by the river system’s point of discharge). As calculated by the Roof Report, in practice this expands the scope of cooperation by 6366 km² (ICPDR, 2004).84

Despite efforts to integrate the geographic scope of cooperation across the basin, according to one downstream participant there was a difference between the objective of using a river basin approach and how it was actually implemented. For example, in comparison to the border approach of the monitoring network created by the Bucharest Declaration, the Transnational Monitoring Network (TNMN) is intended to monitor “riverine conditions in the Danube catchment area (ICPDR, 2006).”85 However, the network accomplishes this primarily through monitoring “the major rivers in the Danube River Basin” (ICPDR, 2006). In this example, despite the emphasis on the basin, in

84 This approach is compatible with international law, such as the ILA’s 1972 Draft Articles on Marine Pollution of Continental Origin, which recommend extending the geographic scope of cooperation beyond the drainage basin to include impacted marine areas (Bourne, 1996). However, the focus on environmental protection constitutes a shift from international water law to international environmental law (Teclaff, 1996).

85 The TNMN was formally established in 1996. Similar to the monitoring system established by the Bucharest Declaration, TNMN uses national data, which are monitored and assessed according to harmonized methods. TNMN also aims to develop joint monitoring and data analysis programs. Other differences between the Bucharest approach and that of the TNMN are TNMN emphasizes joint monitoring and data processing and monitors a greater range of indicators to assess transboundary impacts (ICPDR, 2006).
practice the DRPC looked only slightly beyond the main river to include major tributaries (Interview Danube 20, 2006).86

The European Parliamentarians working on a regional planning framework were aware of the tendency to focus on the main river and, in practice, neglect issues specific to the tributary basins. They cited this as an error in the UNECE Helsinki Convention.

This ‘spatial error’ of approach is illustrated in the UN/ECE Convention on the Protection and Use of Transboundary Water Courses and International Lakes, opened for signature in Helsinki in 1992. The Rapporteur does not seek to challenge the validity of this instrument which in fact makes a valuable contribution to the ‘cause’ of major international rivers, often disadvantaged by their ‘division’ among a number of countries.

However, the main consideration in spatial planning terms is that under such a convention...the Danube is considered solely in relation to its own drainage basin without regard to its tributaries, which is an incomplete conception for the purposes of integrated management (Council of Europe Parliamentary Assembly, 1991).

The geographic scope was one reason the Parliamentarians thought another agreement was needed in addition to the negotiations on the DRPC and the Ecological Convention, which would cover the entire Danube catchment including its tributaries in a practical way. The Parliamentarians also considered the approaches to both conventions too centralized, which they saw as limiting flexibility in implementation (Council of Europe Parliamentary Assembly, 1991).

The Parliamentarians therefore sought to formalize a European Danube basin charter, whose focus would be to avoid the “restrictive approach to the Danube catchment area

86 This changed later with the introduction of the EU Water Framework Directive.
along which is prescribed, for instance, by the convention of the United Nations Economic Commission for Europe on international water courses, and to include the catchment areas of the tributaries (Council of Europe Parliamentary Assembly, 1994a).

The discussions among the Parliamentarians provide evidence that changes were coming. Even as the DPRC negotiations were progressing, there were other international currents seeking to orient the geographic scope of cooperation differently.

Range of Issues

Although the Helsinki Convention provided the framework for the DRPC negotiations, there were different views of the range of activities and issues to be addressed. The

87 An initial hearing was held in 1992 in Budapest, where the desire was expressed to study further the issue of pollution from the Danube to the Black Sea (Council of Europe Parliamentary Assembly, 1991). The Parliamentary Assembly's Committee on the Environment, Regional Planning and Local Authorities dedicated their Second Interparliamentary Conference to the Danube basin, which was held in October 1993 in Regensburg, Germany. In Regensburg the participants included decision-makers at different levels of authority, as well as representatives from NGOs and civil society. In Resolution 1021 on the Preservation and Development of the Danube Basin the participants asked the Council of Europe to draw up a European Danube basin charter, which would lay the foundation for an international council of the Danube, stipulate principles for permanent general cooperation in the Danube region, and bring together representatives of national and local governments to coordinate current Danube initiatives, including existing and future conventions, projects and other activities (Council of Europe Parliamentary Assembly, 1994b). An ad hoc sub-committee worked on drafting the charter in consultation with the Council of Europe’s Directorate of Environment and Local Authorities. In response to comments and questions about the scope of the text, the sub-committee decided the charter should instead take the form of a convention for the Danube (Council of Europe Parliamentary Assembly, 1997a). The text was approved by the sub-committee in 1996 and presented to the Parliamentary Assembly in 1997 (Council of Europe Parliamentary Assembly, 1997a, 1997b). The Draft of the European Charter of the Danube Basin considered the entire Danube basin for spatial planning and sustainable development. It would consider existing forms of cooperation and coordinate them. Participants to national delegations would include different levels of government, international organizations and NGOs. Other states who are members of the Council of Europe or relevant agreements, and other organizations could be observers. Recommendations would be made to the Committee of Ministers of the Council of Europe or possible some part of it, to the Parliamentary Assembly, to the Congress of Local and Regional Authorities of Europe, and to any other relevant national or international authorities. Initially the Secretariat would be financed by the Committee of Ministers of the Council of Europe, which would give them the right to monitor some aspects of implementation. Financing responsibilities would shift to the parties after the fourth year. By this time the DRPC had already been signed (Council of Europe Parliamentary Assembly, 1997a).
development of the name of the Convention provides some insight into the discussions over the range of issues. The Convention was originally titled *Convention on Water Management Cooperation for the Protection of the Danube River* or the *Danube Water Management Convention* (Zavadsky, 1993), but later became the *Convention on Cooperation for the Protection and Sustainable Use of the Danube River* or *Danube River Protection Convention*. Water management was narrowly defined, whereas protection and sustainable use were understood as broader concepts. According to an Austrian negotiator, the new agreement was intended to focus on water management, but, similar to his interpretation of Helsinki, only in terms of the transboundary impacts of pollution on protecting water quality and the riparian environment and not broader issues of water quantity and management.

According to a Czech delegate, the decision to build on the more narrowly defined focus reflected the upper riparians’ interest in improving water quality and not downstream riparians’ interest in also addressing water quantity (Interview Danube 07, 2006).⁸⁸

According to a Slovak participant,

> This Convention was influenced mainly by Germany and Austria. We had not so big experience from the past and also here we could see personal influences because Mr. Kittinger was President of the Interim Commission for Danube Protection...[and] was before involved in... working party on water problems under umbrella of UNECE. And he was the chairman for a longer time of this working party on water problems. And in time of his activity there the Helsinki Convention was under preparation and he was responsible for that. And it is natural that his thinking was quite later in preparation of Danube Convention (Interview Danube 27, 2006).

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⁸⁸ According to an Austrian participant quantity is mentioned only three times in the final DRPC and only in reference to monitoring and assessment. However, even monitoring of water use has not been implemented (Questionnaire Danube 02, 2004).
The DRPC’s focus on pollution prevention and reduction was shaped by the Helsinki Convention, Kittinger’s participation in them, German and Austrian past experiences collaborating on transboundary water management, and other countries’ inexperience.

Szilagyi (1993) reveals a broader interpretation of the scope of Helsinki by Hungary, which includes transboundary pollution, but also water quality and quantity protection for equitable use of the waters (Szilagyi, 1993). Hungary was also trying to orient cooperation more broadly through the negotiations on the separate ecological convention. Although unsuccessful these negotiations did have an impact on the DRPC scope.

The draft Danube Basin Ecological Convention built on the idea of integrating environmental protection into all areas of policy, which was becoming the preferred European strategy for achieving environmental protection. In the context of water management integrated referred to multiple concepts: spatial planning, such as managing rivers on the watershed scale; planning across media, so that efforts to limit pollution from air, water, and land would complement one another instead of transferring pollution

from one medium to another; and planning across areas of responsibility, such as
requiring cooperation among different domestic authorities for issuing pollution permits.
The Hungarian proposal sought to build on these developments and focused on
...preserving, maintaining and restoring the natural environment and natural
values of the Danube Basin, especially in the following areas: maintaining the
ecological integrity of the Danube Basin, sustainable use of resources, protection,
maintenance and restoration of natural flora and fauna together with their habitats,
preservation of biological diversity and landscape diversity, the maintenance of
ecological systems linked to the hydrological system of the Danube, preservation,
maintenance, and, as necessary, restoration of natural landscapes, especially
wetlands, geological and geomorphologic formations (Temporary Secretariat

Therefore, although it encompassed water protection, this was not the main subject. Land
within the watershed would also be protected, for example through a green corridor
running through the Danubian countries.90

The Hungarian proposal raised several concerns among other negotiators. Some
politicians in Austria and Germany were concerned a broad agreement, covering both
land and water, could go against their interests. However, expressing these concerns
would have meant opposing the idea of integrating water resource protection across
different media, land, air and water, which they generally supported. As a result, the
upstream negotiators made a concession in the DRPC. They specified that water quality
objectives should take into account requirements for the banks and wetlands, and created
an ecological working group under the ICPDR to address this ("Convention on

90 According to Rose (1992) earlier drafts of the Ecological Convention were interpreted as prioritizing
ecological needs over other resource uses. Parties would strive to prevent human actions from endangering
“...human health and safety, air, water, soil, climate, flora, fauna and living communities, including their
biological diversity and possible role as bioindicators, as well as other interactions (Draft Convention
quoted in (Rose, 1992)). As such, Hungarian officials may have hoped the proposed Ecological
Convention would help them oppose completion of the disputed hydropower facility at Gabčíkovo-
Nagymaros. Hungarian officials hoped the Convention would help them oppose its completion (RECIEL,
1994).
Cooperation for the Protection and Sustainable Use of the Danube River (Danube River Protection Convention)," 1994; Interview Danube 03, 2006; Interview Danube 25, 2006). They also changed the name of the convention, shifting from water management to protection and sustainable use, to emphasize environmental protection and sustainable use as advocated by Hungary and others.

Upstream countries had other concerns over the Hungarian proposal, as it would have required changes to existing commitments, such as navigation, which they considered unrealistic. As one Austrian participant in the negotiations recalled

They [the Hungarians] had in mind a binding convention which would include everything and would also change everything. And include commitments which are very far reaching, not soft law, but strict law. And this would have interfered with too many already existing agreements. For example, for the Danube River the navigation agreement was already very traditional and also the ECE [Helsinki Convention] and some environmental agreements, for example air pollution, and so it was too difficult to reenter into all these subjects (Interview Danube 03, 2006).

For example, broadening water management would have brought water quantity issues into the negotiation, which under the then recently adopted EU Maastricht Treaty, would require unanimous consent among all the EU member countries, including non-Danubian countries. In comparison to the Hungarian proposal, the provisions of the Helsinki Convention were more compatible with existing agreements. Using the Helsinki Convention, narrowly interpreted, as the basis for cooperation would allow the negotiators to avoid renegotiating existing agreements.

Although working within the constraints of existing agreements may have made it easier to reach a consensus within a short time frame, it undermined the principle of integrated
river basin management. Instead of addressing all uses together, navigation would be regulated by the Danube Commission and water protection by the new agreement. For example, the DRPC covers protection of the river from pollution caused by navigation, not navigation itself. Similarly, “water power generation is included only from the aspect of conserving the river bed and the river environment, but not from the aspect of power, of water power, of water management (Interview Danube 03, 2006).”\(^91\) Therefore, although changing the name of the DRPC to include \textit{protection and sustainable use} can be seen as a concession to the Hungarian interests, in practice the DRPC limited the scope of activities for cooperation to protecting the environmental aspects of water management, and excluded other aspects of water use and land use within the basin (Interview Danube 03, 2006).

According to a Croatian participant, Croatia also opposed the Hungarian proposal, but for the opposite reason. Croatia interpreted the Hungarian proposal as potentially limiting definitions of water management (Interview Danube 06, 2006). The Hungarian proposal drew its support primarily from relatively new and weak environmental ministries, while much of the opposition came from the established ministries in charge of water resources management who favored the DRPC initiative.\(^92\) Delegates from a water management background, such as the Croatian delegate, thought the Hungarian proposal focused too

\(^91\) A distinction was also made between existing and planned water constructions works. The transboundary impacts of existing works are largely excluded, excepting the prevention of further environmental degradation from their operation.

\(^92\) The delegates to the negotiations came from different ministries, depending on the division of responsibilities in the particular country. Since the time of the negotiations, the national responsibilities for water resources management and environment have been merged in some of the countries where they were previously separated.
much on protecting aquatic ecology while neglecting other aspects of water management (Interview Danube 06, 2006).  

The water regime depends on geographic characteristics, hydrologic characteristics and the impact of human impact into that system. Because through integrated water management, if it is truly integrated water management, it has to meet the needs of all stakeholders. The basic point of the problem is if you direct water management only toward environmental protection, you leave out other stakeholders and this can hardly be justified with some kind of progress because you still need water for agriculture, for power production, and this simply takes into account only one narrow segment (Interview Danube 06, 2006).

From this perspective, instead of seeing environmental protection as only one objective for water management among many, the Hungarian proposal privileged ecological protection too much over other considerations. The Croatian delegate therefore thought the Hungarian proposal risked undermining the existing tradition of integrated river basin management, understood in terms of regulating interconnected uses of the water for many different objectives. According to this tradition, water management was seen as a broader concept than environmental protection, as water management could integrate cooperation on more related issues (Interview Danube 06, 2006). Therefore, water managers united against the Hungarian proposal, and in some cases even against other ministries within their own country, for different reasons. Some considered the proposal too broad and others too narrow.

Cooperation on the Hungarian proposal proceeded for a while in parallel to the DRPC negotiations. Unlike the non-binding Bucharest Declaration, which could include elements on which there was no consensus, and like the DRPC negotiations, the

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93 According to more than one delegate, the negotiators also thought the Hungarian proposal lacked clear objectives, in part because it did not seem grounded in existing international law (Interview Danube 06, 2006; Interview Danube 25, 2006).
Hungarian proposal required unanimous agreement in order to serve as a basis for cooperation. Although the Hungarian-led initiative created a Temporary Secretariat and elaborated four drafts of the Danube Basin Ecological Convention, it could not garner the needed consensus. Ultimately the DRPC was ready to sign and the participants saw no reason to wait for the completion of the Ecological Convention to do so. Due to the DRPC’s flexible structure, an ecological agreement could always be attached as a later protocol (Interview Danube 12, 2006). The development of an ecological agreement remained on the agenda for a while even after the ICPDR was established, until the parties decided to concentrate on implementing the DRPC and the EU WFD (Interview Danube 12, 2006). Cooperation continued on a joint Ministerial Declaration on the Danube Basin Ecology for presentation to the European Union and national governments (Bosnjakovic, 2003; Greenway Central and East European Network of Environmental NGOs, 1995; RECIEL, 1994; Zavadsky, 1993).

Meanwhile, European Parliamentarians were also negotiating a framework agreement for the Danube region, the European Danube basin charter. They were concerned the DRPC was oriented too narrowly and, similar to the Croatian concern described above, the Ecological Convention would also take a sectoral approach due to its focus on the environment. The Parliamentarians also foresaw the potential for the two Conventions to overlap with one another, leading to confusion about how to implement either one.

The existing initiatives...are each of undeniable value, being concerned with problems of great individual significance. Unfortunately, it appears difficult to guarantee a comprehensive and integrated approach to all the problems of the Danube basin merely by juxtaposing the sectoral activities of the various parties. Moreover, as the initiatives now stand, the extent of possible overlap between the
two conventions put in hand in 1991 is a fair question (Council of Europe Parliamentary Assembly, 1994a).

The Parliamentarians therefore sought to define an integrated approach to the Danube as one including navigation, ecologically acceptable energy production, water for drinking, industrial, and agricultural uses, tourism, and protecting a relatively undamaged natural environment. They also sought to bring together representatives of national and local governments to coordinate activities (Council of Europe Parliamentary Assembly, 1994b). The Parliamentarians were pushing the boundaries of how integrated river basin management was understood to include all uses and a more decentralized approach, involving different levels of government in implementation. However, progress on the DRPC was proceeding more rapidly.

The Environmental Programme for the Danube River provided yet another interpretation of integrated river basin management, oriented more broadly to protect the environment, sustainable management of the basin, and promote broad participation among a range of public and private actors (McCaffrey, 2006). According to a Slovak participant, “The coordinating of this Danube programme was oriented more environmentally and the program of the Commission [ICPDR] was oriented according to the Convention (Interview Danube 27, 2006).” The EPDB emphasized the ecology of the basin more than the DRPC, for example by including biological monitoring (which would later be the basis for the EU WFD monitoring philosophy) in addition to chemical monitoring (Interview Danube 20, 2006; Interview Danube 28, 2006). The differences between the EPDB and DRPC initially caused concern among some participants in the Interim Commission and DRPC negotiations.
Some of the initial concerns of those within the Interim Commission about the EPDRB can be attributed in part due to budgetary differences and personality differences, but there were also significant questions about how issues were being prioritized and whose interests the prioritization represented. The Interim Secretariat of the DRPC had ideas of what it wanted to do, but a relatively small amount of money available to finance their activities and needs as the Danube states were not yet required to contribute to its support.\footnote{Austria financed much of the interim secretariat’s activities.} In comparison, the EPDRB had significant funding available to finance its own activities independently from the Interim Secretariat. In the perspective of the Interim Secretariat, the EPDRB could decide on activities and then announce these to the Interim Secretariat (Interview Danube 07, 2006). In the view of the Interim Secretariat, not enough effort was put into first prioritizing the countries’ needs. To the upstream participants, who were not recipients of EPDRB funding, it was unclear whether the EPDRB projects represented the interests of the donors or the Central and Eastern European states, who received and depended on EPDRB funding to support their participation. Poor communication between the EPDRB and the interim ICPDR Secretariat exacerbated these tensions (Interview Danube 04, 2006).

Given the EPDRB’s more significant budget, some within the Interim Secretariat were concerned the EPDRB would distort how downstream countries determined their priorities for action. For example, the countries might prioritize their efforts based on what was likely to secure donor money through the EPDRB, instead of what was good for the emerging international cooperation (Interview Danube 04, 2006). Or, according to
a participant from an international organization, some countries might pragmatically decide not to prioritize the same issues in the Interim Secretariat as those already prioritized by the EPDRB, expecting the regional organization to fund those activities anyway (Interview Danube 29, 2006).

For example, while intergovernmental negotiations proceeded on the DRPC, the EPDRB worked on formulating its Strategic Action Plan (SAP) for 1995–2005, a list of priorities for implementing the DRPC. Some DRPC negotiators were concerned that integrated water resources management might mean something different in the SAP and define national priorities differently from the approach of the Interim Commission (Interview Danube 04, 2006; Interview Danube 27, 2006). One example was the issue of nutrient reduction. Some DRPC participants thought the EPDRB over-prioritized this issue due to its visibility, over other issues to which they would have preferred to see the resources devoted (Interview Danube 04, 2006; Interview Danube 25, 2006). After the DRPC was

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95 The four objectives articulated in the SAP are (1) Reduce the negative impacts of activities in the Danube River Basin on riverine ecosystems and the Black Sea; (2) Maintain and improve water quality and availability and quality in the Danube River Basin; (3) Control hazards from accidental spills; and (4) develop regional water management cooperation. In addition, several shared environmental values were articulated in the SAP: the precautionary principle, use of best available techniques, use of best environmental practices, pollution control at the source, the polluter-pays principle, regional cooperation, and sharing of information (EPDRB, 1994; Nachtnebel, 1997). Finally, the SAP recommended strategies to be included in each country’s National Action Plan. Actions suggested included expansion of sewer systems with nutrient removal capacity, reduction of emissions from industry and agriculture, conservation and restoration of the wetland and floodplain areas of the tributaries and main Danube, and establishment of an integrated water management approach (EPDRB, 1994). The SAP was approved in 1994 by Environmental Ministers of Danube States and the Environment Commissioner of the EU.

96 In the SAP the Danube states declared for the first time that their nutrient discharges posed a significant risk to the Danube basin and the Black Sea. In fact, the SAP declared that “eutrophication is the main problem threatening the biodiversity and the economic potential of the riverine ecosystems, the Danube delta and the Black Sea (EPDRB 1994).” The SAP stated that the Danube contributes half of the total river load (from all rivers discharging into the Sea) of nutrients that cause eutrophication. The Danube states agreed that nutrients needed to be addressed at the multilateral level. At this time there was no national accounting of sources of nutrient pollution, such as fertilizer plants, and there was tremendous uncertainty about who was contributing how much of the total nutrient load to the Black Sea. Although some officials in upstream countries thought that nutrients were being prioritized too strongly, they decided not to oppose
adopted, there was also some hesitancy to take action on the EPDRB’s SAP because
countries knew it would be replaced by the ICPDR’s own Joint Action Plan (Interview
Danube 29, 2006).

According to one German delegate to the Bucharest meetings, in Bucharest the
countries had differentiated between water management issues and environmental
protection because they wanted to first accomplish something and only later
address other issues. The priorities were a little different...I’m a little conservative
still and from the old guard...At the beginning we were cautious about interacting
with them [the environmentalists]. How far do they want to go? What are their
objectives?...This green side in the beginning, we were skeptical. But over time,
we noticed what they were doing wasn’t wrong and they were helping with
support and it was reasonable what they were recommending. Over time we were
able to work together (Interview Danube 16, 2006).

Despite concerns over prioritization, experience working with different partners helped
shape the official negotiations on the DRPC.

The EPDRB also helped implement the DRPC’s focus on joint environmental monitoring
and data sharing. The EPDRB Task Force created three sub-groups, similar to those
created by the Bucharest Declaration, to work on creating a regional monitoring system,
an accident emergency warning system (for detecting release of hazardous substances),
and a basin-wide system for exchanging information (Botterweg & Turcan, 1998).

PHARE focused on the ecology of the Danube River basin, not only the water of the
Danube itself. TACIS helped provide financing to include Ukraine and Moldova in the
monitoring network agreed on under the Bucharest Declaration. These programs would
provide critical funding (1) for central and eastern European countries to participate in

the wording. The SAP was not a legally binding agreement and they did not expect that signing would
cause them any harm. Over time they would try to find out more about the actual conditions in the basins.

97 Article 15 of the DRCP on Research and Development specifies, “(1) To further the aims of this
Convention, the Contracting Parties shall establish complementary or joint programmes of scientific or
technical research ("Convention on Cooperation for the Protection and Sustainable Use of the Danube
River (Danube River Protection Convention)," 1994).”
Danube negotiations; and (2) for equipment enabling these countries to participate in an integrated approach to monitoring and assessing the state of the river environment, including chemical and biological monitoring (Interview Danube 20, 2006). For example, the EPDRB helped countries gain experience in monitoring water quality according to agreed upon protocols for frequency and parameters (Interview Danube 06, 2006).

According to one Slovak participant:

The main mission was to analyze the situation in the whole Danube river basin and prepare all the information to be understandable and to be comparable. Because, for example, data were very different from the countries. Quality of the data and also the approaches were different. (Interview Danube 27, 2006)

The EPDRB also paid for studies and made suggestions about the direction in which they would like to see the cooperation develop, such as more of an environmental direction. In this way the EPDRB went beyond the existing work under the Bucharest Declaration, which covered flooding, hazardous substances, and water balance, to address additional issues such as wetlands and floodplain restoration.

**Participation**

As mentioned earlier participation was open to all major Danubian states. The UNECE Helsinki Convention, defines “Riparian Parties” as “Parties bordering the same transboundary waters” and entreats them to develop a harmonized approach for the catchment to address transboundary impacts and protection of the environment of transboundary waters ("Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki Convention)," 1992): Article 1, Article 2). Although intended to develop a harmonized approach for the catchment, the Helsinki
Convention’s definition of Riparian Parties limits participation to those states bordering the same transboundary river.

When negotiations on the DRPC began all countries with considerable territories within the basin participated along with the European Community. Considerable territory was defined as having more than 2000 km² within the catchment. According to one of the negotiators, this spatial distinction was made because Switzerland was asked to participate, but was not interested. Subsequently the negotiators excluded all countries with territories in the basin smaller than Switzerland’s. The countries with smaller territory within the basin also did not express any interest in participating (Interview Danube 03, 2006). Initially all of the countries with considerable territories within the basin also bordered the Danube. However, after the political changes in the early 1990s some countries with significant territories within the basin, such as the Czech Republic, were no longer riparian to the Danube. As countries continued to break into smaller countries, most recently with the 2006 separation of Serbia and Montenegro, each of the new countries with territory in the basin continued to participate. Following the dissolution of the Soviet Union, Russia no longer held territory in the Danube basin and its delegation was eventually replaced by a Ukrainian delegation.

Interestingly the negotiations on the Danube Basin Ecological Convention included Turkey along with the Danube states. The broad environmental scope of the negotiations

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98 "‘Danubian States’ mean sovereign States sharing a considerable part of the hydrological catchment area of the Danube River. As considerable part there is assumed a share exceeding 2,000 km² of the total hydrological catchment area (‘Convention on Cooperation for the Protection and Sustainable Use of the Danube River (Danube River Protection Convention),’ 1994): Article 1)."
meant that even non-Danube states could have a significant interest in participating. Turkey has significant territory bordering the Black Sea, and therefore its environment is influenced by the Danube discharge. Such cooperation would presage more direct cooperation in the future between the ICPDR and the Black Sea Commission.99

In addition to the participation of national delegates within the DRPC negotiations, there was also participation from other kinds of representatives within the framework of the Environmental Programme for the Danube River Basin, including international donor agencies, like GEF, and non-governmental organizations, like IUCN and WWF. The EPDRB therefore helped to integrate water resource management in another way, across different kinds of stakeholders. For example, the group preparing the draft SAP report was made up of representatives from four countries: Romania, Bulgaria, Hungary, and Austria, as well as from the EPDRB’s Co-ordination Unit, the World Bank, and UNDP.100 National consultations provided opportunities for both governments and interest groups to provide feedback. Participants across the basin recognize the EPDRB support to bring representatives from the Danube countries together with international financing organizations to discuss priorities, needs, and conditions, in addition to funding technical equipment and other investments. The more decentralized approach of implementation of EPDRB activities, as compared to the legal and centralized DRPC approach (McCaffrey, 2006), has been constructive (Linnerooth-Bayer, 1996). For

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99 In 1997 the ICPDR and Black Sea Commission began in 1997, was reinforced by the signing of a Memorandum of Understanding in 2001, and is implemented through a Joint Technical Working Group (ICPDR, 2008).

100 At the outset the EPDRB involved primarily representatives from countries who were recipients of EU PHARE and TACIS funds, i.e. basin countries except for Germany and Austria. Over time Austria and then Germany increased their participation in EPDRB’s activities (Interview Danube 28, 2006).
example, as part of the EPDRB countries drafted national environmental reports. The national reviews included, "an initial inventory of pollution sources, an assessment of environmental issues and problem areas, review of available data and studies, and assessment of existing infrastructure (Nachtnebel, 1997)." IUCN, was responsible for assisting the central and eastern European countries (all Danube countries except Germany and Austria) in developing national environmental reports. According to one national delegate to the DRPC negotiations

It was recognized from the early beginning that we have problems with traffic, with degradation of environmental resources. We have economic problems, which subsequently create environmental problems. So, these environmental reports has a very broad scope. Not only water. And this might have been one of the reasons why IUCN was invited...You find many differentiated international institutions, associations. But, they have quite specified tasks and this might have been one of the reasons why IUCN was adopted to run the program (Interview Danube 02, 2006).

In comparison to the narrower focus of the DRPC negotiations, the EPDRB, in this case with IUCN’s help, could take a broader approach. However, at times the EPDRB also pushed the boundaries of what some national delegates to the DRPC were comfortable with.

For example, in the beginning the differing approaches to NGO participation led to some tensions. The donors required active participation from NGOs. As a result, NGOs were engaged in all stages of research and action programs, from preparation to evaluation of results. According to a Slovak participant,

The NGOs were very active [in the EPDRB] and very involved in the programs, in control, because each year PCU was responsible to present to all of them what was results achieved and what is program and everyone could discuss about all
the things and of course it was very difficult to tell them you are not right, to find arguments (Interview Danube 27, 2006).

However, it was not obvious how such participation could be incorporated into the official intergovernmental work on the DRPC and of the Interim Commission. According to the same participant,

From the beginning we had really a difficulties for example in the framework of the international commission that we should involve NGOs and we should listen to them and discuss with them all the things and also to respect their view. But it was very difficult to start these discussions and also to find some mechanism of how to respect their view in preparation of real programs. Not only to listen to them, but also to apply their requirement in the practical life. Very different from atmosphere in international commission, because if somebody said from the country that this is not priority or not acceptable for them, discussion was impossible because NGOs were not present in discussions from the beginning...

But later we [the ICPDR] invited people for meetings and were present and the system of meetings is that there are two parts of meetings. One is for solution of internal things, that means structural, secretariat and how to use money for the secretariat for individual programs. And the second part is really about all the activities and how to orient the next program and assessment of the past year and the NGOs participated in these discussions and their view is respected.

...I think this approach to put together environmentalists, that means NGOs, and governmental people, it was very useful because if you hear some arguments you can find...you must find also arguments for your position. And in some cases the proposal from the other side could be useful for solution of your things. Priorities are very important and we recognize at the end it is very useful for both of us, for NGOs, because in some cases they have their own group and they are discussing and they didn’t know our needs, our arguments, our reaction because we were under pressure of the other ministries or some requirements from people, from population. And it was necessary to harmonize all those things (Interview Danube 27, 2006).

What started out as a tension, how to incorporate unofficials, stakeholders other than those from the official national delegations, in the intergovernmental work eventually became a strength for building understanding and creative problem-solving.

The other real success is the ICPDR getting people together on a regular basis. Trust is built up on personal relationships, so people know who to phone, who to email as it is now, that you’re not just dealing with a country, you’re dealing with
somebody, so if you have a problem you can solve it. You don’t have to go up, and back down again, you can go straight across. Okay, you may have to do it two ways, but there are other ways to solve it, and I think that’s another strength of the ICPDR, and I think it’s engendered this sort of trust and self-reliance to some extent that you can do something (Interview Danube 28, 2006).

According to one national delegate, although in general the same people were involved in negotiating both the DRPC and the EPDRB’s non-binding SAP, the SAP was more technically oriented and therefore technical experts were more involved in its development (Interview Danube 07, 2006). Work on the SAP also included non-Danubian experts as bidding on contracts for technical work for the EPDRB was open, which some Danube riparians resented. From their perspective, the hiring of outside experts was an example of EPDRB’s wasteful spending as money was flowing out of the basin, for example to The Netherlands or Great Britain. Although funding from the EPDRB was intended to support the former Communist states, some participating officials estimated that 70-80% of funds were used to pay for services from western consulting companies who partnered with on-site colleagues from the former Communist states (Interview Danube 04, 2006). Some thought this money was spent inefficiently, as national experts were more familiar with the region, its problems, and have a longer time period of reference (Questionnaire Danube 02, 2006). They would have preferred to see the money spent more efficiently by keeping it within the basin, which would also strengthen expertise and cooperation.

101 The decision to use consultants was in part a political decision, to balance technical expertise from the upper riparians (Interview Danube 29, 2006), who dominated the DRPC negotiations, and was also in part due to a requirement for open bidding procedures.
The use of outside consultants also led to some early distrust among national experts who were left out of the data production or interpretation. For example, Germans and Austrians resisted the findings of the Haskoning Report, produced by a Dutch consulting company. Haskoning used some of the early data produced in accordance with the Bucharest Declaration to conduct a rapid assessment of contributions to nutrient loads to the Black Sea and released its findings to the media. These findings largely blamed Germany and Austria for nutrient loads to the Black Sea.¹⁰² Not having participated in the assessment, the upstream countries questioned the preliminary findings and use of the sometimes questionable data from the Bucharest monitoring network.¹⁰³ However, despite their initial resistance, the report did motivate some experts in the upstream countries and people involved in water administration to think more about the issue (Interview Danube 02, 2006).

Eventually, the EU Phare program faded and the ICPDR took over the results of the EPDRB. The UN/GEF component continued with the Environmental Pollution Reduction ¹⁰² The Haskoning report indicated that the composition of zoobenthic, plankton, and fish populations had changed, with fewer commercially valuable fish species and more economically insignificant algae-eating fish. It attributed 50% of the total surface water flowing into the Black Sea to the Danube River. It also compared the nitrogen loads discharged into the delta by the Danube between 1960 and 1991, using data from the monitoring system established by the Bucharest Convention, and calculated that loads had increased by a factor of nine during that time. The Haskoning report concluded that the Black Sea was experiencing severe nitrogen pollution which was in large part due to poor policies in the Danube watershed. The Haskoning study broke down the contributions of nitrogen based on economic sector. About 50% of the nitrogen load to the Danube and Black Sea was attributed to agriculture and 28% of the load to population. The Haskoning assessment also compared scenarios for nutrient reduction to evaluate which would be the most cost-effective. It concluded that reductions in nitrogen from agriculture were necessary, but often not socially feasible. As a result, more expensive measures to reduce nitrogen from population (improvements to sewage treatment plants) would be needed to reduce transboundary nutrient loads (Haskoning Royal Dutch Consulting Engineers and Architects, 1994).
¹⁰³ These countries also pointed to the water treatment, including significant investments in sewerage and waste water treatment plants, they were already doing to limit nutrient pollution in accordance with the EU Urban Wastewater Directive, and the lack of similar actions by downstream countries (Interview Danube 04, 2006).
Programme and the Danube Regional Programme. As the program changed, more experts were included from the Danube, including Austrian and German experts, which increased ownership of the projects and was critical to making progress (Interview Danube 15, 2006; Interview Danube 29, 2006). In the opinion of an ICPDR representative the Danube Regional Programme was successful in part because it was willing to adjust its objectives in accordance with guidance from the ICPDR.

They, to their credit, the people in that project management unit have recognized that they have an initial project document, they’ve modified it significantly based on needs that have essentially come, so that the document hasn’t... become enslaved to [the project document]. And circumstances change. Things are moving quickly. There’s new opportunities, new situations...Everything about that project is descended from that initial project document. The world doesn’t work that way....I understand in the sense that you don’t want to have something that’s so open that anyone can do whatever the hell they want and waste all our money. But at the same time if there’s institutions there that provide some level of guidance, then you have to allow that to help guide, and that has been the case here (Interview Danube 33, 2006).

According to this participant the project leaders were able and willing to adjust their original objectives to accommodate guidance from the ICPDR. In this way the project objectives supported those of the ICPDR.

Participation of NGOs from the basin in Danube decision-making continues through the Danube Environment Forum, which was founded in 1999 as a basin-wide platform to coordinate NGOs working to protect the Danube at all levels, basin, sub-basin, national and local. Hungary originally had the idea for creating such a coordinating forum for NGOs, but the idea was not further developed. Three NGOs who had previously cooperated on the Morava River from Austria, Slovakia, and Czech Republic revived the idea. They knew without such a structure NGOs would find it difficult to contribute to
protecting the Danube, for example by participating in the ICPDR’s work. DEF now has over eighty-five member NGOs in fourteen Danubian countries. DEF purposefully maintains a decentralized, bottom-up approach as a complement to the ICPDR’s top-down approach. Observership in the ICPDR enables DEF to attend all meetings, be in expert groups, be informed about ongoing activities and plans, and provide comments on draft documents. DEF’s participation has served to raise awareness within the ICPDR about issues of concern to some of its interest groups, for example such as the lack of information about Ukraine’s construction of the Bystroe channel. However, DEF does not see itself as a watchdog. It “first of all want[s] to cooperate with the ICPDR, the ministries, authorities to contribute to the process and help with the protection of the river, with the implementation of WFD. We like more the cooperation and the work together for these goals (Interview Danube 05, 2006).”

Participation of such groups is necessary because the ICPDR cannot work at the community level or the province level. At the international basin-wide level people understand each other and the primary issues. However, administrators at the lower levels don’t always share these and instead, due to the lack of a common identity and the large economic differences, act based on short-term economic needs (Interview Danube 30, 2006). Although there is consensus at the ICPDR level, the interactions between the national and the local level vary considerably between countries with multi-level governance systems and centralized governance systems. Therefore, the ability of

104 DEF’s members include NGOs from Austria, Bosnia i Herzegovina, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Moldova, Romania, Serbia, Slovakia, Slovenia and Ukraine. DEF is based in Slovakia and is coordinated through 13 national focal points. Additional information is available at http://def.distelverein.at/.
countries to implement their commitments varies greatly. However, “the official line within Danube countries with respect to Water Framework Directive is they’re all the same (Interview Danube 30, 2006).” NGOs and networks of NGOs are therefore needed to provide feedback on local perspectives to the ICPDR and also to implement joint projects, which help to build a shared identity.

A Slovak participants described an example of success in making the technical information resulting from international cooperation relevant for local policy-makers and in an expanding understanding among them of the watershed and environmental approach to water management.

We had discussions with mayors of small villages in mountain areas ...[about] communication between forecast center and the population...to deal with information and in time which is usable for them. That means the forecast must be more rapid than the flood will come. And it is related mainly to flash fields... From international point of view, only professionals cooperate. In the local conditions you must cooperate with the people from the area. To be understandable for them and to provide them with information that is useful for them in their practical life. Because international centers are involved in very professional forecasts and to use very sophisticated information and so on. But for local people it is not so much important. It is important for them to have something that is very concrete to react, to monitor the situation.

...And I was very positively surprised how they can understand what are natural conditions in the river basin and they must think of solidarity. They are thinking about measures they can take in their village and also they are thinking of villages that are downstream. It was very nice for me to recognize that those people understand this principle which is very important and this principle of solidarity for all the issues. It is important that the idea is the property of the people living in the field, not only something that is recognized by professionals, by environmentalists, but ordinary people are able to think in very environmental way (Interview Danube 27, 2006).
"Danube Day" is an effort to involve all different kinds of organizations across the basins in many different activities to "inspire the public to act to protect the Danube in their every-day lives (ICPDR, 2009c)." "Danube Day" is celebrated on June 29th throughout the Danube River basin in commemoration of the signing of the DRPC, to highlight the significance of protecting the Danube, celebrate successes, discuss challenges and mobilize people. Participants, such as IAD, celebrate the river and international cooperation with festivals, public events and educational activities along the entire river to engage people of all ages and interests in all Danube countries. Coordinated by the ICPDR, activities are organized by international organizations, local and national governments, NGOs, sub-river basin organizations, and businesses. The activities strive to create a sense of community, of "Danube solidarity", and responsibility among the diverse people within the basin to protect the river (Danube Day). On the part of organizers, such as IAD, such activities further stakeholder involvement in participatory procedures (Bloesch, 2005).

**Role of the International Authority**

The DRPC negotiators had different views about how much influence international institutions should be given and whether the new Danube organization should be included within an existing umbrella organization. Some countries thought that the ICPDR should become part of the United Nations (UN) system to take advantage of parallel developments and funding opportunities. Supporters pushed to locate the Secretariat in Vienna, one of the four duty stations of the UN, in order to connect the two. There was
also some interest by the Austrian Executive Secretary of the Danube Commission in Budapest at the time to locate the new commission in Budapest and expand the Danube Commission for navigation’s responsibilities to include the environment (Interview Danube 01, 2006). However, as mentioned earlier this was not considered feasible because Germany was not yet a member of the navigation commission and some did not think the existing commission’s mandate and expertise could be expanded to include the environment.

The EU wanted its Environment Directorate-General to have influence over the Danube organization. It would therefore have liked to see the new Danube organization be directed from Brussels (where the EPDRB was originally located before being transferred to Vienna) and was not entirely satisfied with the decision to base the ICPDR Secretariat in Vienna. Many central and eastern European countries (CEECs) were very interested in maintaining close ties to the EU as their participation in the ICPDR could facilitate EU accession. These countries sought to demonstrate their capacity to apply international environmental standards by implementing the European Union’s Water Framework Directive (EU WFD) and other directives. For example, technical discussions within the framework of the DRPC about how to address municipal pollution became a way to implement the EU’s Urban Waste Water Directive (Interview Danube 07, 2006).

Working in the expert groups for the ICPDR Danube water management plan also trained Central and Eastern European (CEE) experts, so they are able to create national water management plans, as required by the EU (Interview Danube 06, 2006). The CEE countries benefited from EU financial support by fulfilling their commitments to the new
Commission. Finally, the EU exerted its influence in more subtle ways, pushing for English to be one of the working languages of the ICPDR in addition to German, despite the fact that it is not a language native to any Danube countries and is not one of the working languages used by the DC (Interview Danube 01, 2006). Ultimately, the Secretariat was established in Vienna with Austria providing initial financing and three personnel, Mr. Kittinger, Mr. Velcovsky (who participated in the DRPC negotiations as a representative of the Foreign Ministry), and Mr. Fleckseeder (who had previously been at the Technical University of Vienna and then the Austrian Federal Ministry of Agriculture, Forestry and Water Management).

Although the DRPC defined the geographic scope for cooperation and areas of responsibility, it left much of the policy-making and standard setting to the ICPDR. For example, although the negotiators wanted to include some water quality standards in the initial agreement, many questions about specific standards were left to be covered later via amendments to the DRPC’s technical appendices (Annex I-III). Technical appendices were designed to be amended according to the decision-making procedures of the ICPDR and not require ratification by the parliaments of the Contracting Parties. The negotiators considered this a flexible process in which data could be added and acted on as they become available. The negotiators also knew they needed to be able to amend the DRPC’s technical appendices because they anticipated the EU Water Framework Directive would require new standards and institutional arrangements (Interview Danube 03, 2006).
Recent Developments of the Danube Water Protection Regime From the EU Water Framework Directive to Today (2000-Present)

In 2000 the delegates to the ICPDR agreed to use the ICPDR to coordinate their implementation of the EU Water Framework Directive, for example to develop a River Basin Management Plan for the Danube River Basin. All EU States and EU accession countries are required to implement the WFD. However, this decision was reached even though, at the time, fewer than half of the DRPC Contracting Parties were part of the EU or its accession process (Weller, 2004).\textsuperscript{105} The ICDPR Executive Secretary describes the decision “to utilise the EU Water Framework Directive as a basis for organising water management efforts (Weller, 2004)” as reinforcing the work under the DRPC. Indeed, the DRPC negotiators were already aware of the EU WFD negotiations, which took place between 1988 and 2000, and tried to make the two as compatible as possible. However, the decision to implement the EU WFD has also brought some changes to implementation of the DRPC. As one Austrian representative to a scientific basin organization explained the EU WFD was in some ways seen as overthrowing existing cooperation, “This was a change of the European Union (Interview Danube 30, 2006).”

**Range of Issues**

Aware of the work on the Ecological Convention, the European Charter for the Danube basin, and the EU WFD, the DRPC negotiators anticipated they would need to broaden the range of issues they focused on from water protection to sustainable development.

\textsuperscript{105} The UNDP/GEF Danube Regional Project provided resources to support the cooperation of countries not part of the EU accession process.
The EPDRB can also be partially credited with broadening the range of issues from water protection to including elements of the ecosystem, such as wetlands. According to one international participant in the EPDRB

I don’t know that it was right but they started with water quality and then eventually you see now a much bigger focus on wetlands, on an ecosystem approach and GEF demanded that...Now the next big push is to add the land dimension...nonpoint source pollution. Well, if you don’t address agriculture then you’re not really going to tackle that. How do you address that? Well land use practices and I think it really is going to shake things up a little bit because that’s a big nut to crack (Interview Danube 29, 2006).

At the same time pressure to consider a broader range of issues was coming from other European initiatives. The Parliamentary Assembly still considered the DRPC approach too narrow and saw the potential for conflict in the Danube region between development objectives. The 1997 Report on the European Charter for the Danube basin presented to the Council of Europe’s Parliamentary Assembly recognized there was no agreement spanning all of the range of uses of the Danube, despite the two Conventions and other agreements on a wide range of issues, including environmental protection, navigation issues, transfrontier water management, and tourism. The Report states

The Assembly believes that only a comprehensive and integrated approach to the various sectoral policies concerned can ensure harmonious, satisfactory, ecologically acceptable and economically legitimate development of the region.

Consequently, while recognising the validity of these initiatives and the important role they can play with regard to the specific problems addressed, the Assembly believes there is a need to put in place a mechanism which will ensure that all the relevant problems are taken into consideration in a comprehensive and integrated manner, which meets the requirements of sustainable development and which, in turn, fits in with a regional development policy that is consistent both with a pan-European approach and with the specific problems of the region (Council of Europe Parliamentary Assembly, 1997a).
In 2000 the European Commission declared, “There is no common concept of the Danube space (European Commission DG: Regional Policy, 2000).” The Parliamentarians therefore continued their negotiations and developed a Draft of the European Charter of the Danube Basin, which aimed to manage the Danube basin as an integrated whole for spatial planning and sustainable development.

The Committee of Ministers ultimately decided against adopting the European Charter for the Danube Basin. The Committee declared that it was unsure of its role in promoting cooperation in subregions of Europe, expressed concern with possible areas of overlap with existing cooperation, such as ARGE Donauländer, and deferred to the relevant States to take comprehensive action within existing forums for Danube cooperation, such as the Danube Commission created under the 1948 Belgrade Convention, the ICPDR and cooperation at the subbasin level. A cooperation framework for the implementation of all legal instruments applicable to the Danube region might be useful, but it is for the Contracting Parties to the different instruments to create such a framework (Council of Europe Committee of Ministers, 2001).

106 The Parliamentary Assembly called for the Committee of Ministers to reconsider its decision (Council of Europe Parliamentary Assembly, 2000a), and protested that the Committee’s concerns could be addressed. In particular, the Committee on the Environment, Regional Planning and Local Authorities ascribed the Committee of Ministers decision to a misunderstanding of the Charter, stating, “Throughout the preparatory work a paramount concern was to refrain from creating any new instrument capable of even partially overlapping with others given that the initiative had completely different purpose. Despite of frequent alterations of the draft proposals and in the light of reactions by the governments, including some governments of countries in the Danube region, the rapporteur is convinced that the scope of the instrument has not been fully understood and that, while the Charter’s sole purpose of providing a platform for dialogue was plain enough at parliamentary level, it was not equally clear to the governments (Council of Europe Parliamentary Assembly, 2000b).” However, the Committee of Ministers declined to reconsider, reiterating that the Danube States should take action themselves within existing fora for cooperation, such as the ICPDR, either at the basin or subbasin level (Council of Europe Committee of Ministers, 2001).

“The Committee of Ministers would like to draw particular attention to the Convention for the Protection of the Danube River, as the appropriate mechanism for addressing the environmental issues which should be strengthened with the participation of all the Danube states and by developing co-operative action for managing the Danube basin and beyond. The Committee of Ministers supports the activities of the International Commission for the Protection of the Danube River (Council of Europe Committee of Ministers, 2001).”
Europe Committee of Ministers, 1998).” Although unsuccessful as a Charter, cooperation has continued on a more comprehensive regional approach under the Declaration on the Establishment of the Danube Cooperation Process (DCP), launched in 2002.107 The Declaration acknowledges the responsibilities of the Danube Commission and ICPDR and invites them and other regional organizations to be partners, including the International Sava River Basin Commission, ARGE Donauländer, the Steering Committee of Corridor VII, and the Black Sea Economic Cooperation. ("Declaration on the Establishment of the Danube Cooperation Process," 2002). Although ultimately unsuccessful, the efforts toward the Ecological Convention and the Draft of the European Charter of the Danube Basin pushed the boundaries of what the appropriate range of issues should be for cooperation, which contributed to the DCP effort.

The EU WFD was another source of pressure on the ICPDR to expand the range of issues for cooperation. For example, the EU WFD more explicitly addresses groundwater and

107 Austria, Romania, the European Commission, and the Stability Pact for South Eastern Europe led the initiative, based on cooperation between the Ministries of Foreign Affairs of the Danube State. Austria, Bosnia i Hercegovina, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Moldova, Romania, Serbia, Slovakia, Slovenia, Ukraine, the European Commission and the Regional Cooperation Council (RCC, the successor organization to the Stability Pact for South Eastern Europe) are full participants. Other countries can participate as guests, such as Macedonia (because it has territory in the basin) and Russia (which is part of the Danube Commission on navigation). The Declaration proposes to organize cooperation toward sustainable development under five fields: the economic dimension, which will include the Pan-European transport Corridors, including the Danube waterway, Corridor VII; the navigation dimension, which will be implemented by the Danube Commission; the environmental dimension, which will be carried out by the ICPDR; the tourism dimension, developing tourism from the source to the delta; the cultural dimension, which will highlight commonalities and differences among Danubian countries’ cultures; and the sub-regional dimension, coordinated by ARGE Donauländer. The Declaration is adamant it will not duplicate existing fora and initiatives for cooperation. Instead, it will add value by organizing a new fora for cooperation, biennial conferences at the level of ministers of foreign affairs ("Declaration on the Establishment of the Danube Cooperation Process," 2002). The objectives are to build on existing cooperation by adding clear political and economic dimensions, establish priorities for action, effectively implement existing cooperation, focusing and harmonizing their objectives where needed, improve regional security, without creating new institutions. Specific working procedures are left up to designated organizations and countries who take the lead on a given the initiative. For example, if updating the 1948 Belgrade Convention is a common goal shared by Danubian countries, implementing this goal is left to the Danube Commission ("Principles and Working Methods of the Danube Cooperation Process," 2002).
adopts an ecological approach. The EU WFD emphasizes all activities impacting the basin environment, including infrastructure and hydromorphological alterations for hydropower generation and navigation which were excluded from the DRPC. As one representative of the ICPDR described, although there was already movement within the ICPDR away from a narrow water protection focus to consider what's happening with the land around it, the EU WFD forced an approach to protect the environment (Interview Danube 33, 2006). For example, the ICPDR established an ad hoc Ecological Expert Group (ECO EG) in 2001 to support activities related to the conservation, restoration and sustainable management of aquatic ecosystems and their dependent terrestrial ecosystems and wetlands (Klindova, 2004).

According to a Hungarian delegate, some saw this shift as an opportunity to provide support to the Hungarian ecological initiative. However, implementing the EU WFD has also required tremendous resources and other delegations resisted using resources for anything other than implementing the DRPC and the EU WFD, which was still oriented more toward water protection than broader issues of ecological protection or sustainable water use. As a result, even initiatives that were compatible with it, such as the Hungarian Ecological Convention, were not able to compete for resources (Interview Danube 12, 2006).

Recent conflicts between environmental protection and navigation show the need for an expanded range of issues for cooperation. As described earlier, the efforts to develop the Danube River as Corridor VII under the framework of the Trans-European Network for
Transport (TEN-T) are coming into conflict with initiatives to restore wetlands in the lower Danube, such as the Lower Danube Green Corridor Initiative. Some countries have pledged to protect wetlands in the same areas where the river channel will need to be altered and regulated to improve shipping (Interview Danube 19, 2006; Lucius, Ereifej, Gruber, & Rast, 2009; WWF, 2010). Typically improving the channel for shipping is detrimental to wetlands. In part due to such conflicting visions about how the river should be used the Danube was included in the 2007 WWF’s list of the World’s Top 10 Rivers at Risk due to risks posed by navigation infrastructure (L. Susskind & Ashcraft, 2010).

For example, in 2004 Ukraine began construction on a shipping canal through the Danube Delta via the Bystroe arm to the Black Sea. This area is part of the Danube Delta Biosphere Reserve, a designated reserve under the UNESCO Man in the Biosphere Reserve, and therefore a recognized area of global ecological importance. The Danube delta on the Black Sea spans the three main branches of the Danube and about 80% of it is located in Romania and 20% in Ukraine (ICPDR, 2004). The Sulina branch is already heavily canalized and serves as the main shipping route between the Danube and the Black Sea. Romania criticized Ukraine for not properly notifying it when Ukraine began constructing the new navigation canal. Such conflicts and the requirements of the EU WFD make it obvious the ICPDR needs to take a different approach to cooperation.

108 The Lower Danube Green Corridor Initiative is a framework for cooperation on floodplain protection and restoration between Bulgaria, Romania, Moldova and Ukraine ("Declaration On the Cooperation for the Creation of a Lower Danube Green Corridor," 2000).
109 The report can be accessed at http://assets.panda.org/downloads/worldstop10riversatriskfinalmarch13.pdf. Although the merit of listing the Danube in this report can be debated, it does signal the need to address unresolved conflicts between different ideas of how the river should be used and developed.
Given the requirements of the EU WFD, a German delegate to the ICPDR said, “...we have to do something...we see that we won’t get very far without navigation. We have to try some way to bring navigation on board (Interview Danube 15, 2006)!”

The ICDPR, Ukraine, Romania, and Moldova convened a conference in 2006 on “Conservation and Sustainable Development of the Danube Delta”\(^\text{110}\). This conference brought the three countries together for the first time to exchange views, develop a collaborative vision for development, and to promote international cooperation. Of note was also the range of stakeholders and the clear presence of the NGO community (Interview Danube 28, 2006). During the conference, the three countries agreed on the need for a common institutional mechanism to support management of the delta, for data exchange, and expressed interest in preparing a sub-basin management plan. Ukraine, which some other countries considered uninterested in the ICPDR’s activities, is now showing more of an interest in participating in ICPDR expert groups (Interview Danube 15, 2006).

Although ICPDR’s participation in the Bystroe dispute is within its mandate of sustainable development, its involvement in issues relating to this project also places it firmly within the DC’s sphere of navigation issues. Meanwhile, the DC’s mandate has also expanded to include some environmental issues resulting from navigation and possible benefits from increased navigation from transporting goods via ship as compared to via truck or rail, such as reduced carbon dioxide emissions, fewer road accidents, noise

\(^{110}\) Information about the Conference is available at http://www.icpdr.org/icpdr-pages/danube_delta_conference.htm
reduction, and less use of space (Rusche, 2009). The mandates of these two Commissions (and Conventions) overlap on issues such as the Bystroe canal and the TEN-T projects for navigation (discussed in Chapter Three), as predicted earlier by the European Parliamentarians.

Cooperation between the two Commission has been hampered by the perceptions each has of the other. In interviews numerous ICPDR participants made comments indicating they consider the DC an obsolete relic with only weak advisory authority. For example, according to one ICPDR representative

"Unfortunately, the Danube Commission is not a functioning institution...it doesn't work and no one has any respect for it because it doesn't work but everybody recognizes that it is the institution that ultimately has to work to make all that happen related to navigation... they need to strengthen themselves as an institution in order to make that non-binding component more binding through force of moral persuasion as opposed to legal push (Interview Danube 33, 2006)."

A 2006 comment from a representative of the DC indicates a similar lack confidence in the ICPDR, "Do you know...the ICPDR is an ecological organization. It is not so important... It exists only 6 or 7 years and who knows maybe in the near future Brussels will say we need another organization only for this (Interview Danube 32, 2006)." Such opinions do not make it easier for the two Commissions to work with one another. Nevertheless, the Commissions have been making progress on developing a mutually acceptable approach to developing navigation on the river.

According to the ICPDR, the EU WFD and the Danube RBM Plan do not preclude future navigation projects, but any projects have to meet the EU WFD environmental objectives to protect and restore the ecology and minimize negative impacts and the management
objectives of the DRBM Plan. “Integrated planning is needed to enable navigation
development and sustainable management of rivers to achieve all required environmental
objectives (Vogel, 2009).” As a representative of the DC stated, improving transport of
goods on the Danube is “...the most environmentally friendly way...for the carriage of
goods (Interview Danube 31, 2006).”111 Using integrated planning from the outset of
project conception, through Strategic Environmental Assessments (SEAs), EIAs, and
developing joint planning objectives for IWT and river/floodplain ecological integrity is
intended to ensure “win-win solutions for both (Vogel, 2009; Zinke, 2009).”

In pursuit of such an approach, the ICPDR, the Danube Commission and the International
Commission for the Protection of the Sava River Basin (which addresses both
environmental protection and navigation)112 initiated an “integrated stakeholder
dialogue”, which brought together both ecologic and navigation interests (ICPDR,
2009d). As one German ICPDR delegate expressed, “I’m not optimistic that we can
overcome the differences which exist. However, it would perhaps be a success just to get
a process going for joint studies or analyses in order to maybe write down a few criteria
(Interview Danube 15, 2006).” This sentiment expresses the feeling that no amount of
discussion is going to find common ground between environmental interests in protecting
the last free flowing parts of the Danube, for example between Straubing and Vilshofen,
and navigation interests in deepening this section to permit bigger ships to pass during

111 Transporting goods via ships can reduce the need for trucks on European highways, reducing pollution,
simplifying transport of hazardous materials, and reducing accidents. This participant thought this priority
of inland waterways was not well known because it was not well advertised and promoted, and because
transport on the Danube was blocked for a while after 1999 (Interview Danube 31, 2006).
112 See later section on Geographical Scope for a description of the Sava Commission.
more of the year. And yet, a consideration of alternative plans could allow for some agreement to be reached (WWF, 2010).

In 2007 the three Commissions released a *Joint Statement on Guiding Principles on the Development of Inland Navigation and Environmental in the Danube River Basin* and have since held follow up meetings (ICPDR, 2007). The Joint Statement provides guidelines for developing navigation on the Danube and its tributaries in an environmentally sustainable way and developing a mechanism for sharing information and monitoring implementation (Komatina, 2010). They are also currently developing a best practice manual on sustainable waterway planning. The manual offers a strategy for implementing the agreed upon guidelines through a consensus building process.

According to in-progress work on the manual, as part of an integrated planning process projects will (1) identify integrated project objectives, which include those for inland water transport, the environment, flood management, fisheries; (2) conduct a stakeholder assessment to identify and integrate relevant stakeholders; (3) carry out an integrated planning process to develop the project and secure win-win results; and (4) conduct comprehensive environmental monitoring throughout the project to allow for an adaptive approach. The process is designed to integrate multiple uses of the river, different kinds of stakeholders, and involve them throughout the process, including in the environmental impact assessment process and in applying for environmental permits for the project. Stakeholder dialogues supported the manual drafting process. These dialogues used concrete examples to try to devise strategies for improving navigation while also
addressing environmental concerns, such as improving connectivity between the river and its floodplain or improving fish passage (Zinke, 2010).

**Implementing Authority**

The ICPDR created a River Basin Management Expert Group, in which all DRPC countries are represented, to develop the River Basin Management Plan (International Water Assessment Centre, 2001). According to a German participant

> It has been a great challenge to meet the ambitious deadlines of the WFD for the Danube states. A river basin management group was needed to work on the River Basin Management Plan and it needed to have a coordinating role within the ICPDR. It needed to become the most important working group, instead of on par with the others, so that it could coordinate work within the expert groups and the elements of the basin plan would be produced in time (Interview Danube 15, 2006).

Today there are six expert groups within the ICPDR: River Basin Management which prepares tasks to implement the EU WFD, Pressures and Measures, Monitoring and Assessment, which manages both the AEWS and TNMN, Flood Protection, Information Management and Geographical Information System, and Public Participation. As the coordinating group, the River Basin Management Group’s function and work took some precedence over the existing working groups.

In conformity with their obligations under the EU WFD, each country contributed official data to the joint Danube Basin Analysis, the “Roof Report” (International Commission for the Protection of the Danube River, 2005). The Roof Report characterizes the situation of the Danube and significant water management issues affecting the river and groundwater, pollution from organic substances, nutrients, hazardous substances, and
hydromorphological changes. The ICPDR tried to harmonize data collection methods, but each country is responsible for the data it provides.

Two Joint Danube Surveys (JDS), in 2001 and 2007, were launched to produce comparable water quality information for the entire Danube. In the most recent JDS three ships traveled down the Danube and its main tributaries. On the boats teams of scientists from the different countries took samples and analyzed them. While such activities help provide data to fulfill the WFD, they also bring people together and instill a sense of pride in their joint activities, similar to the Danube Day activities. As one delegate from Germany attested, “Das schweißt zusammen (Interview Danube 15, 2006)”, the process binds the participants together. The ICPDR compiled the data and published it in the River Basin Management Plan. As a result, comprehensive data on a variety of indicators are available throughout the basin, many of them for the first time. The River Danube Basin Management Plan, now legally binding for EU member states, also includes a program of joint measures with management objectives for each significant water management issue.

113 The ICPDR’s Roof Report identified a number of significant problems for water quality and sustainable use in the Danube. Nutrients emissions from the basin to the Danube and the Black Sea increased between the 1950s and 1990s and caused algal blooms in the Black Sea. Since then, the nutrient loads have decreased from Germany and Austria, due to waste water treatment plants with nutrient removal, and from the lower basin, in response to the dissolution of the Soviet Union, economic collapse in the 1990s, and resulting decrease in fertilizer production and application for agriculture. Other pollutants include persistent organic compounds and metals, such as cadmium and lead. There are extensive hydromorphological alterations in the basin for a variety of purposes, including hydropower, navigation and flood prevention. There are 69 dams along the main stem of the river, which disrupt fish passage and separate floodplains and wetlands from the river. A large portion of the Danube’s historical floodplain have been drained. Proposed morphological alterations to improve conditions for navigation, such as the TEN-T Corridor along the Danube will require additional hydromorphological alterations, including along some of the only free flowing stretches of the Danube in its upper basin (ICPDR, 2004, 2009a; Sommerwerk et al., 2009).
The ICPDR took a stronger role in the Bystroe dispute than it has in the past.\(^{114}\) According to one ICPDR representative, the ICPDR’s involvement was not intended to stop the project, but to make sure the project planners “clarify and discuss the things they need to do if they’re going to have a successful project before they do it (Interview Danube 33, 2006).” The ICPDR’s involvement demonstrated member countries cannot unilaterally develop projects with transboundary impacts without regard to the DRPC. Through its involvement the ICPDR also showed that it can “help facilitate dialogue amongst experts, understanding of what the issues were and to see the issue in a bigger context (Interview Danube 33, 2006).” According to a Slovak ICPDR participant this experience was different from the past, in which people could do things without discussing them with their neighbors. Now, “they are under pressure to do something what is acceptable for their neighbors, for the basic approach propagated by ICPDR and they are pressed to discuss some things...and now there is task force for that and they [Ukraine] promised that now really more detailed discussions...and we start the discussion (Interview Danube 27, 2006).” This suggests that the ICPDR has become more accepted as a relevant actor to help resolve disputes within the basin.

\(^{114}\) In the past the ICPDR has stayed out of what it framed bilateral conflicts, such as the Gabčíkovo-Nagymaros hydropower dam dispute between the Slovak Republic and Hungary, even if such conflicts had the potential to have basin-wide impacts. This dispute involved a 1977 agreement between Hungary and Czechoslovakia for the joint construction and operation of a water project for flood control, navigation, and hydropower generation on the portion of the Danube forming their border. Opposition in Hungary led to the eventual abandonment of its portion of the project at Nagymaros. The Slovak government pursued an alternate variant of the original plan, which involved damming part of the Danube, diverting water to a canal, and reducing the water flowing in the original main stem. In 1993 the case was submitted to the International Court of Justice, which found both countries at fault for pursuing unilateral actions. After the collapse of the Communist regimes, the European Union, through the 1993 Stability Pact, played a large role in facilitating discussions to address the conflict (Pachova & Jansky, 2008).
Participation

The EU WFD represents a new shift to integrating diverse participation into water management. According to a Slovak participant

It is early in the process for integrated management, it is also a question of the countries to respect this competence of the Ministries of Environment. My feeling is that the power of the Ministry of Environment is so weak, compared to the Ministry of Finance. It is a problem for all Europe and the world...to...persuade all of them to be helpful in solution of all the things because they are very complicated and in the end I'm not sure whether all of the countries and all competent bodies understand what is behind WFD and who should be responsible for that. Because it is not the thing of the Ministry of Environment, but it is the task for the whole society, for the whole government...And it is recognized for this time, I suppose, that it is responsibility of Ministry of Environment and you are responsible for that because you are responsible for international issues and also you have the competence and you are responsible, not we. That is the problem (Interview Danube 27, 2006).

This comment shows within countries not all parts of government understand they and their activities need to be part of an integrated approach. As an implementing platform for the EU WFD the ICPDR provides a forum for bringing ministries from the same country together. According to one ICPDR representative, “I don’t say it’s a formal function, but that’s the practical reality, is that we’re doing that and doing it quite well I think because we have done exactly that...They don’t do it on their own, they need this push from outside and our framework provides a mechanism to do that where they feel safe and there’s some legitimacy to it (Interview Danube 33, 2006).”
As part of the EU WFD process the ICPDR has also expanded its cooperation with other basin-wide technical groups in areas where the ICPDR lacks expertise.\textsuperscript{115} For example IAD Observers to the ICPDR have contributed a macrophyte inventory (macrophytes are aquatic plants and are useful as biological indicators of river health) (Janauer, Hale, \& Sweeting, 2003), the first water quality maps of the Danube River and its tributaries based on biological and ecological parameters (Bloesch, 2009; Schmid, 2004) and maps for the WFD Danube Roof Report based on specific indicators (ICPDR, 2004; Teodorovic, 2006).

The ICPDR also relied on IHP Danube to elaborate the basin water balance.\textsuperscript{116} The DRPC included a provision for the Contracting Parties to revise the general water balance of the Danube, using comparable data and a harmonized methodology.\textsuperscript{117} The EU WFD requires the ICPDR to coordinate data and analyses for the Roof Report and 2009 River Basin District Management Plan, for which the ICPDR also needed the water balance. However, the ICPDR lacked the capacity to revise the water balance on its own and,

\textsuperscript{115} Typical data gaps include missing data on certain portions of the river, information on the relationship between habitat changes and species’ needs, scale relationships between the ecological processes in better understood smaller catchments and those in the larger watershed, and difficulties in defining reference conditions in a useful way by classifying the watershed parts according to chemical and ecological status (Boon, 2005).

\textsuperscript{116} Another example of the ICPDR’s use of IHP data is in developing a basin-wide response to flooding, including improved data exchange and a harmonized risk assessment, as well as development of a basin-wide flood warning system and flood action plans for 17 subbasins (ICPDR Flood Protection Expert Group, 2004).

\textsuperscript{117} Article 9 (3) of the DRPC states, “The Contracting Parties shall establish, on the basis of a harmonised methodology, domestic water balances, as well as the general water balance of the Danube River Basin. As an input for this purpose the Contracting Parties to the extent necessary shall provide connecting data which are sufficiently comparable through the application of the harmonised methodology. On the same data base water balances can also be compiled for the main tributaries of the Danube River ("Convention on Cooperation for the Protection and Sustainable Use of the Danube River (Danube River Protection Convention)," 1994).” Chapter 3.13 of the ICPDR’s Joint Action Plan tasks the ICPDR with developing the harmonised methodology and general water balance for the whole Danube and its main tributaries by 2005 (International Commission for the Protection of the Danube River, 2001).
therefore, supported IHP Danube’s work on the water balance.\textsuperscript{118} Some IHP Danube participants were also interested in collaborating with the ICPDR as they hoped the EU WFD would provide an institutional imperative to their own participants for more data sharing (Interview Danube 26, 2006).\textsuperscript{119} Frustrated by the shortcomings of the existing joint data, scientists hoped the updated water balance would be based on (1) improvements in the availability of hydrological data in the basin, including precipitation data and (2) data that were better harmonized (Behr, 1991). During the process IHP Danube participants expressed a variety of concerns over the project, including the time frame from which data were used to create the water balance (Regional Hydrological Cooperation of the Danube Countries in the Framework of IHP/UNESCO, 2004),\textsuperscript{120} how to deal with missing data,\textsuperscript{121} common methods for using Geographic Information Systems

\textsuperscript{118} Financial support came from UNESCO. It was unusual that an IHP Danube follow-up volume receive outside support and was the result of ICPDR’s significant interest in the output (Interview Danube 12, 2006). The 1987 principles state that each country coordinating a volume is responsible for funding the work on it. Typically IHP UNESCO has provided financial assistance for publication.\textsuperscript{119} While IHP UNESCO supports scientific cooperation, participation in IHP projects is voluntary and not based on a legal mandate. This means the countries participating in IHP Danube are not legally obliged to provide data or follow agreed upon procedures or recommendations. This becomes a particular problem during periods of tension between countries.\textsuperscript{120} The data period used to generate the first water balance was 1941-1970. For the revised water balance the countries wanted to use monthly data on precipitation, air temperature, air humidity and runoff collected from 1961-1990. The length of the time period was selected because the World Meteorological Organization recommends using a thirty year period (Interview Danube 26, 2006). However, some thought data should be used from 1951-1980. They considered this a more stable and appropriate period for creating a water balance to be used in on-going climate change studies. Some said since the then current year was already past 2000 and, if the water balance intended to be up-to-date, it made no sense to use such old data. Others said they could only provide data up to 1990. So, the 1961-1990 period was agreed on, with some countries choosing to submit data from 1951-2000 (Interview Danube 26, 2006).\textsuperscript{121} The team wanted to produce maps of precipitation, evapotranspiration and runoff (P. Petrovic & Badurova, 2004). However, not all countries provided maps of the river network within their territory (Interview Danube 26, 2006). Other problems arose because data from some countries were available for only part of the period, part of the river network (as not all sub-basins were fully gauged), or for only some of the parameters, for example some data were lacking on runoff contributions (Pavel Petrovic, 1998). National time series data on precipitation is not homogenous because, for example, gauges are moved to different locations and the kinds of instruments used changes (Behr, 1991). “First you get the map from the network, observation network, and you say ‘Wonderful! Please provide all this data.’ Well, later on it turns out only a few stations are regularly operated and finally you are happy to get even a few time series out of that (Interview Danube 02, 2006).” Such incomplete data series and significant errors in input data are typical (Gutknecht, 1991). Project coordinators were then faced with the question of how to proceed. Out of
and a common approach to providing methodological
details in the final report (Interview Danube 26, 2006).

Despite such difficulties, according to one participant discussing the success of the effort, “A report is available, accessible for all the Danube countries (Interview Danube 02, 2006).” The final maps and a summary of the data are available to be shared, but not the actual data (Interview Danube 26, 2006). The ICPDR, under the DRPC mandate, may be able to help improve sharing of the actual data in the future (Interview Danube 02, 2006).

The problems experienced while revising the water balance demonstrate the differences between the data needs of scientists and policy-makers and the difficulties of meeting both. Policy-makers within the ICDPR needed to meet deadlines imposed by the EU WFD. Given the limited time frame, they needed to settle for the best data they could get at the time and then revise policies as new data became available. The scientists’

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122 The countries agreed to use GIS and a modified WatBal model (used for estimating elements needed for the water balance), which had been developed jointly by the International Institute for Applied Systems Analysis (IIASA) and the University of Colorado. The WatBal model results were then interpreted by a team from the Institute of Hydrology of the Slovak Academy of Sciences (P. Petrovic & Badurova, 2004). Simulated results may be very different from actual conditions and therefore need to be compared when possible to adjust the model (Gutknecht, 1991). However, in some cases the project coordinators lacked data on actual conditions and had to do their best with the data which were available and simulated results. A disagreement over how to address data problems caused some participants to complain the modelers were relying too heavily on data produced by computers, “instead of working with their heads” (Interview Danube 07, 2006). The critics were concerned that although scientists working with the data and models are aware of the data limitations, decision-makers may not be. An overreliance on simulations to “fill in the gaps” might produce inaccurate results, which could then be incorporated into actual decision-making. The availability of the results could also obscure the continued need to update the basin-wide hydrological monitoring network and produce the missing data on a regular basis.

123 Some countries were unhappy with the working group’s approach and submitted their data on their own with explanations of the methods they used (Domokos, 2005; Pavel Petrovic, 2004).

124 Originally IHP Danube agreed to make a CD available with all the data used to make the report, but they ran into legal difficulties. Despite the availability of the report, many countries had given permission for the actual data to be used only to develop the water balance.
reluctance to work with the available data was seen as unrealistic for decision-making.

One policy-maker described scientists as

...Always afraid...they don’t want to publish anything for peer review [and] later...find out the data’s not right. So, it’s understandable that people don’t want to put something out there, that’s only maybe a trend or has a 20% or 40% margin of error. So there’s that...that tension is always there. That’s to say, “Well, we can’t do a strategic plan for the next 10 years because we don’t have the data...The downstream countries’ margin is too lousy. We can’t. We’re comparing apples and oranges you know. So, when they have their monitoring instead of monthly, weekly or daily like we do and we have intercalibration that shows it’s of the same quality then we can talk” (Interview Danube 29, 2006).

For their part, some scientists criticized the actions of the project’s coordinating scientists and final analysis for lacking transparency and quality assurance, for including data for the sake of including them, regardless of quality or joint acceptability. According to the critics, past research often ended up in drawers because there were no agreed upon methodologies, data quality control, little field work and calibration of models, and no sense of specific objectives for producing the data. Once the project was completed and the data produced, nobody maintained the databases, improved or updated them (Interview Danube 13, 2006; Interview Danube 14, 2006). One frustration expressed by these scientists is that once policy-makers receive the report they request, such as the updated water balance, they consider the project complete. Policy-makers may see little incentive to continue to invest in subsequent data improvements. This tendency may be exacerbated when simulated data obscures gaps in the actual data and when other technical problems (like how data should be compared) are not made explicit. The frustration with the lack of science’s influence on water management policy was mirrored by another participant, “This collected set of data is quite valuable because you wouldn’t be able to get it somewhere else, but I think no one is really using that up to now
Despite their frustrations, all of these comments indicate that IHP scientists are, at least informally, considering how to ensure their findings are used by policy-makers.

In order to avoid overlap IHP Danube and IAD are in the process of reorienting their research programs to focus on producing data relevant for integrated river basin management and policy decisions (Bloesch, 2001; Domokos, 2004). According to some IAD participants this shift is similar to humans shifting from gatherers and collectors to hunters and then producers (Bloesch, 2005; Teodorovic, 2005). IAD is moving from "‘gathering and hunting’ to conceptual framework and predictive modeling...from a bit sleepy scientific association to a competent partner in water protection, conservation, restoration projects and even water management within the Danube River Basin (Teodorovic, 2005):3).” According to another IAD participant, this shift focuses on practical management responses and implementation of ecosystem concepts in river basins, which see nature as “basically...unbalanced and balance is the exception (Bloesch, 2005):11).” IAD Observers in the ICPDR expert groups are sometimes able to add or bring in such ideas to the group’s regular work.127

125 IAD maintains its focus on monitoring, but is shifting from collecting data to focus on a continuous process of improving data and methods, for example through joint international research projects focusing on harmonizing individual and national data sampling, analysis and processing, and GIS-mapping. IAD is looking to focus its scientific program on the impacts of change and future pressures on the basin, including flood protection (Humpesch, Schiel, Weilguni, & Dujmic, 2000; Weilguni, 2000), hydropower, wetland conservation, biodiversity (Schiemer, 1999; Tockner & Ward, 1999) and navigation (Teodorovic, 2006). Expanding its traditional emphasis on biology and limnology to floodplain conservation and biodiversity, IAD is now striving to produce studies that will contribute to more sustainable transboundary river basin management and policy decisions (Bloesch, 2005).

126 For example, recently the Biotic Processes expert group is using ICPDR data to model and understand the impacts of water management activities and river works on the Danube ecology and water quality. The Chemistry and Physics expert group is coordinating studies of the impacts of implementing the EU Water Framework Directive and approaches to restoring the flow regime, water quality, and riparian structure.
The ICPDR also provides a forum to bring together what are otherwise separate organizations, such as the IHP and IAD. “All of them have good links to ICPDR. So, they bring all those groups together and this is useful...It’s really very difficult task to coordinate with such a heterogeneous group (Interview Danube 02, 2006).” Smaller organizations, such as IHP may be able to conduct studies more efficiently than the ICPDR, but there needs then to be a link to the ICPDR so the data are considered acceptable, for example through a small steering committee (Interview Danube 02, 2006).”

Geographic Scope

The EU WFD is based on a river basin approach and expands the geographic scope of cooperation. The DRPC covers the territory as shared by its Contracting Parties plus

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The Fishery and Fish Biology expert group studied the management of freshwater fisheries on bordering rivers, joint policy development, and institutional strengthening to improve decision-making on the Danube and Sava Rivers. For information on these projects, please see the individual websites for the IAD expert groups at http://www.iad.gsi/content/research/expert_groups/expert_groups.php.

127 Although its participants are not paid for their time working in ICPDR expert groups, some IAD people are “double function people (Interview Danube 30, 2006)” who would be working within ICPDR working groups anyway, but are also IAD representatives.

128 Even with a desire among some for an all-encompassing common umbrella for international cooperation on hydrology, creating such a structure would be difficult due to the multi-faceted nature of the issue. “Hydrology is a science which is dealing with water and with everything which can be transported by water (Interview Danube 26, 2006).” Instead, there are: (1) the Working Meetings of the Regional Hydrological Co-operation (IHP Danube), which are technical forums, but the chairs of the national committees are not considered “people from practice” (Interview Danube 26, 2006); (2) the Danube Conferences, which bring together participants from across the Danube basin focusing on hydrological forecasting and the hydrological basis of water management, which are considered meetings of technical experts; and (3) other Danube conferences organized by the Academy of Sciences or different ministries to focus on specific areas for cooperation. Some participants think there is a benefit from integrating these different forums under an international commission for hydrology under the framework of the ICPDR, which would enable closer cooperation between IHP UNESCO in Venice and the European Commission. However, creating such a commission raises concerns for others that active and meaningful technical participation would be undermined in pursuit of political integration.
impacted seas. The EU WFD’s Danube River Basin District includes all territory within the basin, plus impacted seas. Some countries with territories within the basin of less than 2000 km$^2$ are EU Members or Candidates, Italy, Macedonia and Poland, and therefore have to fulfill the EU WFD obligations for international river basins. Others, such as Switzerland and Albania have offered their support even though they are not part of the EU. Officially cooperation on implementing the EU WFD, such as obtaining the needed information for the River Basin Management Plan, with these countries is achieved through bilateral agreements. In practice the WFD approach should bring a stronger emphasis on the tributaries and subbasins of the watershed.

The EU WFD is encourages implementation at the sub-basin level where appropriate (Interview Danube 11, 2006). The ICPDR now provides an umbrella for organizing subbasin forums for cooperation in the Sava, Tisza, and Drava River basins, the Danube delta and the Carpathian mountains.$^{129}$ Similar to the EU WFD, some of these agreements extend the interpretation of an integrated approach more broadly than the DRPC.

The Drava originates in Italy and flows through Austria, Slovenia, Hungary and Croatia. Since 2008 the countries have been cooperating toward a common declaration, signed under the ICPDR framework. The “Declaration Concerning Common Approaches to Water Management, Flood Protection, Hydropower Utilization and Nature and Biodiversity Conservation in the Drava River Basin” has ten objectives, including integrated implementation of EU policies on water and nature protection (ICPDR, 2009b).

$^{129}$ See [http://www.carpathianconvention.org](http://www.carpathianconvention.org) for more information on the Carpathian Convention.
The Tisza is the longest tributary and has the largest sub-basin of the Danube. Its basin includes territory from Slovakia, Ukraine, Hungary, Romania, Serbia. During the past 30 years the Tisza has experienced more than 100 major floods (Sommerwerk et al., 2009). In 2000 two tailings ponds within its basin Romania to burst. The ponds released mining waste and pollutants, such as cyanide, heavy metals, and sediment, into tributaries and eventually to the Danube. In 2004 the five countries signed a Memorandum of Understanding (Towards a River Basin Management Plan for the Tisza River Supporting Sustainable Development of the Region) and created the Tisza Group to coordinate actions. With support from the ICPDR the Tisza riparians are now cooperating to develop a river basin plan and integrate water resources management, in pursuit of sustainable development in the region ("Ministerial Statement Towards the Development and Implementation of a River Basin Management Plan for the Tisza River Basin Supporting the Sustainable Development of the Region (Adopted in Vienna on 16 February)," 2010).

Subbasin cooperation has also developed on the Sava River after the dissolution of Yugoslavia. The Sava basin is the tributary that discharges the most water into the Danube. It is shared by Slovenia, Croatia, Bosnia and Herzegovina, Serbia. In 2002 the Framework Agreement on the Sava River Basin and the Protocol on the Navigation Regime were negotiated and signed together. Together they address navigation, environmental protection and sustainable water use and economic development. The International Sava River Basin Commission was established in 2005 to implement the Framework Agreement on the Sava River Basin and is located in Zagreb, Croatia. The
objectives of the commission are to establish an international navigation regime, establish sustainable water management, and reduce the negative impacts of floods, ice, draught and accidents. It therefore explicitly seeks to integrate navigational (including defining activities related to the freedom of navigation) and non-navigational uses, including hydropower, water supply, irrigation, recreation and tourism, into water and ecosystem protection (Bogdanovic, 2005; International Sava Basin River Commission, 2008b). The ICPDR supports the Sava Commission’s activities to implement the EU WFD, including developing a river basin management plan (ICPDR and UNDP/GEF, 2006). While the decisions of the Sava Commission on water management are recommendations, similar to those of the ICPDR, its decisions on navigation are binding for all Parties (International Sava Basin River Commission, 2008a). In this way its authority on navigation goes beyond that of the Danube Commission on navigation, and is more similar to the Central Commission for Navigation on the Rhine. According to a Croatian participant, as a basin organization, the Sava Commission has enabled countries without bilateral agreements on transboundary waters, such as Croatia and Serbia, to maintain good communication even through difficult periods of flooding (Interview Danube 06, 2006). These subbasin forums provide new opportunities for considering issues specific to these areas.

The institutional arrangements across the three stages of development of the Danube water protection regime are summarized below in Table 1.
<table>
<thead>
<tr>
<th>Institutional Arrangements</th>
<th>DWPR\textsubscript{IA}</th>
<th>DWPR\textsubscript{IB}</th>
<th>DWPR\textsubscript{IC}</th>
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</thead>
<tbody>
<tr>
<td><strong>Geographic scope</strong></td>
<td>The main river and tributaries (through bilateral agreement), in practice the main stem of the river</td>
<td>The river basin as far as it is shared by the Contracting Parties plus impacted areas of receiving seas</td>
<td>The Danube River Basin district: The basin as shared by Contracting Parties and EU members, bilateral agreements extend scope to the entire basin in practice, plus impacted areas of receiving seas</td>
</tr>
<tr>
<td><strong>Range of activities or issues addressed</strong></td>
<td>Water quality: Pollution from hazardous and radioactive substances</td>
<td>Sustainable and equitable water management, including surface and ground waters, in practice mainly focused on water quality</td>
<td>EU WFD implementation activities: Integrated water protection; Development of a joint basin management plan; Harmonization of methodologies and approaches for conducting the analysis</td>
</tr>
<tr>
<td></td>
<td>Water quantity: Flood warning, water balance</td>
<td>Monitoring of transboundary impacts: Pollution, flooding, ice hazards, reduction of pollution loads to the Black Sea</td>
<td>DRPC activities: Sustainable and equitable water management, including surface and ground waters, in practice mainly focused on water quality</td>
</tr>
<tr>
<td></td>
<td>Environmental conservation</td>
<td>Monitoring network</td>
<td>Monitoring of transboundary impacts: Pollution, flooding, ice hazards, reduction of pollution loads to the Black Sea</td>
</tr>
<tr>
<td></td>
<td>Data exchange</td>
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</tbody>
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<thead>
<tr>
<th>Participation</th>
<th>None established, Regular meetings of ministers, delegations, and working groups</th>
<th>Legislative: Elaborate proposals and recommendations to Contracting Parties (CPs)</th>
<th>Administrative: Implement EU WFD; Coordinate and regulate uniform data exchange</th>
<th>Judicial: Provide a framework for consultations on activities likely to cause transboundary impacts, can provide</th>
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<tr>
<td>8 major Danube basin states (considered to have major territories in the basin): Austria, Bulgaria, Czechoslovakia, Germany, Hungary, Romania, the Soviet Union and Yugoslavia</td>
<td>14 major Danube basin states (countries with territories greater than 2000 km² in the basin) and the European Community: Austria, Bosnia i Herzegovina, Bulgaria, Croatia, the Czech Republic, Germany, Hungary, Moldova, Montenegro, Romania, Serbia, Slovakia, Slovenia and Ukraine</td>
<td>Observers include non-governmental organizations, intergovernmental organizations, and industry groups</td>
<td>Legislative: Elaborate proposals and recommendations to CPs Administrative: Implement EU WFD; Coordinate and regulate uniform data exchange; Provide umbrella for subbasin cooperation Judicial: Provide a framework for consultations on activities likely to cause transboundary impacts, can provide</td>
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So far this chapter tells the story of how cooperation on water protection evolved in the Danube. This chapter has also highlighted how some efforts to consolidate an agreement on water protection made it more difficult to deal with later changes, such as the separation between water protection and navigation. However, despite such obstacles, cooperation under the water protection regime has slowly adapted to the changes. Despite its relatively narrow focus, over time cooperation under the DRPC has expanded to accommodate many contemporary changes. The geographic scope of cooperation expanded from focusing on the main stem of the Danube to its whole catchment, adjacent impact areas, and subbasins. The early issues for international cooperation on water protection, navigation and limnology, grew to include hydrology, water quality protection, and later sustainable development, with a broader consideration of the environment of the basin and its relationship to other uses of the river. As new issue areas were identified for coordinated action, new agreements were reached, such as the Danube River Protection Convention for water protection, and new networks and organizations formed, such as ARGE Donauländer for regional development and IAWD for drinking water and water supply. Although the scope of issues for international cooperation on water protection was defined as distinct from the scope of issues for international cooperation on navigation, these have expanded over time, creating some areas of overlapping competency. Participation in institutional arrangements has expanded from...
states and national research institutes to include different levels of government, non-governmental organizations, industry, and international organizations and financial institutions. The implementing authority has strengthened from a non-binding declaration to a binding agreement with an organization charged with implementing the EU WFD. The decisions of the Sava Commission on navigation are binding on Contracting Parties. The next section will highlight the adaptive strategies used within the Danube water protection regime to avoid the usual obstacles posed by institutional arrangements to adapting to future changes.

Discussion

The early stages of the Danube water protection regime took an adaptive approach to conflict and uncertainty. The open-ended and non-binding cooperation begun under the Bucharest Declaration did not constrain cooperation in a particular direction. This left open the possibility for expanding the cooperation as new information became available. Although the Bucharest negotiators could not have envisioned the new possibilities for cooperation that would sweep in with the fall of the Iron Curtain, they did expect the Declaration to be only the first step in international cooperation on protecting the Danube. They expected the institutional arrangements they created with the Declaration to be provisional, pending more negotiations.

The countries agreed to disagree and created working groups on issues, including those on which there was no consensus. These working groups were forums for regular
meetings among experts to consider practical questions of how to implement integrated water management practice. The Bucharest Declaration also created a uniform monitoring system to produce data in which all participants would have confidence, which would detect changes in the system and could be used to develop water management policies. As described earlier, the countries agreed on developing an environmental monitoring network to evaluate water quality and detect hazardous substances, provide warning for floods, and provide information for calculating a water balance. Although the countries adopted an integrated basin approach in the Declaration, in practice cooperation was limited to the main stem. Although the environmental monitoring process suffered from some of the data collection and analysis problems as the previous IAD and IHP experiences, it did constitute the very beginning of a joint fact finding process. The participants in the working groups, which were open to all major Danube basin states, were able to design the system and respond to changes as they arose, conveying information when appropriate to the meetings of delegation leaders and ministers for higher-level direction.

An additional source of flexibility was the emphasis within the working groups on achieving practical results, in the form of a monitoring system or policy results. As what was considered feasible could change over time, so might the focus of the working groups change. This approach led to practical success in implementation of a uniform monitoring network for hazardous substances and floods. Even the problems experienced in the water balance group illustrate some of the strengths of the working groups. Controversy within this group focused on how the results should be translated into new
policies for managing water quantity, and less on the actual data the countries were producing. This implied the technical experts had some level of comfort with the data they had available and some level of comfort with engaging in questions about policy implications. It was also important to have an opportunity to explore what was feasible, even if no immediate consensus about policy implications was reached. As discussed earlier, the issue of the water balance would, in fact, reappear later in the context of fulfilling obligations under the EU WFD.

The participants also engaged in multiple forums for cooperation, which allowed them to pursue cooperation on a variety of different institutional arrangements even when there was no consensus about how to proceed. They pursued parallel initiatives which addressed different issues, included different countries, provided opportunities for non-governmental stakeholders to participate and increased opportunities for financial support. For example, although the participants agreed on the principle of integrated water resources management, they differed on what that meant in practice for the range of issues their cooperation should address. This led to the Austrian-led water protection convention, more narrowly focused on water protection in line with the UNECE Helsinki Convention, and the Hungarian-led ecological convention. The Environmental Programme for the Danube River Basin also approached the cooperation more broadly than the DRPC, including wetlands and more of a watershed approach. The European Parliamentarians took an even broader approach to defining the range of issues for integrated water resources management and planning. Even though the participants did not all agree on the wisdom of each of these initiatives, they nevertheless created forums
for discussing the initiatives. The participants therefore avoided arguing over how to define the range of issues for cooperation in any single initiative, which could have stalled cooperation. Instead, cooperation proceeded in different directions at the same time.

The forums could also include a broader range of stakeholders than would have been able to participate in any one forum. For example, the negotiations on ecological protection included Turkey as a littoral state of the Black Sea. The DRPC included only countries with considerable territories within the Danube basin. The Parliamentarians included subnational governments and even some from outside the Danube basin were welcome to participate.\textsuperscript{131} The EPDRB provided an opportunity for unofficials to participate, people not part of official national delegations.\textsuperscript{132}

Even though work on an ecological convention and a Danube charter eventually ended, cooperation within these forums provided diverse opportunities for exploring ideas. There was some cross-pollination as negotiators of the DRPC included some issues proposed within other initiatives, such as wetlands. The different forums also provided opportunities for policy-makers to consider ideas that pushed contemporary boundaries of international law. As one Czech delegate to the ICPDR recognized in hindsight, "I think it is a pity that the convention on nature protection was not developed, signed and

\textsuperscript{131} Including subnational governments was a deliberate attempt to counter what was the Parliamentarians saw as a centralized approach of the negotiations on the conventions. They thought a more decentralized approach, as defined by including subnational participants and creating forums for sub-basin cooperation, would be more effective in implementing cooperation.

\textsuperscript{132} Over time, experiences within the EPDRB and its subsequent UNDP/GEF Danube Regional Programme built an appreciation among official delegates for the contributions of unofficials and lead to a process for actively interacting with them under the DRPC.
implemented. Now we would have better knowledge for Water Framework Directive implementation (Questionnaire Danube 01, 2006).” At a most basic level the parallel negotiations made the participants under the DRPC aware of international currents, which would later restructure their cooperation.

In the second stage of the water protection regime, after negotiation of the Danube River Protection Convention, some adaptive approaches from the earlier stage were continued. Cooperation continued to proceed in multiple forums. Financing from the Environmental Programme for the Danube River Basin allowed the participants to expand their monitoring system, which required pushing some scientists to compare and analyze data even when what they had to work with was not perfect. For example, as one EPDRB participant described work on the monitoring network

I think the other success story, and not just because I was involved from the start, is the monitoring network. And I think, well when it was first created, the countries were totally nervous about the fact that there were 30 parameters, but they could only measure 3, or 10, or something like that. And they said well, we can’t do anything until we can measure more and we said, “No! Send what you can, and you’ll start a process.” And gradually, it’s got to a point where most of the countries provide data, and I think even Bosnia is providing their own information. They’re all sharing it on an open basis, you can see it in here [the Danube River Basin District Management Plan], for what it’s worth in terms of reading, but it shows a huge amount of trust and cooperation (Interview Danube 28, 2006).

The EPDRB pushed countries and their scientists to implement a harmonized process of data collection and sharing, even though they did not yet have the capacity to fully implement what they had agreed on. By starting “early but imperfectly (Jansky, 2001)” they could later evaluate their progress and revise it based on new experiences and practical results. Only by doing so were they able to eventually produce the joint data
required for the Danube River Basin District Management Plan. Such adaptive efforts to focus on implementation were characteristic of the second stage.

Participation in the working groups is open to a variety of stakeholders who are ICPDR observers, not only government delegates. These stakeholders can bring new knowledge and perspectives to the cooperation, and questions. For example, professionals are active in their own fields and bring the cutting edge of scientific knowledge into a discussion, which can otherwise be dominated by routine. According to one IHP participant, “Environmental policy makers don’t keep up to date with the development of science or the problems of environmental management (Interview Danube 13, 2006).” According to another IHP participant, scientists do and can therefore provide expertise in evaluating the quality of data and analysis, as well as recommendations for improvement (Interview Danube 12, 2006). According to an IAD representative, scientists in working groups can contribute new ideas, a different perspective of nature conservation and planning to the ICPDR’s work. This includes a new concepts of river basins, which see nature as “basically...unbalanced and balance is the exception (Bloesch, 2005):11.” These scientists are therefore critical to improving joint fact finding, the dialogue within the ICPDR, within their external professional organizations, and with the public, on the environmental tradeoffs of different policy options (Interview Danube 30, 2006).

While such participation encourages an adaptive approach to uncertainty, it is not always welcome and sometimes makes it difficult to revisit existing agreements on a joint methodology or monitoring approach, even if they could be improved. Once participants
become comfortable with their agreed upon procedures, they may be reluctant to change their approach and risk returning to a state of uncertainty about their procedures. Renegotiating the initial agreement can require significant time, energy and funding, and may therefore not always be seen as an efficient use of limited resources. However, in order for environmental monitoring to reflect current concerns and scientific capabilities, participants need to push the boundaries ahead of what is considered feasible or desirable. According to one IAD participant such contributions sometimes make more work for the ICPDR.

...in a way this is not wanted in [the] ICPDR, because it is quite difficult to get all standards, to get agreements. So they are scientifically, they are maybe, they are ten years, they have the state of '95 or methods of '95. So, there are now quite good methods for general microbiology. These we could of course use. But within ICPDR, if you want to propose [a] new method, there is quite some resistance...As a scientist you bring in new things, sometimes you make work more difficult (Interview Danube 30, 2006).

A more adaptive approach to uncertainty has the potential to create conflict. As a result, it is important the cooperation also adopts an adaptive approach to managing conflict, instead of trying to ignore it or minimize it.

In some ways cooperation during the second stage did take an adaptive approach to conflict, in others it did not. There were opportunities for different kinds of stakeholders to participate. The DRPC negotiators aimed for unanimous consent on all elements of the agreement, which meant they had to take into consideration each others’ interests. By focusing on the principle of reciprocal obligations they negotiated a geographical scope which included impacted areas outside of the watershed. In a more conventional approach to conflict, the DRPC focused on a narrow range of issues and excluded
existing agreements. As a result, major uses of the river, which could conflict with water protection in the future, were outside of the DRPC’s mandate. The DRPC did empower the ICPDR to make continuous adjustments to the agreement without the need for subsequent approval. The Danube framework agreement only defined the general area of cooperation, but left many areas of policy-making and standard setting to the ICPDR. Kittinger described this feature of the ICPDR, “It is up to the International Commission to develop this framework further by setting priorities and taking up actual issues as required by joint cooperation in practice (Kittinger, 1997):45-46).” For example, technical appendices for setting specific water quality standards can be added to the DRPC that do not require the full ratification procedure. This gave the participants the flexibility to accommodate emerging standards, new information, or new issues for cooperation. According to one delegate to the ICPDR, “Our capabilities and our power and abilities to do things is much greater because we are able to react and change and do things (Interview Danube 33, 2006).” This was important because the DRPC negotiators knew whatever institutional arrangements they agreed on would eventually have to adjust to comply with the EU Water Framework Directive. This approach made it easier for the ICPDR to restructure itself (in a way that could not have been foreseen when the DPRC was first signed) so it could assist the Contracting Parties in implementing the EU WFD.

The institutional arrangements of the third stage of the water protection regime take a more adaptive approach. The geographic scope of cooperation is broader and more focused on the entire watershed, allowing scientists and policy-makers to better understand the whole system. The continued broad participation in working groups
includes participation from non-governmental groups who see the system as dynamic, with balance an exception. The EU WFD provides a timetable for implementation and meeting river management objectives. In order to implement the EU WFD the ICPDR participants therefore have several deadlines to meet, ensuring an adaptive approach to addressing uncertainty through ongoing monitoring and review.

The participants have also expanded the range of issues they address. In response to the EU WFD mandate to address all basin activities impacting the environment, as well as other EU initiatives, such as TEN-T, cooperation now addresses existing areas of cooperation and a broader range of issues. The ICPDR and DC now cooperate on some navigation issues in accordance with a best practice manual for sustainable waterway planning. The manual includes a list of guidelines for possible projects and then in individual cases or projects, the parties look and see what is possible (Interview Danube 15, 2006). This kind of approach is intended to prevent pitting one environmental policy against another environmental policy. According to an IAD participant the new joint ICPDR and DC process provides an opportunity for to discuss different uses, which was not previously possible.

It’s one environmental policy against the other environment policy, because then you will argue with, ok, we have a kind of clean transportation policy, environmentally friendly transportation...Shipping is really big issue and it’s important that people make it an issue so it would be made in the best possible way. I think it would be a shame if it would just be built without these kind of discussions... (Interview Danube 30, 2006).

The process outlined in the manual can help participants consider “packages of tradeoffs, how shipping can be improved and environment can be improved...to make sure to get the best environmental improvements possible if degradation is going to happen
(Interview Danube 30, 2006).” By discussing specific tradeoffs to improve shipping and the environment the planning process for navigation projects takes an adaptive approach to conflict. To fulfill the EU WFD the ICPDR can engage in a broader range of issues, encourage data sharing and communication, and help to manage tensions between different uses of the Danube.

Implementation at different scales is another way to manage tensions between different water users and uses. For example, the International Sava River Basin Commission’s mandate integrates water protection, navigation, and other uses of the river basin. It also has decision-making authority on navigation issues. In both of these respects the Sava Commission takes a different and unique approach to defining the scope of cooperation, when compared with either basin-wide authority, the ICPDR or DC. Similarly, cooperation on the Drava and Tisza river basins and Danube delta provide opportunities for the riparian countries to define how they want to implement integrated river basin management within these subbasins. In the ecological scope of some of these subbasin agreements, including the Carpathian Convention (Interview Danube 25, 2006), there are echoes of the Hungarian proposal for an Ecological Convention (Interview Danube 25, 2006). These subbasin forums provide new opportunities to understand the tradeoffs between potential uses and resolve conflicts between interests. Although subbasin priorities could conflict with basin wide priorities, good communication with the ICPDR and DC should be able to manage any tensions. The approaches to conflict and uncertainty of the institutional arrangements of the three stages of the Danube water protection regime are summarized below.
Table 2 Approach to Conflict and Uncertainty of the Institutional Arrangements of the Danube Water Protection Regime

<table>
<thead>
<tr>
<th>DWPR</th>
<th>Adaptive: Created working groups to manage tensions on a broad range of issues, including issues about which there was no consensus</th>
<th>Adaptive: Non-binding form of Declaration, could adjust cooperation later based on expected future negotiations</th>
</tr>
</thead>
<tbody>
<tr>
<td>DWPR</td>
<td>Adaptive: Multiple forums for cooperation, allowed for different ranges of issues, different participants, different geographic scope</td>
<td>Adaptive: Created uniform monitoring system</td>
</tr>
<tr>
<td>DWPR</td>
<td>Adaptive: Participation from broad range of stakeholders</td>
<td>Adaptive: Expanded uniform monitoring system, more parameters, started “early, but imperfectly”</td>
</tr>
<tr>
<td>DWPR</td>
<td>Adaptive: Multiple forums for cooperation, allowed for different ranges of issues, different participants, different geographic scope</td>
<td>Adaptive: Focus on implementation and practical solutions</td>
</tr>
<tr>
<td>DWPR</td>
<td>Adaptive: DRPC unanimous consent on all elements of the agreement</td>
<td>Adaptive: Negotiated geographical scope, generally catchment approach, but included impacted receiving seas so all participants had reciprocal obligations</td>
</tr>
<tr>
<td>DWPR</td>
<td>Conventional: DRPC addressed a narrow range of issues</td>
<td>Adaptive: Gave river basin organization authority to make adjustments and set standards as needed without ratification, including future adjustments based on EU WFD standards</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DWPR&lt;sub&gt;1B&lt;/sub&gt; (cont)</th>
<th>Conventional: DRPC excluded existing agreements</th>
<th>Adaptive: Broader participation in working groups, not only government delegates</th>
</tr>
</thead>
<tbody>
<tr>
<td>DWPR&lt;sub&gt;1C&lt;/sub&gt;</td>
<td>More Adaptive: Broader range of issues</td>
<td>More Adaptive: Broader geographic scope</td>
</tr>
<tr>
<td></td>
<td>Adaptive: Also addresses existing areas of cooperation</td>
<td>Adaptive: Broader participation in working groups, includes non-governmental groups who see system as dynamic</td>
</tr>
<tr>
<td></td>
<td>Adaptive: Some implementation at subbasin scale</td>
<td>Adaptive: EU WFD requires monitoring and evaluation</td>
</tr>
<tr>
<td></td>
<td>Adaptive: ICPDR more involved in dispute resolution</td>
<td></td>
</tr>
</tbody>
</table>

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The Nile River

A Brief Description of the Nile River System

The main characteristic of the Nile basin is its variability (John V. Sutcliffe, 2009:335).

At 6671 kilometers the Nile is traditionally considered the longest river in the world (Nile Basin Initiative, 2010b). The Nile is the only river running almost directly south to north and is the only permanent river to cross the Sahara, the largest desert in the world. The current form of the Nile came into being when a number of independent watersheds became linked into one river system around 10,800 years ago after the last ice age. The two main tributaries of the Nile, the White Nile and the Blue Nile, meet in Khartoum to form the main Nile. The Nile’s watershed is commonly divided into four subbasins: the White Nile and its equatorial lakes, the Blue Nile and Lake Tana, the River Atbara, and the Main Nile (Dumont, 2009a). Alternately, the basin can be described according to five regions, distinct in their history and structure: the great lake plateau of Central Africa, the Sudd and Central Sudan, the Ethiopian Highlands, the cataract tract of the main Nile from Khartoum to Aswan, and the main Nile in Egypt downstream of Aswan to the delta and Mediterranean Sea (Hamza, 2009).

1 There are many different reports of the length of the Nile. Some measurements indicate the Amazon River may be longer (Duffy, 2007).

2 Historically, the Yellow or Desert Nile also contributed water from the Nile-Chad divide, but it has long been inactive (Dumont, 2009a).
The Nile receives water from the territories of ten countries (during at least some part of the year) before reaching the Mediterranean Sea. The table below summarizes some of the information on each countries' contribution to the Nile and its watershed.
<table>
<thead>
<tr>
<th>Country</th>
<th>Area in Nile basin (km²)</th>
<th>% of Total area of basin in the country</th>
<th>% of total area of country in the basin</th>
<th>Country water dependency %</th>
<th>Participation in international river organizations (present and past)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burundi</td>
<td>13,260</td>
<td>0.4</td>
<td>47.6</td>
<td>20</td>
<td>Hydromet Undugu TECCONILE Obs. NBI</td>
</tr>
<tr>
<td>Democratic Republic of Congo</td>
<td>22,143</td>
<td>0.7</td>
<td>0.9</td>
<td>30</td>
<td>Hydromet Undugu TECCONILE NBI</td>
</tr>
<tr>
<td>Egypt</td>
<td>326,751</td>
<td>10.5</td>
<td>32.6</td>
<td>97</td>
<td>Hydromet Undugu TECCONILE NBI</td>
</tr>
<tr>
<td>Eritrea</td>
<td>24,921</td>
<td>0.8</td>
<td>20.5</td>
<td>56</td>
<td>TECCONILE Obs. NBI Observer</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>365,117</td>
<td>11.7</td>
<td>33.2</td>
<td>0</td>
<td>Hydromet Observer TECCONILE Obs. NBI</td>
</tr>
<tr>
<td>Kenya</td>
<td>46,229</td>
<td>1.5</td>
<td>8</td>
<td>33</td>
<td>Hydromet TECCONILE Obs. NBI</td>
</tr>
<tr>
<td>Rwanda</td>
<td>19,876</td>
<td>0.6</td>
<td>75.5</td>
<td>0</td>
<td>Hydromet Undugu TECCONILE NBI</td>
</tr>
<tr>
<td>Sudan</td>
<td>1,978,506</td>
<td>63.6</td>
<td>79</td>
<td>77</td>
<td>Hydromet Undugu TECCONILE NBI</td>
</tr>
</tbody>
</table>

3 This table is based on information found in the following sources: (Food and Agriculture Organization Land and Water Development Division, 1997, 2005; Nicol, 2003; World Resources Institute, 2004).
4 Although this information is included for reference countries with relatively small territories in the basin, such as Burundi and Rwanda can still contribute a significant percentage of water to the river’s total flow.
5 This figure refers to the percentage of the total basin contributed by the country’s territory.
6 This figure refers to the percentage of the total area of the country that lies within the basin.
7 The water dependency ration is a measure of internal renewable water resources, or how much water is generated over the country’s territory through precipitation, compared to the total renewable water resources that originate outside the country. 0% means the country does not receive water from neighboring countries. 100% means that all of its water comes from other countries. Some of the numbers for Nile countries differ among published sources (see (Nicol, 2003)). In order to maintain consistency across the Danube and Nile cases, this research used the data from (World Resources Institute, 2004).
As a result of the Nile system’s significant variation across space, seasons, years and even much longer cycles it is difficult to describe the watershed in terms of averages. The wetness of the upstream areas stands in stark contrast to the arid regions in the north of the Nile’s watershed, which experience virtually no rainfall. Rainfall falls mainly during “rainy seasons”, which differ between the meteorologically independent Blue and White Nile basins. The Lake Victoria basin (part of the White Nile basin) has two rainy seasons, usually occurring from March to May and October or November to December (J. V. Sutcliffe & Lazenby, 1994). The White Nile contributes a significant portion of the Nile’s year-round baseflow to Sudan and Egypt (Lehman, 2009). Despite its smaller watershed and shorter length, the Blue Nile contributes 60-69% of the total discharge of the main Nile, mostly during the single rainy season between May and October (Vijverberg, Sibbing, & Dejen, 2009). Hamad and El-Battahani describe the rainfall in Sudan

The words ‘average’ and ‘annual’ precipitation are the general terms used in literature, but they are misleading in the case of Sudan. Across most of the country the rainy season is limited to less than four months, with the rest of the year being virtually dry. Moreover, rainfall usually arrives in isolated showers

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8 The White Nile also receives water from glacial runoff.
9 Other sources estimate the Blue Nile’s contribution even higher.
that are highly variable in time, location and intensity (Hamad & El-Battahani, 2005).

Annual rainfall across the basin can also vary significantly across years, with persistent periods of wet and dry years (Camberlin, 2009; John V. Sutcliffe, 2009). The Nile’s variability is due to changes in precipitation, evaporation rates and basin vegetation, all of which can also be impacted by human activities in the basin. For example, the mean annual discharge between 1900 and 1959 was 84 km$^3$. The mean annual discharge between 1977 and 1987 was only 72 km$^3$, a fifteen percent decline. In 1916 the mean annual discharge was 120 km$^3$. In 1984 it was only 42 km$^3$ (Hulme, 1994). In addition to precipitation, the Nile riparians, except for Egypt, have significant soil water resources to grow crops and ground water resources.\textsuperscript{10} However, soil and ground water are also unequally distributed within the countries. As a result of temporal and spatial variability in water availability, drought and famine are recurrent concerns. For example Ethiopia experienced drought and famine between 1972 and 1973 and again from 1984 to 1985 (Conway, 2005).

The headwaters of the White Nile are characterized by a mountainous, equatorial climate and the great lake plateau of Central Africa. The Rukarara and Ruvyironza, which drain waters from Rwanda and Burundi, are the most distant tributaries of Lake Victoria and are located in the Kagera River basin. The shores of Lake Victoria (or Victoria Nyanza in Bantu languages) are shared by Kenya, Tanzania, and Uganda. Lake Victoria is the largest of the Nile’s equatorial lakes and the third largest freshwater lake by surface area

\textsuperscript{10} Soil water is water that infiltrates the upper soil layers and is available to support vegetation and crops. Large percentages of the population in many upper riparian countries are completely dependent on rainfall and soil water for subsistence farming (Tesfaye, 2008). However, soil water is usually omitted from measures of water availability, such as water dependency (John Anthony Allan, 2009).
in the world. It is relatively shallow and lake levels are vulnerable to fluctuations in precipitation and evaporation. As a result, Lake Victoria experiences periods of heavy flooding, such as between 1961-1962 when the lake level rose two meters, and periods of low levels, such as between 2001-2004 (Lehman, 2009). When the river leaves Lake Victoria near Jinja in Uganda, it is known either as the Victoria Nile or the White Nile. The outflow from Lake Victoria is regulated by the Owen Falls Dam (also Nalubaale Dam), built in 1956 to generate hydropower. A second hydropower facility, the Kiira power station, was added just downstream in 2002. Separated from Lake Victoria by waterfalls and rapids, the river flows on in a roughly northwest direction through the rift lakes.

The rift lakes\textsuperscript{11} include Lakes Albert, Edward and George. These Lakes contribute a significant quantity of water to the Nile from a series of steep, short rivers and lakes, which drain rain and glacial melt-water from the high Rwenzori mountains (which Ptolemy identified as the Mountains of the Moon and the source of the Nile) and the volcanic Virunga highlands (Eggermont, Van Damme, & Russell, 2009). Leaving Lake Albert, the river, now known as the Albert Nile, passes through a narrow gorge and rapids before entering Sudan. Upon entering Sudan the river flows into the Sudd, seasonally flooding its swamps, and is known as Bahr el Jebel, or river of the mountain. The Sudd was designated a Ramsar Site of international importance in 2006, according to the Ramsar Convention on Wetlands. In the Sudd the river is joined by the Bahr el

\textsuperscript{11} Rift lakes are formed due to movements of the earth in fault areas. Some of the Western Rift Valley Lakes are home to tremendous biodiversity, including Lakes Albert, Edward and George.
Ghazal\textsuperscript{12} and the Sobat.\textsuperscript{13} Both of these tributaries lose significant quantities of water to evapotranspiration, seepage and overbank flows into the Sudd's marshy lands. Nearly half of the water entering the Sudd is similarly “lost”, and as a result, much less water flows out of the Sudd than into it (Said, 1993). The river continues to flow northward across flatlands until it reaches Khartoum, where it is joined by the Blue Nile (Dumont, 2009a).

The origin of the Blue Nile or Abbay in Amharic is Lake Tana, located in the central Ethiopian Highlands in a semi-arid climate. Lake Tana, the third largest lake in the Nile Basin, is a shallow lake with many small islands and high evaporation. Approximately seven large permanent rivers and many short seasonal rivers contribute water to the lake.\textsuperscript{14} Most inflow to the Lake occurs during the main rainy season, between July and August. During the dry season the adjacent wetlands are farmed to produce crops, such as rice. Deforestation around Lake Tana is causing high levels of suspended sediment in the Lake, especially during the rainy season. During the rainy season, the Blue Nile swells to a torrent up to twenty times its flow during dry periods (Andah & Siccardi, 1991). At this time the Blue Nile can alternately be considered a thief, stealing water, soil and property away from Ethiopia for use further downstream (Tafla, 2000), or as a necessary drain, saving parts of the country from drowning.

\textsuperscript{12} The Bahr el Ghazal has the largest watershed of the Nile’s tributaries. It drains water from territory in Sudan, DR Congo and the Central African Republic (Dumont, 2009a). Including the Central African Republic among the Nile riparians would increase their number to eleven. However, perhaps because the Bahr el Ghazal’s contribution is seasonal and minimal (much of its water is “lost” in the Sudd and does not reach the Nile) the Central African Republic is not usually considered part of the Nile watershed.

\textsuperscript{13} The Sobat drains water from Ethiopia and Sudan. Although this means Ethiopia contributes water to the White Nile and could be considered part of the White Nile basin, I have never seen Ethiopia included among the White Nile riparians.

\textsuperscript{14} Four tributaries, Gilgel Abbay, Megech River, Gumara River and Rib River, contribute 95% of the annual inflow (Vijverberg et al., 2009).
Leaving Lake Tana the Blue Nile is very steep. The river flows through a water regulation weir at the mouth of the Lake and a hydropower plant at the Tissisat Falls. The Blue Nile then passes through a deep, 500 km long gorge, which forces the river into a large loop, first south, then west. After entering Sudan, the river flows across an increasingly arid and level plain, which was created over time by the flooding and deposition of sediment from the gorge. Two tributaries flow into the river, the Dinder and Rahad, which also originate in the Ethiopian Highlands. There are reservoirs behind two dams in Sudan, the Sennar (completed in 1925) and the Roseires (completed in 1966), which have affected the water regime (Dumont, 2009a; Vijverberg et al., 2009). The dams provide much of Sudan’s electricity and water from their reservoirs is used to irrigate the Gezira agricultural area.

The Blue Nile and the White Nile meet at the long island named the Mogran or “the elephant’s trunk” at Khartoum. The Atbara is the last tributary to join the Main Nile after the Blue and White Nile meet. It contributes water from the Ethiopian Highlands and Eritrea.\textsuperscript{15} After the confluence with the Atbara, the Nile loses water to evaporation and infiltration on its way north to the Mediterranean Sea.

Between Khartoum and Aswan, Egypt the lava fields of the Bayuda Desert push the Nile’s course into another large loop, flowing south, then west. Along the way six natural cataracts (rapids) impede the river; but two were submerged by Lake Nasser and the

\textsuperscript{15} The Atbara is joined by the Tekeze (or Setit) River and seasonal Gash (or Mareb) River. The Gash River is usually dry. When wet, its waters flow into the Sudanese plain and usually dissipate before reaching the Nile system.
Merowe Dam recently submerged a third. The Aswan High Dam in Egypt created Lake Nasser (Lake Nubia in Sudanese territory), the longest man-made lake in the world. Lake Nasser stores about two years of the Nile’s discharge (Dumont, 2009a; El-Shabrawy, 2009). The Fayum channel, which transported water from very high floods in the past, is located south of Cairo. The channel is maintained to supply water to a large agricultural area threatened by increasing salinity (Dumont, 2009a). North of Cairo is the Nile delta, formed over time from sediments transported from upstream and deposited here. The two main river branches in the delta are the Rosetta and Damietta. Four shallow lakes are located close to the Mediterranean Sea, which are hydrologically connected to both the river and the Sea. The delta, encompassing two thirds of Egypt’s agriculture, is covered with irrigation canals, barrages and pumping stations. Major crops are cotton, vegetables, and grains. The delta is also home to significant oil and gas production, and chemical industries. Agricultural pesticides, raw sewage, and urban and industrial effluents are sources of pollution to the delta (Hamza, 2009).

Along the length of the Nile there is hydropower generation, notably at the Aswan High Dam in Egypt, the Roseires and Sennar Dams in Sudan, the Owen Falls and Kiira Power Stations in Uganda, and the Tis Abbay and Tekeze power stations in Ethiopia. Historically Egypt was susceptible to high and low Nile floods and famine. Today the Aswan High Dam protects Egypt against the Nile’s interannual variability (Dumont,

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16 The Aswan High Dam has now blocked most sediment transport to the delta.
17 Additional power stations are planned or under construction, such as the Merowe Dam in Sudan, the Bujagali Power Station in Uganda, and the Nyabarongo Power Station in Rwanda. The Bujagali Power Station is going forward with private financing even though critics warn that the project is based on the unusually high levels of Lake Victoria over the last thirty years and the project may not be able to cover its costs (Waterbury, 2002).
The Dam transforms the river below Aswan into a completely regulated year-round irrigation system. However, Egypt is still vulnerable to interdecadal variability, or prolonged low or high Nile flows.\(^{18}\) There is tremendous potential to expand hydropower generation in the upstream countries (see for example (Arsano & Tamrat, 2005)). Longer range shipping occurs primarily in Egypt and Sudan, although the entire Nile is used locally for transport when water levels permit. Egypt releases water from the Aswan High Dam to protect navigation during the winter lower flow period (Hefny & Amer, 2005).

The Nile watershed is home to a number of endemic fish species and many birds. Wildlife and bird watching are important tourist industries. Subsistence fisheries are important throughout the basin, and natural fisheries are augmented by fish farms. However, many lakes, such as Lake Victoria, Lake Tana and the Nile Delta lakes are over-fished and suffer from the introduction of invasive species, including the Nile perch and Nile hyacinth.\(^{19}\) In particular, Lake Victoria, whose fishery is heavily export oriented, has shown a dramatic decline in fish biodiversity and is now dominated by introduced species. Bacterial pollution is a problem around population centers on lakes, such as around Lake Victoria and Lake Tana. Other common environmental problems in the basin include deforestation, soil erosion, sedimentation, diseases such as bilharzia,

\(^{18}\) For example, low flows in the 1980s compelled Egypt to consider emergency drought plans to reduce outflow from the dam. High flows in 1999 compelled Egypt to release water via the Toshka overspill to prevent water from flowing over the Aswan High Dam and flooding downstream areas (Conway, 2005).

\(^{19}\) Nile hyacinth, *Eichhornia crassipes*, was introduced as an ornamental plant to the Nile watershed several times, beginning with the end of the 19th century. It blocks irrigation channels, reservoirs and hydropower generators and is a significant problem in Lake Victoria (Dumont, 2009a; Lehman, 2009). The Nile Perch, *Lates niloticus*, was intentionally introduced to Lake Victoria and has decimated many native fish populations. Primarily exported to Europe, the Nile Perch is now being heavily fished, which may allow native fish populations to recover.
malaria, trypanosomiasis (sleeping sickness) and, historically, rinderpest (Abate, 1994; Williams, 2009).

GDP per capita is highest in Egypt and Sudan, followed by Uganda, Kenya and Tanzania, and lowest in the countries furthest upstream (John Anthony Allan, 2009). Many countries have high population growth rates, high unemployment levels, low education levels, significant rural to urban migration leading to an increasingly concentrated population, food insecurity, and high international debt (Abate, 1994). Historic conflict and in some cases current disputes threaten the stability of many of the Nile countries (Tesfaye, 2008).\(^{20}\) As a result, one can question the ability of the Nile countries to effectively implement any Nile agreement for the benefit of all people living within the basin (Yohannes, 2008).

\(^{20}\) A notable development is the reemergence of the East African Community, which unites Burundi, Kenya, Rwanda, Tanzania and Uganda to foster cooperative development, trade and potentially political union in the future.
All that of Nilus is reported includes contradiction (Translation of Diadorus (1st century BC) by (Skelton, 1956):60)).

Since Pharaonic times downstream water projects on the Nile were intended to serve both flood protection and irrigation interests. However, water projects could do little to alter the natural fluctuations of the river’s flow until the beginning of the 20th century. The invention of concrete, earth moving equipment, and steam power and electricity transmission made it possible to build new multipurpose water works, which could reduce the Nile’s variability through storage and diversions. Willcocks, designer of the Aswan Dam, was a major champion of such projects. Garstin developed proposals to develop the entire Nile basin for the benefit of downstream use. Downstream water administrators became concerned upper riparians might develop similar projects and
diminish the downstream water supply. Early basin agreements focused on preventing any such development without downstream consent.

Much has already been written about the evolution of cooperation in the Nile basin by participants in its developments. The review below will focus on the role of uncertainty and change in shaping cooperative management on the Nile. It will identify arrangements that enabled the Nile countries to address these challenges, as well as barriers to doing so. Several institutional arrangements provide opportunities to adjust to change and manage conflict, but have so far not been implemented using an adaptive approach.

The next section will describe the benefit sharing approach, which is the basis for the current Nile cooperative arrangements. The next section will describe the development of cooperation on managing the Nile before the multilateral benefit sharing regime emerged. The final sections describe the emergence of the benefit sharing regime and its approach to uncertainty and conflict.

**Benefit Sharing**

Economists developed the idea of benefit sharing in international river management out of concern over the potential for conflict over transboundary waters among states unwilling to be integrated in any way, including the joint pursuit of integrated river basin management (D. G. LeMarquand, 1977; Phillips, Daoudy, McCaffrey, Öjendal, &

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21 For a review of recent Nile literature up to 2002 please see (Mohamoda, 2003).
Turton, 2006). „Riparians will pursue joint action only when they expect to receive greater benefits through cooperation than through unilateral action (Sadoff, Whittington, & Grey, 2003).” According to the benefit sharing concept, rational actors will cooperate if the benefits of cooperation are greater than the costs of not cooperating, an often cited cost is a water war. Most experts agree that, despite dramatic forecasts of water wars in the near future (see for example (Klare, 2001; Soffer, 1999)), historically international water is more likely to serve as a basis for cooperation and armed conflict is actually quite rare (see for example (Asmal, 2001; Dolatyar, 2000; Wolf, 1998)). However, even unarmed conflict carries significant costs. For example, persistent tensions and disputes between nations are destabilizing and contribute to environmental and development problems, such as pollution and lack of access to water for drinking and sanitation (Zeitoun & Warner, 2006).

Such disputes can prevent countries from realizing the potential benefits of international cooperation: achieving sustainable use of transboundary aquatic ecosystems, averting violent conflict, contributing to economic development, and reducing poverty (Phillips et al., 2006). Sadoff and Grey (2002) categorize four types of benefits countries can share from cooperative management of international water:

- Benefits to the river (environmental): These result from improved ecosystem management and sustainable development practices. Benefits include improved water quality, reduced flooding, and higher fish harvests. Public awareness and a joint environmental analysis can catalyze this type of benefit.

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22 For other arenas in which the benefit sharing approach is used see for example the Conventions on Biological Diversity (CBD). For a list from the CBD of the various definitions in use for benefit-sharing, please see (Ad Hoc Open-Ended Working Group on Access and Benefit-Sharing, 2004).
- Benefits from the river (direct economic): Cooperation can lead to a broader range of uses of the water. Non-consumptive and consumptive uses can be combined to produce greater overall productivity of the system, as well as more equitable distribution of benefits such as hydropower generation and agricultural production. A joint analysis of optimal river development, fora for engaging stakeholders, and identifying win-win investment can catalyze this kind of benefit.

- Reduction of costs because of the river (political): Lack of cooperation imposes both real costs and opportunity costs on riparians, such as missed development opportunities. Benefits include the reduction of tensions and disputes that can lead to these opportunity costs. Communication improvements and political dialogue, including mediated processes, and broad regional or global political initiatives and agreements can catalyze this kind of benefit.

- Benefits beyond the river (indirect economic): Cooperation on international waters can lead to benefits in other sectors. “It is quite possible that the greatest gains associated with cooperation on international rivers will derive from apparently unrelated development that would never have been considered had tensions over shared waters remained between nations (Sadoff & Grey, 2002):401).” For example, cooperation can lead to integration of regional infrastructure, regional trade, and economic growth. A broad analysis of economic barriers and opportunities, fora for civil society and private sector exchange, and broad regional or global economic initiatives and agreements can catalyze these benefits.
The existing legal approach, embodied in the Helsinki Rules, Berlin Rules and the UN Convention on the Law of Non-Navigational Uses of International Watercourses, recommends sharing water based on the principles of limited territorial sovereignty and equitable utilization in which every riparian has a right to use the water and the duty to cause no significant harm to other riparians. Although these principles could be interpreted to negotiate arrangements for sharing rights to specific quantities of water, there is a trend to try to negotiate more flexible arrangements based on benefit sharing. The benefit sharing approach recognizes that the sum and distribution of potential cooperative benefits will vary between river basins and is therefore intended to provide negotiators with flexibility (Sadoff & Grey, 2002) (Sadoff & Grey, 2002).

In order to evaluate all the costs and benefits of a given development scenario, the benefit sharing concept shifts the geographic focus from national benefits to watershed benefits, The Helsinki Rules themselves designate rights “to a reasonable and equitable share in the beneficial uses of the waters (Committee on the Uses of the Waters of International Rivers, 1967):Article IV),” and not to specific quantities. The Berlin Rules emphasized the need for negotiators to resolve the relationship between their obligations in order to share in the benefits of water use (Salman, 2007). The negotiations on the UN Convention on the Law of Non-Navigational Uses of International Watercourses added the objective of providing flexibility to states trying to negotiate a strategy to implement the principle of equitable utilization (McCaffrey, 1996a). According to Sadoff, Whittington, and Grey the Berlin Rules and UN Convention indicate a shift away from sharing international river systems by allocating rights to fixed quantities of water to sharing benefits (Sadoff et al., 2003).

Dombrowsky questions whether negotiations over allocating water rights and over sharing benefits are really alternatives, and concludes they are not. In the case of negative unidirectional externalities, such as pollution, Dombrowsky finds that both the allocation of rights and sharing of benefits need to be negotiated together. In the case of positive unidirectional externalities, such as wastewater treatment, she finds that property rights are not an issue because parties have nothing to gain from reneging on their commitments (Dombrowsky, 2009). However, in many kinds of water developments there are both positive and external externalities. For example, building upstream dams can store water and provide downstream countries with a more predictable flow pattern. Dams also store silt, which can negatively impact downstream soil fertility.
which is an adaptive approach to understanding the whole system.\textsuperscript{25} According to Sadoff, Whittington, and Grey

The system value...is the sum of benefits and costs to all riparians (or users) under a specific configuration of uses or development path. By aggregating the value of water in all of its uses within the river basin, this approach effectively forces an integrated systems management perspective by internalizing the externalities (and opportunity costs) of a given development path or configuration of water uses in a basin (Sadoff et al., 2003):27).

The value of applying the benefit sharing concept to development projects can be seen in the water savings from building a dam where reservoir losses to seepage and evaporation are minimal, instead of within the territorial boundaries of a particular country. Other riparians can participate in building and managing such projects and share in the benefits of stored water or electricity generation. Countries can also work together to reduce their vulnerability to climate variations. For example, countries can promote food security over self-sufficiency by financing irrigation in water rich areas and promoting trade instead of trying to produce all the food they need themselves (Sadoff et al., 2003).

At first adopting a watershed approach may not seem to be in the interests of every riparian. An upstream riparian may see little benefit to sharing water with a downstream country. Still, the opportunities for cooperation can be improved if such countries consider the economic value of using water instead of the quantity of available water. According to Sadoff and Grey, “The underlying interests of many involved, often not recognized, is commonly not the water itself- but rather the benefits and opportunities they hope to obtain from access to that water (i.e. not cubic meters but dollars) (Sadoff &

\textsuperscript{25} The benefit sharing concept is therefore an extension of the international water law principle of a community of co-riparian states, in which the river basin is seen as a unified economic unit and the riparian states are entitled to share the international river and the benefits from its use.

Countries have divergent interests in water as a result of unequal access to and use of water, hydropower generation potential, flood protection, and transportation infrastructure providing access to markets for agricultural and industrial goods. The benefit sharing concept seeks to take advantage of complementary interests, such as upstream interest in generating electricity and downstream interest in a regular water supply. Using the benefit sharing concept agreements can be reached even when water uses seem to be incompatible by expanding the range of issues or using compensation strategies and changing the value of not cooperating relative to the value of cooperating.26

The range of benefits under discussion is critical; the broader it is, the more likely riparians will be to find a mutually acceptable configuration of benefits. In addition to water use-related benefits, issues of mutual interest such as trade, immigration, and environmental protect can be incorporated into international rivers negotiations. Geopolitical relationships, public image, and international support might also influence states engaged in discussions of cooperative management of shared waters (Sadoff et al., 2003:44).

26 Compensation can be (1) monetary, in the form of direct payments, creation of development funds, levying of taxes, or revenue sharing, such as the transfer of part of the revenue from the developer of a hydropower generation project to affected communities; (2) joint ventures; (3) cost sharing for projects; (4) pricing agreements for water or electricity generated from the water, or (5) ‘buying-out’ of water rights. Compensation can also be non-monetary, in the form of transfers of water rights or power-sharing deals. Issues can be linked (1) between different water uses within the same basin; (2) different water uses within different basins; or (3) between water and non-water issues, such as trade or security (Although Klaphake considers these non-water issues, in practice they are often inextricably bound together with water.) (Égré, 2007; Klaphake, 2005; Klaphake & Scheumann, 2006).
For example, the upstream country could be interested in sharing water in exchange for cooperation from the downstream country on border security or a commitment of support on a regional trade proposal. Other examples, such as food security, were already mentioned above. In order to identify options for trading across preferences conflicts need to made explicit.

Sharing benefits does not necessarily mean that all riparians will benefit equally or even in an equitable way from using water. For example a hegemonic state may be able to dictate the terms of an agreement to their own benefit (Phillips et al., 2006; Zeitoun & Warner, 2006). When a riparian perceives the outcome as unfair, they may be unwilling to cooperate even if the potential benefits of cooperation outweigh the costs of not cooperating. “Economic analyses can delineate efficient distributions of water, or the benefits derived from the use of water, but these will not be accepted unless they are perceived as equitable (Sadoff et al., 2003:42).” Therefore, it is important that international water sharing arrangements strive to increase equity in addition to ecological integrity, efficiency and any other criteria the parties agree on (H. H. G. Savenije & van der Zaag, 2000).

However, if such an agreement is reached the ratio of costs and benefits can change over time and the benefit sharing concept does not clearly address how to incorporate such changes into decision-making. For example, the assumptions of the costs and benefits of

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27 See (P. van der Zaag, Seyam, & Savenije, 2002) for some generic criteria that can be used to evaluate how proposed management strategies compare, ex. calculate a share based on territory in basin or population of blue water (available water in rivers and aquifers) and green water (available water in the soil and root zone).
an infrastructure project may turn out to be inaccurate several years after the project is in
operation. During the planning phase the projected costs of large dams are typically
underestimated, while the projected benefits are typically overestimated. Once the project
is in operation these errors can be corrected, but how should the corrections be taken into
account in institutional arrangements? What happens when new technologies emerge,
rendering new projects economically viable and existing projects obsolete. Evolving
norms may also change how some costs, such as the displacement of people or changes to
river morphology, are evaluated.

Although no specific guidance is given for how to address such changes, an ongoing
dialogue among stakeholders can evaluate tradeoffs among alternative water management
options and changes over time. Sadoff and Grey recommend using a cooperative regional
assessment to catalyze the sharing of benefits. Such an assessment includes a
transboundary analysis, which describes the range of benefits available at the basin level,
a distributive analysis, which describes possible ways of allocating benefits and costs,
and an institutional analysis, which describes the possible ways to achieve benefit sharing
so benefits are maximized and costs are considered (Sadoff & Grey, 2005). When there
are few benefits to share or their distribution is likely to be inequitable, third-party
mediation can be helpful (Sadoff et al., 2003). This is an approach to managing conflict,
rather than minimizing it. By managing tensions between different users, different uses,
throughout the watershed, the benefit sharing concept takes an adaptive approach to
conflict. Typically cost-benefit evaluations of large-scale infrastructure developments
rely on more conventional expectations of linear and stable system behavior. An ongoing
dialogue has the potential to address dynamic changes to the social-ecological system, but there is little guidance on how to consider changing cost-benefit evaluations when large investment decisions have established new facts on the ground, such as dams.

The World Bank’s policy on international water bodies strives to implement the benefit sharing concept, for example in the Nile River basin. According to its policy, the World Bank strives to adopt a proactive, facilitative, and flexible role to assist riparian countries in regional planning, including entering into institutional arrangements for use of international water systems. The Bank provides technical, financial and legal assistance. It can also help the riparians establish and strengthen water management institutions, such as river basin organizations.28

In implementing its water resources strategy the Bank has tried to adopt a flexible approach to deal with each case on an individual basis and respect the riparians’ interests (Salman, 2009; The World Bank, 2004).29 Generally, the World Bank will not finance a

28 Current World Bank policy for projects on international water ways is elaborated in OP/BP/GP 7.50 issued in 2001. For a history of the evolution of this policy see (Salman, 2009).
29 The Bank requires notification even for projects likely to have only insignificant impacts on other riparians (as part of the obligation in international law to cooperate and exchange data), a response to notification, and other procedures. Notification should include enough information to enable the other riparian to evaluate whether or not the proposed project will cause it appreciable harm. However, “appreciable harm” itself is not clearly defined.
If a riparian state raises an objection to a proposed project on an international waterbody, the Bank studies the nature of the issues, assesses the objection and reasons for it, assesses the likelihood of the project causing appreciable harm, considers urging the riparians to try to reach a joint solution, and considers seeking assistance from an independent expert. However, the Bank can still finance a proposed project over an objection from another riparian. In other words, riparians do not hold veto power over proposed projects in other countries as long as the Bank does not expect the project to result in appreciable harm. The Bank’s procedures following an objection aim to try to determine whether the project could cause appreciable harm.
This approach is consistent with international law requiring consultation and negotiations, although international recommendations differ in their implementation. For example, the International Institute of International Law’s 1961 Salzburg Resolution requires the riparians to negotiate toward reaching an agreement within a reasonable time. If they cannot reach an agreement the riparians are to submit the
project on an international water body that will cause appreciable harm to another riparian without the riparian’s consent.\textsuperscript{30} If the Bank determines a project may cause appreciable harm, it will only finance the project if the riparians reach a negotiated agreement on the project. This policy applies to both upstream and downstream projects. A water diversion project in an upstream country can negatively impact a downstream country or Bank-financed project. Water development projects in downstream countries also have the potential to harm other riparians by allowing the downstream country to establish new water rights, foreclosing the ability of an upstream country to use the water in the future, even if the country is not currently able to develop the water resource (Salman, 2009). For example, in 1996 Egypt proposed to use water from the Aswan High Dam to expand irrigation in the Toshka (or New Valley) Project, an oasis in the desert west of the Nile. Egypt said the water it needed for the project would come from Lake Nasser out of its existing allocation under the 1959 Nile Waters Agreement. The proposal prompted Ethiopia to send a letter to the United Nations, the Organization for African dispute to arbitration or judicial resolution. The Helsinki Rules add the possibility for the riparians to refer the dispute to a joint agency, which will investigate the most efficient use of the entire watershed. The parties can ask an international organization or expert to mediate. They can also create a joint commission to try to find a cooperative solution. If none of these approaches are successful, the parties can submit their dispute to a tribunal or the International Court of Justice. The UN Convention further adds the possibility of creating a fact finding commission to help resolve the dispute. The critical difference is that, in contrast to the Bank’s proposals, these recommendations address cases that have the potential to harm another riparian (Salman, 2009). \textsuperscript{329}

\textsuperscript{30} One of the World Bank’s objectives is to avoid disputes with countries as a result of the projects it finances, whether they are members of the Bank or not. This follows from the obligation not to cause harm, which the Bank could not overlook even if the affected parties were not members of the Bank. The policy therefore creates an open approach to considering the interests of non-members. This approach also meant that the institutional arrangements would not have to be adjusted depending on a countries’ membership in the Bank, which has grown significantly over the years. The Bank considered using the principle of equitable utilization to guide its policy, but decided the no harm principle fit better with the Bank’s objective of avoiding disputes resulting from the projects it finances and was simpler to implement. The two principles remain linked. For example, a project that would result in an inequitable distribution of costs and benefits could be considered causing appreciable harm (Salman, 2009).
Unity, and the World Bank indicating Ethiopia would not consider Egypt entitled to any acquired rights (Waterbury, 2002). 31

**International Cooperation Before the Nile Benefit Sharing Regime**

Perhaps the weight of history lies too heavy in the silt of the Nile valley, but man will always need water; and in the end this may drive him to drink with his enemies (Collins, 1990:300).

The Nile watershed includes some of the earliest human settlements and greatest ancient civilizations. 32 No single culture was ever disseminated throughout the entire basin (East, 1932), instead many different cultures have flourished within it. The earliest evidence of significant use of the river is Egypt’s development of canals for irrigation of crops around 3400 BC. 33 Historically the Nile flooded in Egypt each summer, raising river levels by about seven meters (twenty-three feet) on average (Dumont, 2009b). Egypt depended on

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31 Ethiopia based its complaint on three grounds. If Egypt had water in excess of its current needs to allocate to such a project, Ethiopia felt some water should go to the other riparians. Egypt did not inform Ethiopia of the projected even though it could serve as a basis for Egypt to assert new rights to water and cause harm to Ethiopian interests for future water development. Ethiopia also felt unilateralism should be condemned, although it has itself recently engaged in unilateral projects on the Tekeze River and other areas (Waterbury, 2002). Ethiopia is engaged in building dams on the Gilgel Gibe, a tributary of the Omo River and Lake Turkana, which it shares with Kenya. Environmental activists blocked funding from international financial institutions for Phase III of the Gilgel Gibe hydropower project. However, Ethiopia has recently secured funding from China to complete the project (Sisay, 2010).

32 Human activity in the basin goes back much further. The earliest evidence of humans in the Nile basin dates to at least 400,000 years ago (Said, 1993). However, the remains of a human-like species have been found in Ethiopia dating to 4.4 million years ago.

33 Management of the Nile and its floods though canals and dikes for irrigation and drainage is one of the earliest forms of known water regulation, dating back even before 3400 BC, and was already an early form of multipurpose water development. The first recorded irrigation activities took place around 3100 BC when the pharaoh Menes dammed part of the Nile, to create a lake (Dumont, 2009b). The organization, construction, and maintenance of such water works necessitated cooperation among people and was likely a primary driver in the organization of political units. Political consolidation increased the success and scale of early water developments. For example, unification of the Nile Valley under the legendary ruler Menes led to reclamation of the left bank of the Nile for irrigation. Menes is likely a fictional character created by combining the achievements of two actual kings, Scorpion and Narmer. Reclamation of the right bank followed the reunification of Egypt in the Twelfth Dynasty (Teclaff, 1967).
the annual flood reaching a sufficient level to irrigate its fields and subsiding in time for crops to grow. However, the actual flood level fluctuated significantly between years. Relatively low summer floods, or “failures” of the flood, resulted in drought and famine in Egypt.\textsuperscript{34} As a result, throughout history Egyptians feared the flow of water to the Nile could be cut off upstream and diverted away from Egypt.\textsuperscript{35} Already around 5000 years ago the Egyptians began measuring the Nile’s ebbs and flows using nilometers, structures such as a column with marked intervals extending down to the river level. Records measuring the level of the river from the Rhoda gauge in Cairo have been maintained since 622 AD (John V. Sutcliffe, 2009; Talling, 2009). The seeming regularity of the Nile’s floods made the mystery of their origins all the more alluring (Evans, 1994).

Although the Egyptians could measure the floods, they had only limited knowledge about their origins. The Nile’s morphology presented a barrier to navigation and trade was difficult between the Nile Valley and Ethiopia or Egypt and sub-Saharan equatorial Africa.\textsuperscript{36} Much of the early information about the different parts of the river came from travelers and collectors, including Herodotus who visited the Nile around 460 BC. Not

\textsuperscript{34} Although these historical failures were most likely caused by lack of rain, some ascribe them to human intervention. For example, Willcocks, designer of the first Aswan Dam, attributed Egypt’s seven year famine in the Bible to the cutting of a dike (Willcocks, 1914).

\textsuperscript{35} There were apocryphal accounts of supposed Ethiopian efforts around the turn of the 12\textsuperscript{th} century to divert the course of the Blue Nile southward (away from Egypt). In the 14\textsuperscript{th}, 15\textsuperscript{th}, and 16\textsuperscript{th} centuries Ethiopian made threats or boasts, accentuating its role as “guardian of the course of the Nile”, in order to exercise pressure on Egypt, in particular over the sultan’s treatment of Coptic Christians (Pankhurst, 2000; van Donzel, 2000). Sudan also threatened to divert the Nile’s water supply away from Egypt as part of a conflict after an assassination attempt on Egyptian President Mubarak’s in 1995 in Addis Ababa. Ethiopia and Egypt accused Sudan of harboring and refusing to extradite the suspects, who were Egyptian nationals (Warburg, 2000).

\textsuperscript{36} During pharaonic times trade between Egypt and the Horn of Africa took place through the Red Sea. Cataracts near Aswan and extending southward prevented ships from passing. The Sudd, the swamps in southern Sudan, and its floating vegetation also prevented both the pharaohs and the Romans from passing further south (Dumont, 2009b). Trading centers helped move goods over and beyond the river’s natural barriers. However, the trading caravans were forced to follow routes that left the Nile Valley entirely at times (Shavit, 2000; Teclaff, 1967).
knowing the actual location of the headwaters of the Nile, Herodotus used the principle of symmetry and known geographical features about the Danube to mistakenly conclude the Nile flowed east to west and its headwaters were located in the Atlas mountains of West Africa (Strassler, 2009):2.33, 2.34).  

Figure 2 Herodotus’ Map of the Danube and Nile Rivercourses (Source: (Myers, 1896):618).

The Danube is indicated by the squiggly line between K and A on the upper half of the map and the Nile by the squiggly line between L and B on the lower half.

Herodotus’ use of symmetry in mapping comes from an Ionian concept of geographic symmetry. He thought the Danube was the Nile’s counterpart in the northern hemisphere. Herodotus knew the Danube flowed west to east and incorrectly thought the Danube’s headwaters were located in the Pyrenees. He then surmised the Nile must flow similarly and its source must be located at the same longitude as that of the Danube. Herodotus thought the symmetry extended to the deltas of the two rivers. However, he knew the Nile had more branches in its delta than the Danube. He therefore surmised that some of the Nile’s branches, must be canals (Hartog, 1988). Herodotus also used the known lower part of the Nile to correct the “empirical orientation” of the lower part of the Danube on maps (Myers, 1896). In so doing, Herodotus designed a course for the Danube that matched his theory of symmetry even though it differed from empirical knowledge. Herodotus’ belief that the source of the Nile lay in West Africa was still evident in the writings of 14th century Arab geographers (Levtzion, 2000).

Herodotus doubted other contemporary geographic concepts, including theories about the source of the Nile. These theories offered as explanations: (1) annual winds preventing the Nile from flowing to the Mediterranean; (2) the Nile flowing out of Ocean, a river flowing around the world; and (3) snowmelt flowing from Libya, through Ethiopia, to Egypt. Instead, Herodotus believed the Libyan sun came closest to the Nile in the winter, drying its winter flows (Strassler, 2009).
By the 3rd AD century Greek accounts mention a connection between the seasonal rains in Ethiopia and the Nile floods (Skelton, 1956). Although Ethiopia and Egypt established religious connections in the 4th century, the first accounts in which the two countries acknowledge their hydrologic interdependence date much later, to the 11th century (Pankhurst, 2000). In Europe fantastic stories told of incredible creatures living in the Nile basin and attributed the Nile’s floods to celestial origin (Arbel, 2000).

Intrigued, explorers made the Nile an object of Renaissance scientific inquiry in the 15th and 16th centuries. In 1613 the Portuguese Jesuit Pedro Paez identified the most distant source of the Blue Nile, the Sakala spring (Moorehead, 1962). In the mid-19th century the race was on to locate the source of the White Nile. Around the same time the hydrology and environment of the river came under systematic study (Said, 1993). The explorers Richard Francis Burton and John Hanning Speke famously disagreed over whether the source of the Nile was Lake Tanganyika, which Burton reached in 1858, or Lake Victoria, which Speke reached in 1862. David Livingstone died while trying to

38 According to portions of Agatharchides' On the Erythraean Sea, copied by Diodorus Siculus, military campaigns in the 3rd century BC, had determined seasonal rains in the Ethiopian Highlands were the source of the Nile floods, although they had not actually reached Lake Tana (Skelton, 1956).

[Agatharchides] sheweth how by the hye montous hyllis of Ethiope, from the solsticiall in somer vnto the equynoctiall in autumpne, ther be contynuel showris of rayne. Thenne is it no wonder though Nilus in wynter be scante of water after the nature of those waters that sprynge wellis engowte (Skelton, 1956):60).

39 Ethiopia converted to Coptic Christianity in the 4th century and, from then on, maintained relations with Coptic centers in Egypt. The Ethiopian abun (patriarch) was selected by the Coptic Church of Egypt. As Egypt depended on water and silt from Ethiopia, Pankhurst remarks, “Egypt was thus dependent on Ethiopia for its material existence, and Ethiopia was dependent on Egypt for its spiritual existence (Pankhurst, 2000):25.” Egypt was the only other African state recognized in pre-nineteenth century Ethiopian traditions (Tafla, 2000).

40 Paez was followed to the source of the Blue Nile by another Portuguese Jesuit, Jerónimo Lobo, and again in the 18th century by the Scot James Bruce. Bruce brought back to Europe detailed accounts of Lake Tana and the Blue Nile’s headwaters, samples of Ethiopian seeds, and copies of manuscripts (Moorehead, 1962).

41 European field collectors, such as the German botanist Georg August Schweinfurth and the zoologist Franz Stuhlman, began collecting samples and studying the taxonomy of the basin (Talling, 2009).

42 Although Burton and Speke traveled together on the same expedition, Burton fell ill and Speke continued exploring without him, reaching Lake Victoria.
resolve the controversy, which ultimately fell to Sir Henry Morton Stanley. Stanley circumnavigated Lake Victoria and identified Ripon Falls at its northern shore as the source of the Nile in 1875 (Stanley, 1969).

Great Britain took control of Egypt in 1882 to protect the Suez Canal, which provided a crucial link to its Indian Empire, and other commercial interests (Collins, 1990). The British wanted to increase agricultural production and restore civil order. In order to do this they needed to learn as much about the river as possible and develop a year-round supply of water (Collins, 2000). Sir William Willcocks constructed the first dam at Aswan, completed in 1902. The dam regulated the flow of the Nile across the year and could therefore provide year-round water to crops (Chesworth, 1994). However, the dam was unable to store water between years and could not protect the water supply from low flows in any given year.

Nile Control and the 1929 Nile Waters Agreement

Sir William Garstin, an engineer charged with securing Egypt’s water supply was the first to promote the idea of managing the entire Nile River system as a single unit. In order to

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43 Work on the Suez Canal was completed in 1869, which dramatically shortened the voyage from Europe to India and China. Beginning in 1863 Egypt’s Khedive Ismail campaigned to secure the sources of the Nile and expand his empire to the Red Sea and southward to the northern shore of Lake Victoria and the Kingdom of Buganda (today southern Uganda) (Al-Atawy, 1996). The British had developed significant commercial interests in Egypt’s new cotton and other markets and watched with concern as the Khedive bankrupted Egypt and became increasingly defiant against European investors. European leaders demanded the Ottoman sultan depose Ismail, which he did (Egypt and Sudan were under suzerain control of the Ottoman Empire). Ismail’s successor, Tawfiq, was unable to pay Egypt’s financial debts and lost control over the country, at which point Colonel Urabi Pasha led a national revolution. In a display of force intended to restore order, the British sent a fleet to Alexandria. However, this led to riots and a threat by Urabi to destroy the Suez Canal. British military forces then took control of Egypt (Collins, 1990).
do so, Britain set out to secure the sources of the Nile, or at a minimum, prevent other European countries from interfering with the flow of water to Egypt and Sudan. Britain established control over much of the White Nile basin, which enabled Garstin to obtain the hydrologic information he needed for his basin studies and develop proposals for river works to realize integrated basin management (Collins, 1990, 2000). For example, regular recording of water levels in Lake Victoria began in 1899 (Lehman, 2009). Garstin published the first comprehensive hydrological study of the upper Nile in 1904. This study included time series rain gauge data, the longest of which were fourteen years of data from Entebbe and Natete, Uganda (Garstin, 1904). In 1921 Sir Murdoch MacDonald published *Nile Control*, which proposed river basin projects throughout the basin to benefit downstream agriculture. The projects included a barrage in upper Egypt, water conservation projects in the Sudd, and storage reservoirs in the equatorial lakes and two dams. One dam at Jabal ‘Auliya would provide consistent water supply to Egypt during the low season from January to June. A second dam at Sennar would divert Nile water to irrigate the Gezira plain in Sudan south of Khartoum. Lake Tana was also intended to

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44 Contemporary wisdom incorrectly ascribed much of the Nile’s flow to the White Nile. In 1898 the British defeated the Mahdists (who controlled the confluence of the White Nile and Blue Nile in Sudan after defeating British led Egyptian forces in 1885 at the Siege of Khartoum) and re-established a colonial system, which lasted until Sudanese independence in 1956. On the Atbara River, Great Britain and Italy signed the 1891 Protocol for the Demarcation of their respective Spheres of Influence in East Africa, from Ras Kasar to the Blue Nile. The Protocol limited Italian advances on the Nile and bound the Italian Government not to construct water works on the Atbara which would limit the flow of water into the Nile. However, Italy failed to gain control over Ethiopia. In 1902 Great Britain signed a treaty with Emperor Menelik of Ethiopia. The Treaty regulated the frontier between Ethiopia and Sudan. The English version also committed Menelik not to build water works across the Nile, Lake Tana, or the Sobat River which would arrest the flow of waters to the Nile without the agreement of Great Britain and Sudan. However, the wording in the English and Amharic versions differs and the Amharic version does not restrict Ethiopia from diverting water. A similar agreement was signed protecting the flow of water to Lake Albert and Sudan between Great Britain and Congo in 1906. Another agreement was signed in 1906 between Great Britain, Italy and France, which secured Great Britain and Egypt’s water flow should the status quo in Ethiopia change. Emperor Menelik rejected this agreement as an attempt to infringe upon Ethiopian sovereignty. Ethiopia similarly protested against the 1925 exchange of notes between Great Britain and Italy, which recognized the water rights of Egypt and Sudan. Yet another agreement in 1934 between Great Britain and Belgium, in control of Burundi and Rwanda, protected the flow of Nile water (Amare, 1997; Endeshaw, 2003; Fahmi, 1967).
provide storage to increase the supply of water to Sudan. Great Britain sought concessions from Ethiopia to build the storage, but failed (Waterbury, 2002).

During the planning of the development projects for integrated basin management, competing ideas emerged about how to share the Nile water between Egypt and Sudan, based either on immediate needs or future irrigation potential. In 1920 the Nile Projects Commission was formed to evaluate the Nile Control projects and the data on which the proposals were based, which Egypt was critical of, and advise how water and costs could be divided between Egypt and Sudan. The two British water experts (from India and the United Kingdom) and one American water expert accepted the Nile’s annual flow as 84 billion cubic meters (km³), but only 52 km³ were considered usable. Most of the rest of the annual discharge was considered part of the peak annual flood, which could not be stored and used (Waterbury, 2002). The British commissioners then sought to regulate water use according to land currently under cultivation in Egypt, 5,400,000 feddans and an arbitrary estimate of land that would be cultivated (primarily for cotton) in the near future at Gezira, which was set at 300,000 feddans. The American commissioner, H.T. Cory, thought this was too rigid and the guidelines needed to consider the prospect of expanding the Gezira irrigation scheme, as well as the development of other water uses by future generations (Collins, 1990). Although Cory was unable to sway the other

45 Feddans are used in Egypt to measure area. One feddan = 4200 m² = 1.038 acres.
46 Cory found support for this principle in the Qur’an. He based his guidelines on Egypt’s contemporary use, Sudan’s proposed use in the Gezira, and proposed dividing the remainder of Nile water equally between them for future use. This would have allocated 23 km³ to Sudan, significantly more than the amount needed to irrigate 300,000 feddans or allocated by the 1929 Agreement (Collins, 1990).
commissioners, who stuck with their approach to limit the area under irrigation, his ideas for flexible arrangements resurfaced later.47

With the issue of how to regulate Nile waters unresolved and relations deteriorating between a newly independent Egypt and Sudan, Lord Allenby, Britain’s High Commissioner for Egypt and the Sudan, proposed creating a technical commission to determine how the Nile should be regulated, and in particular how much land Sudan would be allowed to irrigate, how surplus water from basin development projects would be allocated, and how Sudan’s compliance would be monitored.48 Egypt was strong-armed into agreeing to the formation of the Nile Commission in 1925, which included a Dutch chairman and representatives from Sudan and Egypt. The Commission’s 1926 report became an integral part of the Exchange of Notes Between His Majesty’s Government in the United Kingdom and the Egyptian Government in Regard to the Use of the Waters of the River Nile for Irrigation Purposes, Cairo May 7th, 1929 (1929 Nile Waters Agreement). In its report, the Commission wrote it

...decided to approach its task with the object of devising a practical working arrangement which would respect the needs of established irrigation, while permitting such programme of extension as might be feasible under present conditions and those of the near future, without at the same time compromising in any way the possibilities of the more distant future (Nile Commission, 1926): Paragraph 21).

According to this declaration, the Commission recognized the need for institutional arrangements to protect existing irrigation in Egypt, allow for the expansion of irrigation

47 Cory's formula was later used by the Sudanese to argue for equally dividing additional water created by projects (Collins, 1990).
48 Britain maintained control over some administrative activities in Egypt even after unilaterally declaring Egypt independent in 1922 until Egyptian full independence in 1953. After 1922 Egyptian nationalists unsuccessfully pursued unification of Sudan and Egypt.
in Egypt and Sudan and the projects proposed in MacDonald's *Nile Control* for the benefit of Egyptian agriculture, yet avoid compromising potential and unknown future water uses. The next section will discuss how the new institutional arrangements in the Commission's report and the 1929 Nile Waters Agreement tried to address uncertainty and conflict ("Exchange of Notes Between His Majesty's Government in the United Kingdom and the Egyptian Government in Regard to the Use of the Waters of the River Nile for Irrigation Purposes, Cairo May 7th," 1929; Nile Commission, 1926).

The Commission felt it had to respond to changing agriculture needs in Sudan, but also protect existing and planned agriculture in Egypt. It could not “postpone indefinitely all progress in the Sudan (Nile Commission, 1926):Paragraph 38).” The Commission's report allowed for agricultural development in the Gezira scheme in Sudan, but limited the extent and rate of development. Taking into consideration Egyptian and Sudanese existing and foreseeable water needs, the Agreement allocated fixed water amounts for all of what was considered usable Nile water. This translated into 48 billion m$^3$ per year to Egypt and 4 billion m$^3$ per year to Sudan (Collins, 1990). Much has been written disparaging these quantities as unfairly privileging Egyptian over Sudanese agriculture and for being unresponsive to changes in the river system, including any future upper basin needs. This research is primarily interested in how arrangements respond to change over time and will therefore leave aside (for the moment) the significant question of fairness.
According to its mandate the Commission focused on the projects proposed in MacDonald's *Nile Control*. The Commission did not think it necessary to develop institutional arrangements for regulating water use on potential future projects. For example, it did not consider basin irrigation in Sudan a sufficient water use or one having significant potential value to warrant specific institutional arrangements (Nile Commission, 1926: Paragraph 87). Presumably its opinion would have been the same regarding basin irrigation in the rest of the watershed. However, in the event of the need for future upstream basin irrigation, the Committee thought Egypt should be able to count on the assistance of its upstream neighbors, Sudan and the East African Territories administrated by Great Britain. In the actual Agreement this provision became a requirement for Egyptian consent to any upstream project altering the flow of water.

Save with the previous agreement of the Egyptian Government, no irrigation or power works or measures are to be constructed or taken on the River Nile and its branches, or on the lakes from which it flows, so far as all these are in the Sudan or in countries under British administration, which would, in such a manner as to entail any prejudice to the interests of Egypt, either reduce the quantity of water arriving in Egypt, or modify the date of its arrival, or lower its level ("Exchange of Notes Between His Majesty's Government in the United Kingdom and the Egyptian Government in Regard to the Use of the Waters of the River Nile for Irrigation Purposes, Cairo May 7th," 1929):Article 4b).

In principle this Agreement covers all of the Nile basin under Egyptian, Sudanese and British control. Ethiopia and Belgium, for the territories in the Belgian Congo, Rwanda and Burundi, were not consulted and therefore the Agreement excludes those parts of the basin. This Article assumed the rest of the upstream basin would continue to be administered as a single unit by Great Britain for the benefit of Egyptian water needs. However, the requirement for Egyptian consent to any future consumptive water uses also shows the Commission thought such changes could be possible and was concerned
about their impact on Egypt. Cory, one of the Nile Project Commissioners, warned earlier of the need to consider the development of other water uses by future generations. Although Article 4b does not envision a shift away from using the Nile for anything other than the benefit of downstream agriculture, the Article’s provision can be interpreted as a kind of institutional arrangement designed to address the uncertainty of future water development.

Interestingly, in contrast to the contemporary critique of the rigidity of the water allocations between Egypt and Sudan, the Commission thought designating fixed quantities was the more flexible of the options proposed for regulating Nile water. The alternate proposal from the 1920 Nile Projects Commission would have controlled the volume of water Sudan diverted by limiting the area under irrigation to 300,000 feddans. However, the 1925 Commission thought the area limitation did not make sense unless it also restricted the kinds of crops, the methods permitted to grow them, and made assumptions about how much water each crop needed. The water storage plans already included allowances for uncertainty about reservoir capacity and water losses. The Commission thought the assumptions about crop water needs would introduce another unnecessary restriction on water use and contribute to inefficient use of water, unless volume limits were also created or water “saved” through efficiency improvements could be used for further expansion. If limits were placed on the volume of water Sudan could divert, the Commission thought it unnecessary to regulate the area under irrigation. It therefore decided to allocate water diversions based on volume and season of use. Unlike
the proposal to limit the area of irrigated land at Gezira, the allocations allowed for improvements in water use efficiency, for example through improved growing methods. The Commission recognized the variability in the level of the Nile floods and the potential for the Sudanese water allocation to impact Egyptian agriculture in low flood years. In developing its proposals for water allocations the Commission considered whether to use the mean Nile flood over a specified period (records of floods were available for over 960 years and Garstin and established more extensive regular recording), or to use extreme flows, such as the low floods between 1913 and 1914. Such low flows had been recorded only four times and the Commission decided to use the mean Nile floods in its planning despite the uncertainty that the flood in any given year would reach this mean. The use of the mean flood in the arrangements ignored the variation in actual flows. However, the Commission recognized special arrangements might need to deal with managing water abstractions in low flood years. After considering the issue, the Commission decided

...it would be of doubtful utility to propose special arrangements which would involve elaborate forecasting, would open the door to misunderstanding and friction, and which might never be needed (Nile Commission, 1926):Paragraph 73).

In other words the Commission thought such special arrangements or “complications (Nile Commission, 1926):Paragraph 52),” were more trouble than they were worth

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49 A later analysis of historical fluctuations of the Nile beginning 10,000 years ago came to a similar conclusion. Said’s analysis of the floods recorded on the Roda Nilometer considers 73 percent of floods “normal”, meaning the river’s rise and duration were optimal for Egyptian agriculture. This prompted Said to comment, “The Nile is one of the most predictable rivers of the world. Its flood is seldom sudden or abrupt (Said, 1993):96).” However, as Hurst identified and historical records demonstrate, despite such seeming normality, the Nile is subject to periods of persistent high flows and low flows, as seen in the second half of the 20th century. High flows were also experienced during the last 30 years of the 19th century (Said, 1993).
because of their potential to create conflict.\textsuperscript{50} The Commission’s omission of any arrangements to address variation was an effort to minimize conflict between Egypt and Sudan.

The Commission also recognized that some information, such as the actual impact of proposed works on Egypt’s water supply, could not be known until they were in operation for some time. The Commission recommended maintaining and improving study of the river, gathering information from operation of river development projects, and taking this information into account in future reviews of the institutional arrangements. Although no explicit procedures were elaborated for data sharing, the Agreement did give Egypt the right to monitor Sudanese water diversions and dam operation and access to all facilities needed for studying the Nile. Therefore, presumably Egypt and Sudan would both have access to the data needed to evaluate the development projects. However, the Commission did not specify either how such information would be used or when review should occur, only that all existing irrigation should be respected.

The Commission was also aware that there could be disputes about the facts of the river system and how to interpret the institutional arrangements. However, the Commission considered it outside of its technical mandate to make any special arrangements for addressing such disputes ("Exchange of Notes Between His Majesty's Government in the United Kingdom and the Egyptian Government in Regard to the Use of the Waters of the River Nile for Irrigation Purposes, Cairo May 7th," 1929; Nile Commission, 1926).

\textsuperscript{50} The Commission did consider it simple enough but unnecessary for Sudan to delay the date on which it began abstracting water for Gezira. The Commission was also willing to create a sliding scale for abstraction of what was considered additional water for the purpose of ensuring navigation in Egypt even though this scale might lead to dispute and uncertainty.
In some ways the institutional arrangements were designed to accommodate change. They allowed for expansion of water use in Egypt and Sudan. Egypt’s concern over possible future upstream water use was addressed by a stipulation requiring its consent to any such projects. Fixed quantities were allocated instead of limits to irrigated area to encourage flexibility and efficient water use. The arrangements emphasized continued study of the river and the impacts of development projects. They also recommended reviewing the institutional arrangements in light of any new information. Nevertheless Collins describes the arrangements as “...very practical but short-sighted (Collins, 1990):158).” The arrangements did not have any way to deal with a shift in the purpose of Nile water development away from the objective of furthering downstream agriculture. The arrangements provided no guidelines for how new information should be used in reviewing the water use rules and no specific mechanism for such a review to occur. In general the arrangements tried to minimize the opportunity for conflict and provided little guidance for how to deal with conflict when it arises. All of this would be needed in the future.

New studies of the Nile contributed to improved plans for river basin management. Harold Edwin Hurst produced the first comprehensive water management plan for the Nile in 1946, *The Future Conservation of the Nile* (Hurst, 1944; Hurst, Black, & Simaika, 1946).\(^5\) Hurst used records of Nile flows from 1905 to the mid 1950s to create a data  

\(^5\) For example, research began on the chemistry and limnology of the Nile (Talling, 2009). Around 1930 aerial photos, taken by G.N. Humphreys, became available of the headwaters in the Rwenzori (Eggermont et al., 2009). Hurst expanded the network of hydrological gauges established by Garstin to be able to collect data on the entire Nile basin. Sutcliffe and Park’s analysis of *The Nile Basin* reports shows that in
base for water development planning, develop water budgets and publish descriptions of all the different subbasins in ‘The Nile Basin’ (Howell, 1994; J. V. Sutcliffe & Lazenby, 1994). Based on Hurst’s studies, Britain developed a new plan to improve annual water storage for Egypt’s seasonal irrigation needs. The objectives were to create storage capable of providing a predictable flow from year to year and eliminating risks posed by low flow years, and to develop century storage, a new idea which would enable Egypt to maintain a flow every year equal to the 100 year discharge average. Similar to MacDonald’s previous proposals, century storage would require using the equatorial lakes as reservoirs as part of the Equatorial Nile Project. The Jonglei canal, would transfer water from the lakes through the Sudd and was expected to minimize evaporative losses, increase the Nile yield to Egypt, and reclaim 100,000 hectares of agricultural land in Sudan (Collins, 1990; Dumont, 2009b). All of these plans assumed Egypt’s water dependence on upstream water would remain stable, the level of Lake Victoria would remain similar to what it had been over an approximately fifty year data period, and that most of the White Nile basin would remain under British control and be regulated largely

1933 there were a 100 river gauges in the basin, including in Ethiopia, Uganda and Kenya. The number of gauges increased to as many as 189 in 1962, before declining to 129 in 1977, at which time all riparian states (except Eritrea), were independent (J. V. Sutcliffe & Parks, 1999). After 1945 universities, including Cairo University, the University College of Khartoum, and Makerere College in Kampala, developed as important centers of research on a variety of aquatic subjects, which increasingly encompassed the entire river (Talling, 2009). By the 1950s hydrological services were created in Uganda, Sudan and Ethiopia to measure river levels. However, these services focused on local water development and not integrated development (J. V. Sutcliffe & Parks, 1999).

Garstin was the first to envision a water conservation canal through the Sudd. His design was called “Garstin’s Cut”. The British did not consult the Sudanese as they developed their plans. Sudan was still controlled by the British and initially unable to offer much resistance. Dismayed, the Sudanese government conducted studies to assess the local impacts of the project (Collins, 2000; Talling, 2009). Upon independence (1956) Sudan continued to oppose the British plan and develop its own. Sudan adopted the even more comprehensive 1958 Report on the Nile Valley Plan by Morrice and Allan as its proposal for managing the Nile. This plan included Hurst’s century storage projects, but added additional dams in Sudan and Ethiopia and included the then planned Aswan High Dam in Egypt. A hydroelectric dam in Ethiopia at Lake Tana was intended to produce more power than even the projected output of turbines at the new Aswan High Dam. Egypt opposed Sudan’s Nile Valley Plan and it was never acted upon (Collins, 2000).
for the benefit of Egypt. All assumptions would turn out to be incorrect: construction on the High Aswan Dam began in 1960 provided enough storage to render the upstream development plans obsolete, the level of Lake Victoria started to rise significantly in the early 1960s, and the Nile countries gained their independence, Egypt (full independence 1953), Sudan (1956), Tanganyika (1961), Uganda (1962), and Kenya (1963). A review of two agreements, the Owen Falls Dam Agreement between Egypt and Uganda and the 1959 Nile Waters Agreement between Egypt and Sudan illustrates the dramatic changes in the basin and how concerns about the future shaped water management.

The Owen Falls Dam Agreement

The Owen Falls Dam Agreement was negotiated between 1948 and 1953 by the representatives of Egypt and Britain, on behalf of Uganda (also Kenya and Tanganyika). The Dam was one component of the Equatorial Nile Project, based on Hurst’s basin management concept. Egypt wanted the dam to provide some of the increased storage needed for the century storage plan by raising the levels of Lake Victoria, along with a second dam to do the same for Lake Albert. Uganda was concerned about the extent of flooding, which could prevent oil exploration, but also wanted the Owen Falls Dam to be built (with Egyptian financing), which would provide much needed hydroelectric power. Egypt did not think the Dam would lead to significant problems from flooding. Instead of arguing over the impacts of raising the Lake to different levels, Uganda proposed a contingent agreement (Bazerman & Gillespie, 1999) to address its flooding.

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53 Kenya was also concerned about the impact of flooding at Kisumu from raising the level of Lake Victoria (Collins, 1990).
concern. Uganda would construct the Dam and raise the level of Lake Albert behind the Owen Falls Dam to the minimum storage sought by Egypt, which was the maximum Uganda thought would lead to acceptable flooding impacts. In return, Egypt would pledge to review the impacts of the project with Uganda in twenty years. Based on new data and experience with the actual impacts of the dam over the twenty years, the parties would then consider adjusting the agreed upon level behind the Owen Falls Dam up to a specified maximum. This proposal recognized that neither party could know with certainty the future impacts of the Dam, and took advantage of differences in the parties’ expectations about those impacts. Although generally acceptable to the Egyptian delegation, this plan fell through because the delegation did not have the authority to commit to a formal treaty right away (Collins, 1990).54

Uganda announced it would instead proceed with a small run of the river (no storage) power station to generate 90,000 kW, which would not interfere with Egypt’s water supply. However, Uganda still wanted to secure Egyptian financing for the dam and wanted the dam to generate more electricity than a run of the river station could. Uganda therefore announced it would build the dam high enough to provide the storage Egypt wanted and with the capacity to provide 150,000 kW in the event of future storage, but would install turbines to produce only 90,000 kW which could be operated without storage. This plan would have given Uganda the ability in the future to increase storage behind the Dam and generate more electricity. Under this scenario Egypt would have no control over dam construction or future regulation of releases for downstream supply, which Uganda was presumably well aware Egypt would find unacceptable. In response

54 A complete account of the negotiations can be found in (Collins, 1990).
Egypt agreed to finance the dam and compensate Uganda for flooding impacts and for the loss of power when the dam was storing water for subsequent release for Egyptian objectives. In return, Uganda agreed to operate the dam and storage levels in accordance with the instructions of Egyptian engineer’s stationed there. This arrangement shared benefits by providing Uganda with the higher capacity to generate electricity it wanted and financial compensation. Egypt gained greater capacity to regulate the Nile’s flow over the course of the year for irrigation and an agreement from Uganda to regulate the flows based on Egyptian consent. To cement this latter feature, the Owen Falls Agreement includes a recognition of the 1929 Nile Waters Agreement, which specified that no works should be built in the upper watershed under British control without Egypt’s prior approval (Collins, 1990; "Exchange of Notes Constituting an Agreement Between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of Egypt Regarding the Construction of the Owen Falls Dam, Uganda. Cairo, 16 July 1952 and 5 January 1953," 1953; "Exchange of Notes Constituting an Agreement Between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of Egypt Regarding the Construction of the Owen Falls Dam, Uganda. Cairo, 30 and 31 May," 1949; Howell, 1994).

The countries soon found the arrangement needed to be adjusted. By the end of the Dam’s construction Uganda’s demand for electricity had increased. Power generated by operating the Dam without storage was too variable and unpredictable to meet demand. Uganda therefore sought a temporary constant discharge higher than the storage level originally agreed on. Egypt agreed, with the provision that it be considered temporary.
and not entitle Uganda to an acquired right to this amount of storage. Sudan also agreed as long as Uganda would compensate it for any damage from release of water (Collins, 1990; Howell, 1994). Although the initial agreement called for review and revision after twenty years, when the time came around Uganda, under Idi Amin Dada, paid the provision no attention (Waterbury, 2002).

**The 1959 Nile Waters Agreement**

Egypt, led by Nasser, was developing plans that would render the contemporary basin management plans obsolete. Nasser wanted to secure Egypt's independence and freedom from the caprice of nature and the soon-to-be independent East African Territories. The Aswan High Dam became a symbol of Egyptian independence, prosperity and self-determination (Collins, 1994; Meital, 2000). The High Dam would generate electricity and provide interannual storage, securing Egypt's irrigation from the risk of low flows and high floods in any given year and freeing it from some of its dependence on the upstream countries. It also rendered the Equatorial Nile Project and other coordinated basin development plans obsolete (Collins, 1994). However, the High Dam required resettlement of the populations living in the area soon to be a reservoir and, therefore, Sudanese consent (White, 1988). Sudan was not in favor of the massive project, instead preferring the Nile Valley Plan (see footnote 51 above). Now independent Sudan also

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55 The reservoir created by the Aswan High Dam was expected to submerge land in Sudan and require resettlement of 50,000 Sudanese Nubians, or Halfawis.
wanted to renegotiate the 1929 Agreement as it was negotiated before Sudanese independence.\footnote{Sudan had already ignored the 1929 Agreement by enlarging the Gezira Main Canal (Howell, 1994).}

Needing new arrangements, negotiations began in 1954 on how to realize optimal utilization of the Nile by Egypt and Sudan. After five years of negotiations, during which the military took over governing Sudan, the countries reached the Agreement Between the Republic of Sudan and the United Arab Republic for the Full Utilization of the Nile Waters (1959 Nile Waters Agreement).\footnote{Great Britain, the East African Territories, Ethiopia and the Belgian Congo were not consulted about the final agreement (Howell, 1994).} The 1959 Nile Waters Agreement allocated all of the accepted annual mean discharge to Egypt and Sudan, allowing for evaporative losses. The Aswan High Dam would now be able to store much of the peak annual flood previously considered unusable. Therefore the countries could now allocate 74 km\(^3\) between them (Waterbury, 2002). This translated to 55.5 km\(^3\) per year to Egypt and 18.5 km\(^3\) per year to Sudan, increasing both Egypt and Sudan’s claimed historical rights to Nile water. Sudan was pleased with the significant increase in its allocation. Egypt, as it turned out accurately, expected Sudan would not be able to use all of this water, which would then continue to flow to Egypt (Collins, 1990). The Agreement also established a principle, based on Cory’s proposal to the 1920 Nile Projects Commission, that any increases in average discharge, for example from conservation projects, will be equally shared.\footnote{The Agreement designates “acquired rights” based on the 1929 Agreement of 48 million m\(^3\) to Egypt and 4 million m\(^3\) to Sudan, which each country has the right to withdraw. Any increases in yield is in addition to these acquired rights. After dividing additional water shares from the Sudd el Aali Reservoir, when the river flow remains within a specified average yield, Sudan is expected to receive 18.5 km\(^3\) and Egypt 55.5 km\(^3\) for Egypt. This allocates 74 km\(^3\) of the river’s expected annual yield of 84 km\(^3\), or 88\%, between Egypt and Sudan. Most of the rest is lost to evaporation and infiltration. The PJTC will make}

- Propose and supervise implementation of working arrangements for projects in Egypt, Sudan and upstream countries to increase the Nile yield. Projects planned already in 1959 included the Aswan High Dam in Egypt, Sudd el Aali Reservoir (Lake Nasser), Roseires Dam on the Blue Nile and Jonglei Canal in Sudan;
- Develop fair water sharing arrangements for low flow years;
- Continue collection of hydrologic data by Egyptian and Sudanese engineers in Sudan, Egypt, and Uganda;
- Agree to develop a joint approach in any negotiations with other riparian states concerning Nile waters. If a decision is made to allocate a share of Nile water to any other state, Egypt and Sudan will reduce their shares by equal amounts.

Recommendations for allocating water between Egypt and Sudan in low water years when they cannot withdraw their full rights.

59 The Agreement arranged to pay 15 million Egyptian pounds to Sudan as full compensation for the loss of land and displacement of people as a result of constructing the Sudd el Aali Reservoir. Sudan agreed to relocate all people living in the affected area. This can be considered a kind of benefit sharing arrangement.

60 Although construction on the Jonglei Canal began, it has since been halted due to international and domestic pressure. Internationally, environmentalists called for construction to stop in fora such as the United Nations Environment Programme and the UN Conference on Desertification. Domestically, the Jonglei Canal became a symbol of northern Sudanese aggression against southern Sudan in the Sudanese civil war. Resistance to the canal came to a head in 1984 when the Sudan People’s Liberation Movement destroyed the engineers’ camp and some of their excavating equipment (Collins, 2000). Work on the canal has not resumed and as recently as September 2009 the Government of Southern Sudan stated it had no intention of resuming construction of the canal (Mabior, 2009). Without the Jonglei Canal, earlier development plans for the equatorial lakes to supply water to northern Sudan and Egypt have also come to a halt.

The World Bank provided funding for the Roseires Dam, but conditioned the funds on reaching an agreement with Egypt, providing a significant motivator for Sudan to negotiate. After the United States, Great Britain and World Bank withdrew pledges of support for the Aswan High Dam, Egypt built the Aswan High Dam with Soviet financing. For a full account of these negotiations see (Waterbury, 1979) and (Mason & Asher, 1973).
PJTC will study any projects proposed in other riparian states, develop all implementation and maintenance details, supervise their execution, and monitor water consumption.

According to the Chairman of Egypt's Nile Water Sector the last provision in the 1959 Agreement allows it to accommodate upstream countries' interests and possible future allocations (Metawie, 2004). However, the upstream states saw the 1959 Agreement as a division between Egypt and Sudan of all of the Nile flow, with no acknowledgement of upstream claims to use Nile water. From an Ethiopian perspective,” Britain patched together several agreements, all of which were far from establishing reciprocal rights on entitlement of the Nile water resources (Arsano & Tamrat, 2005):22).” The 1959 Agreement was an extension of the colonial approach to managing water for downstream benefit.

In a sign of the changing upstream water needs, prior to the November signing of the 1959 Agreement, the East African Territories had articulated their water claims in The British Government Note of 11th August 1959.61 Concerned about their future development potential and use of water Uganda, Kenya and Tanganyika had formed the East African Nile Waters Co-ordinating Committee to develop a common policy. Still under British administration, the East African Territories were increasingly sensitive to the limitations posed by the 1929 Nile Waters Agreement on their ability to use water in

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61 Ethiopia was also increasingly concerned by Egypt and Sudan’s bilateral plans for downstream water development. In conjunction with the United States, Ethiopia launched a study of the Blue Nile watershed between 1959 and 1964. As part of the study, about sixty river gauges were established (J. V. Sutcliffe & Parks, 1999). In the resulting Blue Nile Plan Ethiopia proposed four dams, which could store flood water, produce power, and provide a constant flow to the river leaving Ethiopia (Collins, 2000).
the future. The Territories were studying future irrigation projects, but were not yet able to abstract any significant quantities of water. The Committee defined three categories of water for negotiation, the natural river flow without any control works, new water made available through works carried out for Egypt and Sudan, and additional water made available by draining wetlands at the expense of the East African Territories. The Territories claimed a share of the natural flow, a share in benefits from new water projects constructed in their territories, and any additional water. They also claimed a right to renegotiate the water allocations and a right for periodic review. The Territories could roughly project their development plans for twenty-five years into the future and provide economic and technical analyses showing the viability of the plans over this period. They needed these analyses to back up their water use claims in the event of international arbitration, which their advisors already anticipated. In 1958 a new advisor, Morrice, was concerned about the economic analyses used to evaluate their water use proposals as, “...it was quite impossible to say that any particular irrigation scheme would be uneconomic at some future date because conditions constantly changed ((Nile Waters Co-ordinating Committee, 1959) cited in (Howell, 1994)).” Similar to Cory’s approach, Morrice did not want the current negotiations to constrain future negotiations, which he foresaw could take place under very different circumstances. Morrice suggested the East African Territories base their claims on their longer term expectations of the availability of water and land for irrigation. These expectations would require further scientific study, including on hydrology. Ultimately the twenty-five year approach was adopted (The Equatorial Nile Project and the Nile Waters Agreement of 1929: East Africa's Case, 1957; Howell, 1994). Since Great Britain and Egypt did not have direct diplomatic
relations in 1959 the British Government Note was circulated through the Swiss embassy. 62

Great Britain, Egypt and Sudan resumed diplomatic relations in 1961 and began technical and informal negotiations on Nile water issues on the East African water use proposal in the British Government Note, on small, urgent upstream irrigation projects, and Uganda’s request for a temporary constant discharge from the Owen Falls Dam. According to Howell, who led the negotiations for the East African delegation, the downstream countries vaguely admitted the East Africans had a right to some share of Nile water, but then claimed rights from the 1929 Agreement. These rights meant the upstream countries would not receive any share of the natural or new flow resulting from new projects, even those constructed within their territories. Egypt did acknowledge the upstream claims to additional water from draining wetlands, subject to downstream consent if any such projects affected the flow of the Nile. The East African delegates rejected the rights claimed by Egypt under both the 1929 and 1959 Agreements. Part of the reason for rejecting the downstream claims stemmed from the existing independence of Tanganyika and likelihood Uganda and Kenya would soon follow (see Howell 1994 for a detailed description of the negotiations and the reasoning of the East Africans Territories). 63 The negotiations only yielded a commitment to continue discussing the issues. Outside the

62 After the World Bank, the United States, and Great Britain withdrew their financial pledges for the Aswan High Dam Nasser nationalized the Suez Canal in 1956. Israel, Britain and France then invaded Egypt. The military crisis was ended through intervention of the first United Nations peacekeeping mission, which ensured access to the Suez Canal for all ships. During this time there were no diplomatic communications between Great Britain and Egypt. Nevertheless technical discussion continued between Egypt, Sudan and their East African counterparts (Howell, 1994).

63 Independent Tanzania repudiated the 1959 Agreement under the “Nyerere Doctrine”, stating it is not bound by colonial treaties which it had no role in negotiating.
negotiations an agreement was also reached on Uganda’s proposal to apply to the UNDP to finance a hydro-meteorological survey of Lake Victoria (Howell, 1994).

In the next (and what would be the last) round of these negotiations in 1962 the upstream countries sought to reach an agreement that could be revised based on future needs, which the downstream countries were not interested in. The East African delegates also wanted to protect their long-term water interests by preventing the downstream countries from developing additional uses of the water (and thereby laying claim to newly established uses). The downstream countries sought a firm figure from the East Africans for future requirements in order to plan their own water use. They criticized the unproven technical and economic viability of the upstream longer-term proposals for development, as well as the “lack of finality (Howell, 1994)” of the upstream countries’ claims. The economic and technical analyses were developed already by 1957 and expressed in the 1959 British Government Note. Within the ensuing three years significant changes had come about including the 1959 Nile Waters Agreement between Egypt and Sudan, the start of construction of the Aswan High Dam and resulting obsolescence of prior basin development plans and negotiating positions, imminent independence for the East African Territories, the rising power and irrigation needs of the upstream countries (and soon-to-be countries), and the level of Lake Victoria was unexpectedly and dramatically rising. As a result, the earlier economic and technical analyses conducted by the East Africans surely did not reflect the results that would have been reached had the analyses been conducted in 1962. However, such analyses take time, even if a rapid survey is conducted such as the study Uganda undertook to inform the 1959 British Government
Note. Morrice, Uganda’s adviser, considered the 1957 analyses provisional as once better data were available or conditions change “...the electronic computer can easily repeat the calculations with the new figures (Note by H.A. Morrice from 18 August, 1958, cited in (Howell, 1994):94-95).” However, Egypt and Sudan considered such provisional claims an impediment to their own water planning and rejected the approach in favor of “ultimate requirements (cited in (Howell, 1994):102).” No agreement was reached on either the upstream countries’ immediate needs or their longer term twenty-five year needs. Even if a fixed agreement had been reached, neither it nor the 1959 Agreement, would have anticipated the rise of Lake Victoria and increased discharges at Owen Falls, which invalidated most of the calculations on which all comprehensive Nile planning were based (Howell, 1994).

Up to this point institutional arrangements to manage the Nile were limited to bilateral agreements and did not include the entire Nile watershed. Some elements of the 1929 Nile Waters Agreement were intended to be flexible and accommodate change and review. They also tried, unsuccessfully, to stifle conflict. The Agreement was renegotiated in 1959 to take into account expanding Sudanese water use and construction

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64 Uganda was interested in using water for irrigation and developed a negotiating position based on the Equatorial Nile project, which the Aswan High Dam would render obsolete. The Owen Falls Dam Agreement recognized the provision in the 1929 Nile Waters Agreement requiring Egyptian consent for upstream diversions. Uganda considered its consent to constructing additional storage in Lake Albert a significant bargaining chip. Uganda had little interest in raising the level of Lake Albert, but Egypt did as long as it wanted to carry through with its century storage projects in the equatorial lakes. The Lake Albert project would lead to flooding in Uganda and possibly in Sudan, for which Egypt would have to pay compensatory damages ((1957) as cited in (Howell, 1994)). Uganda prepared to ask for compensation for flooding of land that was currently used or could potentially be used, including water needed for irrigation for resettlement. Uganda planned to use the compensation to finance local development, and improvements in communication and transportation. Uganda surveyed the likely extent and value of the negative impacts of raising the level of Lake Albert to different heights and developed a negotiating position based on these. Uganda could not anticipate the construction of the future Aswan High Dam, which would make the entire Equatorial Nile Project unnecessary (Howell, 1994).
of the Aswan High Dam, which rendered obsolete many of the projects planned in 1929. The Agreement did not anticipate the independence of the upstream territories from Britain and did not include provisions for their accession. Even though the 1929 and 1959 included provisions for accommodating upstream consumptive uses, in practice Egypt and Sudan did not agree to the East African proposed consumptive uses because of the economic and technical analyses, which could not accurately assess costs and benefits because of changing conditions (recognized by Morrice in 1958), and because they were not final water use proposals, which they could not be because the upstream countries did not want to preclude their ability to develop other water uses in the future (recognized by Cory in 1921). As a result, in practice the existing institutional arrangements provided little flexibility in how to accommodate changing circumstances (Fahmi, 1967). The Owen Falls Agreement, a bilateral agreement, was more successful in adjusting to changing energy needs and levels of Lake Victoria. However, renegotiation was premised on Uganda not considering the new arrangements an acquired water right. In the mid-1960s a commitment to continue dialogue was the extent of cooperation on the White Nile basin. There was no similar agreement involving Ethiopia.

The question for this research is how do the NBI and cooperative framework negotiations try to facilitate adjustments to change and what features are barriers to change. Recall Morrice’s concern in 1958 over the lack of flexibility in the economic and technical analyses for the East African Territories’ projected twenty-five year development proposals. Morrice thought it would be impossible to evaluate the future benefits and costs of proposed projects over such a time period because no one could know what
future changes might affect such an analysis. In fact, the following twenty-five years brought significant changes to the basin. Although the project proposals were not acted on, if they had, the changes in the basin would have rendered incorrect the analyses of their projected costs and benefits.

For example, construction of the Aswan High Dam and other basin infrastructure projects in Egypt and Sudan allowed these countries to expand irrigation and claim new acquired rights to water use. These projects also reduced downstream reliance on upstream water development projects and completely changed the analysis of the costs and benefits of the century storage plans. The White Nile basin countries became independent and challenged the legitimacy of the 1929 and 1959 Nile Waters Agreement, signed while they were under British administration. War, peace, and political changes swept through most of the Nile countries over the twenty-five year period. As a result national interests, priorities and capacity to implement projects fluctuated, even for implementing already agreed upon such as the Jonglei Canal. The principles of international water law developed further and came to include new concepts, such as integrated river basin management. In a sign of growing upstream cooperation, these principles influenced a new cooperative agreement on the Kagera subbasin and the formation of the Kagera Basin Organization. Finally, the natural river regime itself was subject to extreme low

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65 See footnote 63 above for a discussion of how this affected Uganda’s analysis of its proposed projects.  
66 The Kagera River is the main contributor of water to Lake Victoria. In 1977 Burundi, Rwanda and Tanzania signed the Agreement for the Establishment of the Organization for the Management and the Development of the Kagera River Basin (the Rusumo Treaty). Uganda acceded to the Treaty in 1981. Cooperation toward the Agreement began with discussions between Rwanda and Tanzania about constructing a bridge across the Kagera River at Rusumo and a hydropower project. Burundi is an upstream country and was involved in the negotiations in order to ensure reliable water flows to the project. Uganda, the downstream country, was involved because of potential downstream impacts from the project. The four countries asked UNDP to help plan and finance the project and a basin development plan, including aerial
flows and high flows. Instead of the twenty-five year approach to project planning, Morrice proposed to study the river system and the impacts of project implementation. Morrice thought these studies should inform further implementation of the projects and the development of future proposals (Howell, 1994). Although Morrice’s concerns were not acted on initially, they did build support for a hydro-meteorological survey to try to assess the fluctuations in the water regime of Lake Victoria. These studies catalyzed more extensive development of multilateral cooperation in the Nile basin.

**Early Development of Multilateral Cooperation (1967 – 1999)**

**Hydromet (1967 - 1992)**

In 1961 Uganda, Kenya and Tanzania requested the participation of the United Nations Expanded Programme of Technical Assistance to assist cooperation on a hydrometeorological survey of Lake Victoria’s catchment, including an investigation in photography, tourism, hydropower, fisheries, and institutional arrangements. The final studies were completed in 1976 (Okidi, 1994).

In 1984 the countries created the Organization for the Management and Development of the Kagera River Basin (the Kagera Basin Organization, KBO) as an executive organization to implement agreed upon projects. Headquartered in Kigali, Rwanda, the KBO has the authority to act as a development authority, for example, by entering into contracts, seeking financing for projects and owning property. The cooperative arrangements cover a broad range of issues, water resources development, hydropower, water for mining and drinking, agriculture, livestock, forestry, land reclamation, mineral exploitation, disease and pest control, transport, communication, trade, tourism, wildlife conservation and development, fisheries, industrial development including fertilizer production and peat exploitation, capacity building and environmental protection. The Kagera Basin seeks to support adaptive management and use of an ecosystem approach to managing land resources in the Kagera basin. However, armed conflict, political change, and a lack of financial support have so far prevented the KBO from implementing projects (Metawie, 2004; Okidi, 1994; Waterbury, 2002). See (Phillips et al., 2006) for a review of some possible developments in the Kagera basin.

into the causes of high levels in the early 1960s. The World Metereological Organization (WMO) and the Food and Agriculture Organization (FAO) conducted a preliminary survey and presented the results to the countries, who wished to continue the effort. After securing support from the United Nations Special Fund in 1965, Uganda, Kenya and Tanzania asked Egypt and Sudan (through the PJTC) to join their effort. Egypt was interested in helping upstream countries develop alternatives to Nile water in order to secure its own existing water uses (Waterbury, 2002). In 1967, the Hydrometeorological Survey Project for the catchments of Lakes Victoria, Kioga, and Albert (Hydromet) was initiated. As evidence of the poor relations between the riparians at the time, according to one later participant from Ethiopia, Ethiopia was not invited to participate.

We got hold of that document [the initial project proposal] and said that because Ethiopia is a major stakeholder it should have participated in the projects and therefore without Ethiopia’s participation, that project should not continue... They were a bit furious of course. We also commented on the project documents saying that this document does not represent the interests of the upstream countries (Interview Nile 09, 2004).

A Technical Committee was created to meet regularly and implement the project made up of the heads of the Water Development Departments in Kenya, Tanzania, and Uganda and the Egyptian and Sudanese representatives to the Permanent Joint Technical Committee. The Director General of the East African Meteorological Organisation also participated. Ethiopia joined the Technical Committee as an observer in 1971, and Rwanda and Burundi in 1972, expanding the scope to include their territories in the river basin, including the Kagera basin. In 1974 participation of the Democratic Republic of

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68 The high levels were attributed to extreme rainfall (Conway, 2005). The high lake levels expanded the size of the lakes, causing significant flooding locally and downstream in the Sudd. The Sudd nearly doubled in size, drowning over 120,000 livestock and tens of thousands of livelihoods (Collins, 1994).
Congo (then Zaire) as an observer expanded the scope to Lake Albert’s basin. Regional offices were opened in different riparian countries. WMO acted as the executing agency for the United Nations Development Programme (UNDP), which funded Hydromet (Collins, 1994; Godana, 1985; Metawie, 2004; Nemec & Kite, 1981; J. V. Sutcliffe & Parks, 1999; Tesfaye, 2008).

In the first phase of the project from 1967-1972 Egypt, Kenya, Sudan, Tanzania and Uganda cooperated and collected and analyzed hydrological and meteorological data. The goals of the second phase, begun in 1974, were to investigate strategies to regulate the lakes for the benefit of the riparian countries and to develop a mathematic model of the Upper Nile basin (also including DR Congo). The model, operated on a Kenyan government computer in Nairobi, aimed to help the riparians evaluate alternative water resource development plans and to train staff in the riparian countries to model the water resource system (Nemec & Kite, 1981). An Australian consulting company won the international bidding process to develop the model. WMO recognized the lack of data about the Lake and significant scientific uncertainty. It wanted the model to have the ability change to improve calibration, to incorporate new information about the riparian system, to increase its capabilities and to better fit the facilities and routines of its users. Therefore, it was critical that staff from the riparian countries were trained on the details

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69 Hydromet also aimed to produce data for meeting ecological objectives, in particular: (1) provide information on the water quality of the lakes considering different water use objectives: drinking, industrial, irrigation, stock and wildlife watering, fish and aquatic life, and recreation; (2) provide information about the environmental impacts of water resource development projects on water uses and eutrophication, the ecological balance of the entire ecosystem and disease; and (3) provide information on how to maintain water quality (El-Hinnawi, 1980).

70 The model had three components: a catchment component of precipitation, potential evapotranspiration and runoff to the rivers, lakes and the main Nile; a lake water balance; and a model of how water moves through the channels between the lakes (Nemec & Kite, 1981).
of how the program was constructed in order to be able to make adjustments as needed (Nemec & Kite, 1981). In order to obtain more accurate data on the main sources of uncertainty in the basin (rainfall over the lake and tributary inflow), twenty-five meteorological stations, two hundred rainfall stations, and forty-five gauging stations were created. Integrated methods were agreed on for collecting and processing data, a data center established, and a yearbook published (Godana, 1985; Karyabwite, 2000; J. V. Sutcliffe & Parks, 1999). Nevertheless the model was considered flawed and obsolete not long after its development as some thought the data were suspect (Waterbury, 2002).

Hydromet can be considered the first international institution for the Nile River, which included participation from all watershed riparians and focused on producing knowledge for multiple water use objectives. It created a framework for Nile basin countries to exchange data and scientific expertise. It left behind a network of gauges to measure rainfall, evaporation, lake levels and river flows in Kenya, Uganda, Burundi and Rwanda. However, parts of the hydrological observation network no longer function. For example in Uganda much of the equipment was destroyed during the civil wars of the 1970s and 1980s. Political instability in the southern Sudan limited hydrological observations and there is little published information about the water balance within Ethiopia (Kabanda & Kahangire, 1994; J. V. Sutcliffe & Lazenby, 1994). Political changes also undermined any gains in human capacity building (Waterbury, 2002). Ultimately little progress was

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71 Eritrea was not yet independent when Hydromet was initiated.
72 Ethiopia and the other upstream riparians do not consider basin-wide data sharing harmless, but instead as a reflection of the interests of the downstream countries and in particular Egypt, a dependent client of the World Bank and USAID. Along the same lines, the upstream countries view the international communities' investments in basin wide institutions as evidence of bias in favor of the downstream interests (J.A. Allan, 1994).
made in considering how to evaluate tradeoffs between different development scenarios. According to Howell:

> Even if there were adequate quantitative data...no attempt has been made to weigh in the balance the benefits of conveying much needed water for irrigation downstream against the much less clearly evident advantages and disadvantages of the project to the people of the area. (Howell, 1987 as quoted in (Collins, 1990):301).

Egypt and Sudan unsuccessfully pressed to create a commission for basin-wide water resources planning. The upstream countries resisted the proposal as they anticipated the downstream countries would dominate such a commission, due to their technical expertise, political and military strength (Collins, 1994). The upstream riparians were also concerned about entering into commitments they would later regret (Shapland, 1997). The PJTC went ahead with developing a Master Water Plan in 1981, which included projects in the Sudd and upper Nile basin. However, as Collins comments, “All of these plans are...shrouded in an aura of economic and political fantasy...There was imagination and grandeur in all of these plans and dams but an equal unreality (Collins, 1994):125-126).” Nevertheless, the plans were taken seriously by the PJTC. In 1974 the governments of Egypt and Sudan signed an agreement for a revised proposal for the Jonglei Canal and irrigation. However, opposition from Southern Sudan, the international community, and civil war have prevented the project from going forward (Collins, 1994).74

73 The plans projected water development for a period of twenty-five years, were based on old and incomplete data and studies, dubious financial analyses and included little consultation with and consideration of the quarter of a million potentially affected people. The projects were planned for remote areas ravaged by civil wars, areas with considerable natural obstacles, but no infrastructure.

74 Despite detailed technical and financial arrangements between Egypt and Sudan, the project made little reference to the upper riparians. There was significant public opposition from the Southern Sudanese, especially in Juba. The After the First Sudanese Civil War the Southern Sudanese were distrustful of projects originating in Khartoum, and in particular because this project was developed with no consultation.
UNDUGU (1977 - 1992)

In 1977 Egypt and Sudan asked East African countries to participate in a new commission to promote political, economic, social and cultural cooperation and the integrated development of the natural resources of the whole Nile basin. In 1983 UNDUGU, meaning brotherhood in Swahili, was created.\(^{75}\) Egypt, Sudan, Zaire, Uganda and the Central African Republic participated in the first meeting of mostly Ministers of Foreign Affairs. Tanzania, Rwanda, and Burundi joined these participants in the 1990 Ministerial Council Meeting. Ethiopia and Kenya did not participate because UNDUGU did not address water utilization among all riparians (Arsano & Tamrat, 2005). The Economic Commission for Africa (ECA) provided secretariat services. Egypt submitted a proposal for UNDP to conduct technical and economic analyses of existing regional projects and other future cooperation among UNDUGU’s members. As a result of a preliminary visit by two experts, UNDP devised a proposal for creating a comprehensive twenty-five year infrastructure plan, including developing transportation (road, rail, river, air), energy, water resources, communications and commercial exchange (Ahmed, 1994; United Nations Economic Commission for Africa, 2000). Although UNDUGU envisioned expanding the range of issues it focused on to include issues non-participants

7 A resolution from the 16th Organization of African Unity (OAU) Summit in 1979 in Monrovia focused on self-reliance and African inter-dependence. It encouraged the creation of regional and sub-regional economic groups and UNDUGU was one such unofficial grouping (Ahmed, 1994).
found important (Ahmed, 1994), in the sixty-six meetings between 1977 and 1992
UNDUGU achieved few results in advancing development projects (Collins, 2000;
Tefsaye, 2008).


The Nile ministers responsible for water issues first met in 1992 in Kampala, Uganda at a
meeting co-sponsored by Egypt, Hydromet and UNEP. In 1993 an Agreement was signed
by Egypt, Rwanda, Sudan, Tanzania, Uganda, and Zaire establishing the Technical
Cooperation Committee for Promotion of Development and Environmental Protection of
the Nile basin (TECCONILE), which was intended as a transitional three year
organization replacing Hydromet.76 Burundi, Kenya, Eritrea, and Ethiopia participated as
observers.77 A Council of Ministers (COM) was created of the Ministers from responsible
for water affairs in the Nile states, along with a Technical Committee (TC) of experts
from each country, which was a successor to Hydromet’s Technical Committee and
would function as a steering committee, and a Secretariat based in Entebbe, Uganda.
TECCONILE’s long-term objectives included “promoting the development,
conservation, and use of the Nile Basin water resources in an integrated and sustainable
manner, through basin-wide co-operation for the benefit of all (UNEP/UNDP/Dutch Joint

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76 This transitional period was later extended to 1998.
77 At the same time bilateral agreements with general reference to the Nile cooperation supported the
process. Sudan entered into an agreement with Ethiopia in 1991, the Declaration of Peace and Friendship,
committing the two countries to the principles of equitable utilization for using the Nile waters. Egypt and
Ethiopia signed the Framework for General Cooperation in 1993, in which they agreed the details of Nile
use should be worked out by technical experts on the basis of the rules and principles of international law
(Endeshaw, 2003). Nevertheless, tensions continued to run high with reports that Egypt temporarily
blocked a loan from the African Development Bank for a water development project in Ethiopia (Cowell,
1990; Swain, 1997).
Project on Environmental Law and Institutions in Africa. East African Sub-regional Project, 1999):65). In the short-term this would be accomplished by developing national water master plans, infrastructure and capacity building.

The national water master plans were integrated into a Nile River Basin Action Plan (NRBAP), approved in 1995, with 22 technical assistance and capacity building projects, for a total cost of $140 million to be financed by donor countries (Metawie, 2004; J. I. Uitto & Duda, 2002; Yohannes, 2008). Egypt emphasized projects in which the riparians could make better use of their existing resources, without affecting the flow of the Nile. For example, one suggestion was to develop a long-term process for national, not international measures, which would require no consensus on how to share water use and leave the 1959 Agreement intact (Waterbury, 2002). Several upstream countries continued to be skeptical that TECCONILE would do anything more than reinforce Egypt’s approach to protecting its existing uses. In contrast, Ethiopia preferred to first develop a framework for cooperation with water use rules before developing an action plan (Waterbury, 2002).

In an effort to reassure the upstream countries, TECCONILE adopted equitable sharing of Nile waters as one of its objectives in 1995 (Collins, 2000; Yohannes, 2008). In 1995 Nile-COM asked the World Bank to help the countries finance and implement the

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78 A Canadian company, Hydrosult, produced the NRBAP in consultation with TECCONILE (Hydrosult). According to one participant, most of these projects were already proposed under TECCONILE (Interview Nile 09, 2004).
NRBAP. The Bank’s role would be to assist in facilitating discussions, and in studying and planning the most effective ways of sharing benefits from using the international river. In 1997 the World Bank, along with UNDP and the Canadian International Development Agency (CIDA), agreed to facilitate dialogue among the Nile countries and organize a long-term forum with donors, the International Consortium for Cooperation on the Nile (ICCON) to finance basin-wide cooperative projects. CIDA also supported the annual “Nile 2002 Conferences”. The first Conference in 1993 was held in Aswan, Egypt, and provided an opportunity for experts and national delegates to discuss technical papers and challenges facing the riparians. The early discussions provided input for the NRBAP. However, overall these meetings were loosely structured dialogues (Brunnée & Toope, 2009). The Conferences were also a forum for exchange between national delegates and donors to mobilize financial and technical support for basin-wide cooperation.

According to a Kenyan negotiator, in pursuing the benefit sharing approach the Nile negotiators participants first tried to address non-controversial issues. These include improving environmental management, agreeing on the need for a common arrangement, power trade, increased regional trade, and poverty reduction (Interview Nile 14, 2007). These are expressed in the five components of the NRBAP (UNEP/UNDP/Dutch Joint

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79 The World Bank had been involved in Nile issues for a long time. The Aswan High Dam project was one of its early forays into development on an international river, although the Bank eventually had to pull out of the project (Mason & Asher, 1973).
80 The Nile Basin Trust Fund is administered by the World Bank for the purpose of using financing from ICCON for projects.
81 Cooperation under the framework of the Nile 2002 conferences continues under the Nile Basin Development Forum (NBDF).
Project on Environmental Law and Institutions in Africa. East African Sub-regional Project, 1999):\textsuperscript{82}

a. Integrated water resources planning and management: focusing on efficient water use and development, improving water quality, and environmental protection. Projects included assessing existing water availability and demand, national water development and management plans, assessing the impact of climate change, updating the water balance of Lake Victoria, and managing wetlands.

b. Capacity building: focusing on strengthening basin-wide and national institutional and human resources. Projects included developing a Nile water resources atlas, improving water management methods, strengthening water resources and related agencies for integrated water resources management, strengthening national and regional institutions for water quality protection, establishing basin-wide data base information systems, strengthening national and regional centers of expertise, and strengthening national and regional environmental protection agencies.

c. Training: focusing on improving the skills needed to implement basin-wide cooperative development programs.

d. Regional cooperation. Projects included an inventory of national regional agencies and activities for cooperation, a roster of water resources management expertise in the Nile basin, a Nile basin cooperative framework agreement (Project D-3), public awareness and participation, and identifying national and

\textsuperscript{82} UNDP took the lead on funding the cooperative framework negotiations and the World Bank took the lead on funding the activities that would later be folded into the Nile Basin Initiative. The cooperative framework (Project D-3) was the first project to get off the ground, but cooperation proceeded slowly.
regional projects to promote basin-wide cooperation. This was the only project all countries could agree should go forward. This was also the only project Ethiopia agreed to participate in. The UNDP agreed to finance work on it.

e. Environmental protection and enhancement. Projects included water and land environmental protection and improvement, environmental management and development of subbasin management, and a UNEP diagnostic study of the basin.

Despite such notable developments in basin-wide cooperation, the NRBAP did not mention procedures for information exchange or dispute resolution (UNEP/UNDP/Dutch Joint Project on Environmental Law and Institutions in Africa. East African Sub-regional Project, 1999). Ultimately the countries became engaged in other priorities and many projects were not realized. Political conflict broke out between Ethiopia and Eritrea, and Uganda and Rwanda became involved in the Second Congo War (Waterbury, 2002). Insufficient money was raised to support TECCONILE’s ambitious NRBAP projects (Tafesse, 2008). As a result, Ethiopians saw TECCONILE as achieving little beyond the existing status quo of water utilization and management (Arsano & Tamrat, 2005).

Progress on the cooperative framework agreement was expected to be slow. In 1996 the cooperative framework negotiations brought together a Panel of Experts from the Nile countries, three people from each country. Participants in the discussions included lawyers from the ministry of foreign affairs or consultants, a hydrologist or water

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83 An Ethiopian participant proposed the Nile basin cooperative framework. Ethiopia wanted to first complete the cooperative framework before working on the other projects. The decision was made to proceed in parallel with the other projects to realize some benefits of cooperation in practice (Interview Nile 09, 2004).
resources management expert, engineers and economists (Interview Nile 14, 2007). The process included a study of institutional frameworks and principles used in other river basins, such as the Senegal and Mekong Rivers. It also sought to propose several options for a Nile institutional framework, principles and processes for cooperation (Brunnée & Toope, 2009).

Pending a cooperative framework agreement the countries, with World Bank support, decided they would like to continue their cooperation in some forum beyond TECCONILE. “The countries didn’t want the forum to die. It had taken a long time to come up with some confidence (Interview Nile 10, 2007).” In 1999 in Dar-es-Salaam, Tanzania the Nile Basin Council of Ministers agreed to form a new transitional institutional arrangement, following on TECCONILE, to coordinate technical cooperation until a legal agreement could be reached.

**From the Nile Basin Initiative to the Present (1999-Today)**

At the 1999 meeting in Dar-es-Salaam the Nile-COM adopted policy guidelines for the Nile Basin Initiative (NBI) and articulated a shared vision based on benefit sharing, “To achieve sustainable socio-economic development through the equitable utilization of, and benefit from, the common Nile Basin water resources (Nile Basin Initiative, 2010a).” All Nile delegations signed, with Eritrea participating as an observer.\(^8^4\)

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\(^8^4\) Eritrea contributes little water to the Nile system and does not benefit significantly from it beyond by terracing agricultural plots to increase rainwater infiltration and limit soil erosion. Therefore, Eritrean foreign policy does not prioritize Nile issues and has participated in all Nile development initiatives only as an observer (Oloo, 2007).
The NBI’s objectives are:

- To develop the Nile Basin water resources in a sustainable and equitable way to ensure prosperity, security, and peace for all its peoples;
- To ensure efficient water management and the optimal use of the resources;
- To ensure cooperation and joint action between the riparian countries, seeking win-win gains;
- To target poverty eradication and promote economic integration;
- To ensure that the program results in a move from planning to action (Nile Basin Initiative, 2010b).

The countries seek to promote cooperation on sharing the benefits of water use across a broad range of issues.

The NBI’s authority extends only to executing agreed upon activities. According to one NBI participant, the NBI has no authority of its own because there is no framework (Interview Nile 03, 2004).” According to one NBI representative, the NBI’s duties are only to implement agreed upon projects and other activities. Pending resolution of the cooperative framework negotiations, the NBI’s agreed upon minutes establish it as an international organization for funding purposes, but otherwise limit its authority (Interview Nile 23, 2004). For example the NBI Secretariat can act on behalf of borrower countries to notify other riparians of proposed development projects. This

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85 In order to enter into legally binding agreements with external funding agencies the NBI Secretariat needed a legal personality. Therefore, Uganda gave legal status to the Secretariat by passing the NBI Act, and ratifying the agreed minutes. This established the NBI as an international organization with privileges and immunities (Interview Nile 23, 2004).
arrangement is intended to strengthen the NBI Secretariat, promote data exchange among the Nile riparians, and generally support their cooperative efforts.\(^{86}\)

The riparians developed two approaches to achieve the NBI objectives: a basin-wide Shared Vision Program (SVP)\(^{87}\) and subsidiary action programs (SAPs) in the subbasins, which are intended to demonstrate the mutual benefits of cooperation through implementation of and financial investment in regional, integrated, multipurpose development projects (Metawie, 2004; Nile Basin Initiative, 2010b).\(^{88}\) According to one NBI representative, “The very basic principle under which NBI operates is a kind of win-win (Interview Nile 03, 2004).” Integrated water management is understood as integrating the physical aspects of water resources, environmental sustainability, and all relevant stakeholders (Amer et al., 2005). For example, the countries in the Blue Nile basin, Egypt, Ethiopia, and Sudan, submitted a series of proposed projects, which were then prioritized based on their ability to provide benefits for all and their attractiveness to investors. Egypt and Sudan are now participating in construction and irrigation expansion within Ethiopia (Arsano & Tamrat, 2005). In pursuing projects with the potential for mutual benefits, the participants shifted from thinking within national boundaries to

\(^{86}\) The NBI has carried out this task on several projects, including the Eastern Nile Watershed Management Project on behalf of Egypt and Sudan, the West Delta Water Conservation and Irrigation Rehabilitation Project on behalf of Egypt, Ethiopia’s Irrigation and Drainage Project.

\(^{87}\) The Shared Vision Program (SVP) seeks to develop basin-wide activities to strengthen cooperation and catalyze development. Eight projects have been financed with management units in the different Nile countries: Applied Training, Confidence-Building and Stakeholder Involvement, Shared Vision Coordination, Socio-Economic and Benefits Sharing, Transboundary Environmental Action, the Efficient Water Use for Agriculture, Water Resources Management, and the Regional Power Trade Project.

\(^{88}\) Activities are organized in the Eastern Nile Subsidiary Action Program (ENSAP) and the Nile Equatorial Lakes Subsidiary Action Program (NELSAP). Sample projects include flood and drought management, irrigation and drainage development, integrated water resources planning and management, fisheries development, water hyacinth control, hydropower development and regional sharing, and establishment of the Eastern Nile Technical Regional Office (ENTRO) and Nile Equatorial Lakes Technical Advisory Committee (NEL-TAC) to implement projects.
thinking across them. For example, according to a Uganda NBI representative, landlocked countries are interested in developing projects to access the coast and improving the road and rail network between countries (Interview Nile 04, 2007).

The participants agreed to adopt a basin approach and wanted to make sure they could implement this in practice, but still needed to specify what this would mean (Interview Nile 25, 2004). Which issues and waters would the basin approach apply to? The participants thought some issues, such as environmental issues, clearly should be basin issues. However, other issues such as drought and desertification, extend far beyond the river and its basin. The participants did not think it made sense to apply a basin wide approach for such issues. So, different issues will be addressed at the appropriate scale (Interview Nile 14, 2007). Another question was whether basin water and the river system would be addressed separately. For example, some participants wanted to see the use of basin water and use of water from the river system addressed differently (Interview Nile 19, 2007). By taking a contextual approach to both questions, negotiating specific arrangements to address specific issues, the participants are adopting more of a problemshed approach than a strict watershed approach.

Negotiations on the cooperative framework have continued parallel to technical cooperation within the NBI. The Panel of Experts presented a draft Cooperative Framework to Nile-COM in 2000, which built on the 1997 UN Convention. However, several substantive disagreements remained, for example over the status of existing agreements. A Transitional Committee was created to prepare a single draft, highlighting
areas of convergence (Metawie, 2004). The draft was completed in 2007. All of the upstream countries voted in favor of the draft principle of equitable utilization, while the downstream countries voted against it (Cascão, 2009). Further discussions did not lead to a full consensus. Disagreement remained over how to address existing uses, which was discussed in Article 14 in terms of water security.\(^{89}\) An effort was made to leave resolution of the outstanding Article to the new permanent river basin commission. However, Sudan opposed this approach and walked out of a meeting as it thought the issue should be resolved by the Heads of States and Governments (Mekonnen, 2010).

In May of 2010 some of the Nile states opened the Agreement on the Nile River Basin Cooperative Framework for signature for a period of one year until May 2011. According to reports from the NBI, consensus was reached on all elements of the Agreement, except for the one clause on water security in Article 14 (Nile Basin Initiative, 2010b). The Cooperative Framework Agreement includes principles of international water law, such as information exchange about planned projects, and practical arrangements, such as transforming the NBI into the Nile River Basin Commission, which enables it to enter

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\(^{89}\) The outstanding article states, “Nile Basin States, agree, in a spirit of cooperation, to work together to ensure that all states achieve and sustain water security and not to significantly affect the water security of any other Nile Basin State (Otieno, 2010).” Egypt and Sudan oppose this clause as they claim it will abridge their historical rights and water uses. They want the clause to read “Nile Basin States, agree, in a spirit of cooperation, to work together to ensure that all states achieve and sustain water security and not to adversely affect the water security and current uses and rights of any other Nile Basin States (Otieno, 2010).” The concept of water security was introduced in an effort to make the issue of past agreements more tractable, but some consider it an attempt to use ambiguous phrasing to reinforce the status quo (Interview Nile 19, 2007; Mekonnen, 2010). It is not an established concept in international water law and it is unclear what it means or how it relates to the existing principles of equitable utilization and no harm. It is also unclear how it address the countries’ interests (Interview Nile 21, 2007).

Egypt’s Minister for Water and Irrigation has also stated Egypt requires commitment to notification for planned upstream projects, which will be finalized unanimously, not through majority vote (“Quotes About Nile Basin Initiative,” 2010). Other countries are concerned this would amount to requiring prior consent of all riparians for development projects to proceed, which would give Egypt veto power over any upstream projects (Interview Nile 14, 2007). It is also unclear whether the downstream countries would submit their project proposals to a similar process (Interview Nile 19, 2007).
into legally binding financial arrangements with countries and international organizations. The Agreement does not include specific water allocations. Ethiopia, Rwanda, Tanzania, Uganda, and Kenya have signed the Agreement. As of June 2010 Burundi, DR Congo, Egypt and Sudan have not signed. One more ratification will make the Agreement binding for its signatories. The Nile countries will continue negotiations this fall.

Although participants recognize progress within the NBI, some participants are frustrated with the time it takes to implement projects through the World Bank process and how few results can so far be demonstrated in practice (Cascão, 2009; Tafesse, 2008).

According to one Ethiopian participant, despite much progress, actual implementation of projects lags.

Research and feasibility studies have been completed. Offices and organizations have been created. Project units now exist in each country. People can see the structure. People are engaged in trying to identify win-win projects, but so far there have been no big projects, which is causing some shortcomings in confidence (Interview Nile 19, 2007).

According to another Ethiopian participant

When the SAP programs were formulated, the objective was to build confidence and facilitate progress. When Ethiopia identified projects and went to the NBI it had high expectations for something on the ground in two, three, four, five years. And some power and some small irrigation projects are in the planning. Even at ICCON some donors allocated funds to those specific projects, but even the SVP projects have only started implementing recently. Ethiopia has been pushing all along. Maybe there is some lack of urgency for some others. The World Bank has its operational rules that take a long time. Maybe projects are too big....In 2004 the idea of fast-tracking projects and big multi-purpose projects was developed with an idea towards implementation within 24 months, but these are still in preparation. None have even completed the planning process- even though the

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90 Some academics in Sudan are supporting signing the Agreement (Ali, 2010). Sudan also faces the prospect of an independent Southern Sudan after its referendum in 2011, which would mean an 11th Nile basin riparian.
fast track projects should have only small transboundary impacts. For Ethiopia there is urgency, maybe for some of the others there is not (Interview Nile 21, 2007).

According to an Egyptian NBI representative it is difficult to move forward with programs without knowing what the future Commission will look like and how it will want to implement cooperation. In the meantime all the programs can do is come up with proposals for what they think should be done in their area, conduct training and general awareness raising, and try to support the subsidiary action programs (Interview Nile 22, 2007).

In a step forward in 2007 the Nile basin states announced the formation of a Nile Basin Commission to take over from the NBI to work on facilitating a new agreement for the Nile and establish a sustainable, legal basis for projects to recruit staff and funding. However, the authority of the Commission and the ability of the Nile countries to take over administration of Nile projects is unclear pending the cooperative framework agreement (Interview Nile 05, 2007). According to an Ethiopian delegate creating the Commission before the Agreement was in part due to donor pressure to sign an agreement.

The donors create artificial timetables to keep the process moving. They want a framework agreement adopted. They are reluctant to keep raising funds without a legal personality. They want a commission to be established. However, the countries need to work at their own pace to negotiate principles of cooperation. They don’t want to adopt a paper tiger that cannot be ratified or implemented. However, the countries are also worried that if they don’t adopt an agreement there won’t be money for development projects (Interview Nile 19, 2007).

Similarly, some academic participants from upstream countries see the NBI as externally driven by the World Bank. According to a Ugandan researcher, although the projects
bring money to the region, the projects are not sustainable because NBI people have come to expect high salaries and are mostly interested in perpetuating their jobs. According to this researcher the Bank’s project oriented process means that projects can achieve success, according to the indicators used, without actually having any practical success at all (Interview Nile 08, 2007). Nevertheless, the international community has influence because it can control development funding. While its influence is not always welcome by the Nile countries, it is inescapable (J.A. Allan, 1994).

The international community has been supporting development of a mechanism for civil society and scientific experts to participate in the NBI process. According to one international participant, this has been a significant undertaking as civil society NGOs are just developing in some countries or are “governmental NGOs” (Interview Nile 22, 2004). Similarly, an Ethiopian participant in a non-governmental scientific organization cited the lack of participation of regional scientists and experts outside of national delegations as a significant problem for water management (Questionnaire Nile 04, 2004). In 2002 the Nile Basin Discourse (NBD) was created as a forum for developing this opportunity. CIDA provided funding with IUCN implementation. However, according to one NBI participant, the NBD got off to a rocky start and had little political support from within the Nile countries (Interview Nile 24, 2004). Illustrative of the NBD’s lack of influence on the NBI at this time, according to one Ethiopian NBI delegate, “So far there is no formal linkage between the NBI activities and the Nile Discourse. They do their business and we do our business (Interview Nile 03, 2004).”
The NBD project was not able to maintain itself when the project funding ended. It was relaunched in 2005 with funding from the United Kingdom’s Department for International Development (DFID). The NBD is now a network of NGOs in each of the ten Nile countries. It is trying to establish physical offices in each of the Nile countries in order to influence water policy decisions within the NBI (Nile Basin Discourse, 2010).91

The NBI’s Shared Vision Program is also trying to develop mechanisms for including water users, parliamentarians, journalists, lawyers and donors, NGOs, academics, professional groups in water management decisions. The Applied Training Program and Nile Basin Capacity Building Network in River Engineering (NBCBN-RE) are efforts to include outside scientists in Nile management issues.92

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91 For more information on the NBD see http://www.nilebasindiscourse.org/.
92 Created in 2000, the NBCBN-RE focuses on training of young professionals, basin-wide research, improving the available technology for communication (fast phone lines, DSL, FAX, and computers) and building a network of water professionals. The network receives Dutch funding. There is a coordinating office in each participating country. The NBCBN-RE briefs the NBI of its progress and coordinates with the Applied Training Program (Interview Nile 25, 2004). For additional information see http://www.nbcbn.com/index.php/network-history/
Table 2 Summary of Institutional Arrangements of the Nile Benefit Sharing Regime

<table>
<thead>
<tr>
<th>Institutional Arrangements</th>
<th>NBSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geographic scope</td>
<td>Generally the entire watershed, but may extend beyond it depending on the specific issue</td>
</tr>
<tr>
<td>Range of activities or issues addressed</td>
<td>Integrated water resources planning and management, including flood and drought management, efficient use of water for agriculture, fisheries, hydropower and regional power sharing, environmental protection, poverty eradication, economic integration, capacity building</td>
</tr>
<tr>
<td>Participation</td>
<td>9 major Nile basin states: Burundi, DR Congo, Egypt, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, Uganda. Eritrea participates as an observer.</td>
</tr>
<tr>
<td>Role of the international authority</td>
<td>For the NBI pending resolution of the framework agreement and Nile Basin Commission: Implement agreed upon projects, enter into financing arrangements</td>
</tr>
</tbody>
</table>

Please note: “NBSR” indicates the Nile benefit sharing regime under the Nile Basin Initiative since 1999.

Discussion

Today many of the elements that are considered important for promoting cooperation exist in the Nile basin. There is a collective recognition of the general need for cooperation, a new organization to coordinate cooperation and financing from donors, increased human and technologic capacity, and some strengthening of domestic institutions (Waterbury, 2002). The benefit sharing approach promises to share costs and benefits of Nile basin water development in an equitable way so the harm it causes is considered acceptable. The transitional arrangements adopt many of the mechanisms expected to enable parties to adjust to change. Nevertheless, the riparians have so far been unable to negotiate institutional arrangements acceptable to all. The difficulties for
international river basin management facing the Nile states are often attributed to the 1929 and 1959 Nile Waters Agreements and their inability to adjust to change. For example, according to an Ethiopian water management official, “The nature of existing institutions has severely deterred the decision making elites of the Basin countries from coming to terms with the need to cooperate (Abate, 1994):236).” According to two legal experts

The lack of provision for adaptation of the various Nile treaties’ terms to changing circumstances forestalled opportunities for the transformation of the shared competitive understandings of the parties. Similarly, the very limited procedural frameworks, such as technical cooperation committees, established by these treaties provided little opportunity for fostering mutual learning and understanding (Brunnée & Toope, 2009):105).

This analysis finds some provisions in the 1929 and 1959 Nile Waters Agreements intended to provide flexibility for Egypt and Sudan to adjust their agreements to changing circumstances, however the agreements were not implemented in such a way.93 The continuing problem for Nile multilateral cooperation seems to is one of reaching working arrangements without precluding future opportunities. The variability and contradictions of the Nile basin require such adaptive mechanisms be incorporated into the existing benefit sharing approach.

During the development of multilateral cooperation on the Nile and the benefit sharing regime many significant changes occurred in the basin, including wars, peace agreements

93 The 1929 Agreement provided for future review, but did not specify any mechanisms for carrying it out. The 1959 Agreement included a provision for Egypt and Sudan to renegotiate the issue of Nile water use. The Owen Falls Agreement has been flexible to renegotiation, but with the stipulation that adjustments to the initial agreement not entitle Uganda to new acquired rights. Despite the existence of such mechanisms, the projects proposed by the East African Nile Waters Coordinating Committee did not result in renegotiation efforts in practice. Instead, the projects were rejected on the basis of a lack of confidence in their technical and economic analyses and the lack of finality of the upstream countries' proposals. As Cory recognized at the time, the East African Territories (now countries) could not propose final arrangements without precluding future development.
and political changes. The Cold War ended, which significantly reduced tensions between Egypt, Sudan and Ethiopia in particular (Amer et al., 2005) as they had often found themselves part of different political blocs (Arsano & Tamrat, 2005). Water scarcity contributed to the 1988 famine in Ethiopia, after which Ethiopia adopted new national priorities, providing hydroelectric power and irrigation water to its population. Water scarcity also played a role in the downfall of the Derg military government (Tesfaye, 2008). Ethiopia’s transition to a democratic government (beginning in 1991) brought increased attention to the development and conservation of soil and water resources (Interview Nile 07, 2004) and their role in ensuring political stability.

Integration between Burundi, Kenya, Rwanda, Tanzania, and Uganda led to the creation of the East African Community (EAC). Upstream populations and demand for water resources grew. According to the United National Population Division the total population in the Nile basin is expected to increase between 61 and 82 % by 2030 (Hilhorst, Schütte, & Thuo). Although distributed unevenly across the basin, there has also been some improvement in economic indicators, such as growth in GDP, increasing direct foreign investment and international development assistance (Tesfaye, 2008).

Norms for environmental protection became widely accepted and are expressed, for example, in the Lake Victoria Environmental Management Program and Lake Victoria Basin Commission. Global concern over climate change intensified and historical

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94 Ethiopia was a Western ally under Emperor Selassie, but became an Eastern ally under President Mariam. Egypt was an Eastern ally under Nasser, but became a Western ally under Sadat. Sudan, under President El Nimeiri switched from being an Eastern ally to a Western ally.

95 In 1999 Kenya, Tanzania, and Uganda established the East African Community, a regional intergovernmental organization aimed at broadening political, economic and social cooperation, including the development of regional water resources. Burundi and Rwanda joined in 2006.

96 Environmental arrangements for Lake Victoria were negotiated between 1992 and 1994 between Uganda, Kenya, and Tanzania in response to declining water quality, increasing pollution from sewage, chemicals and agricultural runoff, disease, overfishing, declining biodiversity, land and wetland.
fluctuations are expected to continue. Even without a model to accurately estimate future discharges, Nile water managers know they need to plan for how to cope with increasingly variable flows (Hulme, 1994).

The benefit sharing regime’s institutional arrangements include many features expected to allow the parties to adjust to change. According to some participants the transitional institutional arrangements of the NBI and the cooperative framework negotiations are specifically oriented to embrace change, which is a departure from past initiatives. One Kenyan participant said, “From the beginning the NBI and Project D-3 were an opportunity to shift away from the existing issues and look forward (Interview Nile 14, 2007).” The opportunity for change also explains why Ethiopia is participating, in comparison to other past initiatives. According to one Ethiopian NBI delegate, “We hope that...the NBI will make changes in the status quo. That is why we joined the NBI (Interview Nile 03, 2004).” The signs of change encouraging Ethiopian participation include consensus on negotiating a legal cooperative framework and the inclusion in the NBI objectives of developing sub-basin projects to implement equitable utilization of waters (Arsano & Tamrat, 2005).

degradation and the water hyacinth. Uganda, Tanzania and Kenya have developed National Environmental Action Plans to address Lake Victoria’s problems and agreed to develop a Lake Victoria Environmental Management Program. The project has received funding and assistance from the World Bank, the Global Environment Facility, FAO and UNDP (Metawie, 2004). However, there is still no agreement on critical elements of the water balance of the Lake, such as the quantity of rainfall over the Lake and how this affects fluctuations in its level (Waterbury, 2002). In 2001 the East African Community established the Lake Victoria Basin Commission to promote information sharing and coordinate water management activities, including development of hydraulic infrastructure for irrigation and energy production (Cascão, 2009). So far this Commission is separate from the NBI and the Lake Victoria Environmental Management Program. Participants recognize that it will eventually have fit within the NBI framework, but want to do only on the condition they see no disadvantage to doing so (Interview Nile 10, 2007).
From the beginning one of the hopes for the NBI and cooperative framework negotiation was for new attitudes to be created to promote cooperation, coordination, and planning to change the past “atmosphere of suspicion among the basin states (Mageed, 1985):159).” Historically cultural, geographical, and historical barriers separated the Nile’s major cultures and limited shared experience, mutual understanding, and cooperation (Erlich & Gershoni, 2000):2).” There is evidence the forums for cooperation are leading to significant changes through the development of new norms for cooperation and expectations for behavior (Brunnée & Toope, 2009). According to a Kenyan negotiator, participating in the meetings within the multilateral forums for cooperation increased interest among Kenya’s government officials responsible for water affairs in cooperative management of the river and its resources. “Kenya had not been very involved in TECCONILE, although Uganda and Tanzania were very much involved. Through meetings among the ministers responsible for water affairs, Kenya also got a better understanding of what was going on (Interview Nile 10, 2007).” A Rwandan participant reported the importance of international financial support in bringing about a similar transition in Rwanda’s interests and priorities.

At first participation was not easy and the government did not seem particularly interested. The government didn’t always give authorization [to participate]. Sometimes the participants didn’t see any progress. However, after ICCON the delegates saw changes. The international community pledged a large amount of funds and now they hope to implement development projects (Interview Nile 13, 2007).

An Ethiopian negotiator also reported a broadening of priorities as a result of participation in the multilateral processes, away from a focus only on new legal arrangements to a growing appreciation for the potential for technical cooperation to help realize shared benefits of water use.
My position and my thinking, yes, I think we need to proceed on the two track process. I don’t think relying only on the legal and the Nile basin cooperative framework, especially the ones that are now not yet resolved, they are very difficult issues, it might take time to resolve those issues. But we need to also see the actual benefits that might come out of the cooperation. So, let’s proceed with the current projects and also...try to see the different models of how we can negotiate and maybe that will give us a breakthrough. I don’t think the legal and institutional aspects would be the ultimate goal for cooperation. Probably I had that position earlier, but I don’t have that position now, I don’t think that would resolve matters. Even if you agree on the principles that wouldn’t resolve matters. They are very generous principles, but in order to put those principles into operation you need to have those inputs and then it’s the technical aspect that would be able to resolve the issues (Interview Nile 09, 2004).

In a follow up interview three years later the same Ethiopian negotiator again remarked that the NBI has itself changed attitudes among people engaged in the process, but also more broadly by providing hope that ongoing projects will bring benefits on the ground.

“The change is relative from the past. Discussions are much more open. They could use an assessment of views of the public towards the NBI and how they have changed. There are civil society organizations in each country engaging now, the process is more open, people are more enthusiastic about getting engaged (Interview Nile 17, 2007).”

Although progress on transboundary projects has been slow, there is a growing appreciation of other countries’ interests and priorities. A Kenyan negotiator commented on the continued dialogue bringing about such awareness.

In the beginning of the NBI each country did an environmental scoping and looked at possible water uses. A panel discussed it and it helped improve understanding. For example, it showed Egypt that Kenya needs water. If it had been the first time they met, the Egyptians would not have moved. Being together has given the countries an idea of each other’s interests. Now they can speak with one another openly at a technical level (Interview Nile 10, 2007).
In an adaptive approach to conflict, dialogue within the NBI has enabled all the countries to discuss issues together on a broad range of issues. A Ugandan NBI participant noted his surprise at how rapidly confidence and trust were built, raising expectations. Initially the countries under NELSAP proposed only projects in specific transboundary areas. However, now many of the proposed projects are located entirely within one country, with the understanding that such projects can benefit the whole basin and fit under the NBI framework (Interview Nile 04, 2007). In a more adaptive approach, the project proposals increasingly consider their impact on the entire system. Through the subbasin ENSAP and NELSAP programs technical experts can participate in developing proposals most relevant to their priority issues. Although cooperation so far includes mainly governmental delegates, with international support, initiatives are underway to increase the participation of civil society, outside scientists, and others in water policy making.

Proposed upstream water management infrastructure projects are likely to soon change the facts-on-the-ground of water management, similar to the impact of the Aswan High Dam on contemporary water management.97 To meet development objectives a number of the upstream countries are trying to develop large infrastructure projects with large up-front costs requiring loans. For example Ethiopia envisions developing large water storage and power generation dams to provide energy and food security. So far, without a cooperative agreement these plans cannot go forward with the funding from the international financing organizations. According to an Ethiopian negotiator,

97 For example, the World Bank has provided support for some water projects, including an irrigation project in Ethiopia at Lake Tana. Sudan is panning new hydraulic structures and created a new national Dams Implementation Unit to implement projects with financing from China and Arab donor countries.
Cooperative projects need an agreement to be finalized to go forward. The projects have many impediments and are not implementable without cost sharing and benefit sharing. It needs a legal basis of having an agreement in place. Otherwise the World Bank won’t provide the loan. If the cooperative agreement doesn’t work, we’ll stay with the national agendas (Interview Nile 07, 2004).

Countries now have an alternate source of funding from China, which will allow them to move forward with unilateral development projects they otherwise could not afford. For example, Chinese companies are involved in dam construction in Sudan, Ethiopia, Uganda, Burundi, and DR Congo. Unlike the World Bank, African Development Bank, and many western donor countries, the Chinese companies do not condition their project funding on notification of or consultation with downstream countries. As a result, the other riparians and the international donor community will have less ability to influence basin projects in other Nile countries (Cascão, 2009).

Despite the looming proposals for unilateral development projects, the NBI is silent on how these projects fit into its developing benefit sharing norms and regional water planning (Cascão, 2009). As one Ethiopian government official described the work of the NBI, “They are handling softer issues now, and deferring more contentious ones for later to avoid deadlock, so there is no progress there [the cooperative framework process] (Interview Nile 13, 2004).” The approach is clearly to focus on mutually beneficial projects to build confidence, while avoiding contentious issues for later. In the meantime, in the words of one participant from an international donor organization, “Win-win sounds good, but it is not necessarily possible (Interview Nile 22, 2004).” At some point

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98 As described earlier, according to World Bank policy financing of projects likely to cause appreciable harm require a negotiated agreement among the riparians. Large infrastructure projects are likely to cause appreciable harm to other riparians because they create new established uses and foreclose other potential future uses.
the NBI needs to manage conflict by addressing tradeoffs between unilateral projects and multilateral projects or it runs the risk the riparians will address such issues outside of the multilateral arrangements.

One issue contributing to the difficulty in considering tradeoffs between different water users and uses may be the lack of arrangements establishing data sharing procedures to establish what data will be taken into consideration and how it will be shared. According to a Rwandan participant, data on various proposals are scattered (Interview Nile 13, 2007). According to an Ethiopian negotiator, “As it stands now, we [in the NBI] do not have very clear data exchange procedures. And we don’t have a clear agreement on data exchange (Interview Nile 03, 2004).” A lack of mechanisms for updating information with new and better data doomed past decision support models (Interview Nile 20, 2007). A Kenyan negotiator also expressed the need for data sharing procedures. “A protocol is needed for information and data sharing, only then can future development scenarios be created to evaluate tradeoffs, which should take place on an ongoing basis (Interview Nile 14, 2007).” Without establishing data sharing procedures there is a risk demands for more and better data will be used strategically, as happened in the past, to stall project proposals. According to one representative in an international donor organization, without data guidelines for what kinds of data are needed there is a, “...risk of too much complexity. We need “frugal heuristics” that make us smart (Interview Nile 22, 2004).” Countries may be unwilling to discuss sharing costs and benefits without arrangements for how data will be shared and used to evaluate and reconsider benefit sharing arrangements.
So far the NBI’s priority has been developing institutional arrangements that will allow it to deliver projects (Interview Nile 04, 2007). According to a representative from the NBI Shared Vision Programme, NBI projects develop technical studies in order to analyze the costs and benefits of future tradeoffs and convince policy-makers of the importance of benefit sharing (Interview Nile 06, 2007). These studies make projections about what will happen in the future, even though the assumptions built into these projections are unlikely to be perfectly accurate. For example, the studies cannot account for the impact of technology changes on the amount of water needs for an irrigation scheme, or unexpected negative impacts of a project, or fewer benefits than anticipated. Referring to the large infrastructure projects proposed by Ethiopia, Waterbury (2002) considers the analysis of the plans flawed. However, it is unclear how the NBI proposes to take into account such changes and uncertainty for updating the technical and economic analyses underlying project proposals. Waterbury cautions

As the rules and regulations of a regime are given shape, the designers would do well to build in provisions for periodic review and renegotiation in light of the changing interests of the parties and of the changing nature of the natural regime governing the watercourse. One wants to avoid locking in participants forever; if they think that future alterations are not allowed, they may either fail to join or...

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99 The plans assume the main problem for promoting development is the variability of the water supply. However, other problems will affect the success of the projects. For example, the optimal sites for irrigation and power are in locations where water storage projects will have high evaporative water losses and high sedimentation, which shortens the lifespan of dams. These sites are also far from markets, roads, and ports. So, it will be difficult to transport agricultural products and power to consumers. Sudan experienced similar difficulties with its Gezira power and irrigation schemes, which have not produced food security or a reliable power source. According to Waterbury, smaller projects with lower upfront costs, such as small scale local initiatives in water conservation, harvesting, extension work, improved local storage, improving the road network, are more likely to improve food security (Waterbury, 2002). Ethiopia is taking some steps in this direction, for example by developing extensive projects to improve its road infrastructure. China recently loaned Ethiopia $349 million to build a 79 km (49 mi) road between Addis Ababa and Adama, a business hub in the east ("China Loans Ethiopia $349 Mln for Road Building," 2009). The African Development Bank also recently signed a $125.6 million loan agreement with Ethiopia to finance a highway linking Addis Ababa, Nairobi and Mombasa in Kenya, providing Ethiopia with access to the port (Barrow, 2010).
simply leave when they feel their interests are being hurt. An incentive must be

A critical barrier to cooperation seems to be the lack of mechanisms for periodic review
and renegotiation of institutional arrangements. People predictably shift in and out of
responsibilities for water management issues, yet an Ethiopian participant remarked on
the lack of institutional arrangements to address even such foreseeable changes
(Interview Nile 17, 2007).

According to an Ethiopian negotiator, the countries are “learning by doing (Interview
Nile 03, 2004)” international water management cooperation. Some countries are just
developing their national water plans and are unwilling to bind themselves to an
inflexible agreement. Larger changes loom in the near future. The outcome of a vote in
the 2011 Southern Sudanese referendum may mean an eleventh riparian joins the existing
Nile countries. Ratification of the Agreement on the Nile River Basin Cooperative
Framework could lead to new upstream developments, even without downstream
consent. Therefore, it is critical that institutional arrangement “...be equipped with
process and procedures for the settlement of disputes, and be self-adjusting to the
evolving natural realities of the region and the social needs of its people in the future
(Abate, 1994):241).” Countries seem unwilling to discuss tradeoffs if the information
used to make assessments will be considered an established fact moving forward and
there is no possibility to revisit water management decisions. The Nile regime’s
approaches to uncertainty and conflict are summarized below.
Table 3 Approach to Conflict and Uncertainty of the Institutional Arrangements of the Nile Benefit Sharing Regime

<table>
<thead>
<tr>
<th>Regime</th>
<th>Approach to Conflict</th>
<th>Approach to Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>NBSR</td>
<td>Adaptive: Broad range of issues</td>
<td>Adaptive: Generally adopts a watershed approach, potential to be negotiated for specific issues</td>
</tr>
<tr>
<td></td>
<td>Adaptive: Efforts to include broad range of stakeholders from all countries</td>
<td>Conventional: Limited authority of implementing organization, difficult to adjust to changes</td>
</tr>
<tr>
<td></td>
<td>Adaptive: Implementation at subbasin scale</td>
<td>Conventional: No established data sharing procedures</td>
</tr>
<tr>
<td></td>
<td>Conventional: Win-win approach avoids contentious issues, discussing tradeoffs</td>
<td>Conventional: No date for evaluating and revising any agreement, unclear how benefit sharing approach can be adjusted in the future</td>
</tr>
</tbody>
</table>

Please note: “NBSR” indicates the Nile benefit sharing regime under the Nile Basin Initiative since 1999.
Evidence from the Cases

Revisiting the Research Propositions

Conclusions

Coda: Policy recommendations

We are dealing with a shifting reality, perpetually exposed to the attacks of a past that destroys it and of a future that changes it. (Lévi-Strauss, 1969):3).

It appears on balance that in a changing world it is more prudent to have new options...than to rely on a tradition challenged from without and from within. ((Collins, 1994):134) speaking about the Jonglei Canal)

Evidence from the Cases

The countries of the Danube and the Nile Rivers have created a variety of institutional arrangements to cooperate on the management of their shared river. However, only in some cases have the participants been able to adjust their arrangements to address changes, as seen in the current Danube navigation and water protection regimes. In others, the negotiations have stalled on reaching mutually acceptable arrangements, as in the case of the ongoing Nile benefit sharing regime, or a new regime has been imposed on some participants by the others, as in the first two Danube navigation regimes.

Although other external and internal factors also play a role in explaining the differences
in the regime’s abilities to adjust, this research focuses on the institutional arrangements themselves.

Comparing each of the institutional arrangements on its own across the cases (See table 1 below), geographic scope, participation, the range of issues, and the authority of the implementing organization do not seem sufficient on their own to explain which regimes are best and least able to adjust. Instead, why some regimes are better able to adjust to changes than others is explained by a combination of these arrangements along with three other arrangements, which emerged from an analysis of the data: renegotiating the agreement, sharing data, and protecting minority interests.
### Table 1 Results From Cases

<table>
<thead>
<tr>
<th>Ability to adjust</th>
<th>Regime</th>
<th>Geographic scope</th>
<th>Participation</th>
<th>Range of issues</th>
<th>Authority</th>
<th>Renegotiation</th>
<th>Data sharing</th>
<th>Address differences in interests</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>DNR₂</td>
<td>****</td>
<td>** EDC</td>
<td>****</td>
<td>** EDC</td>
<td>None</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>DWPR₂A</td>
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Key: NA = not applicable, most conventional = none; * = more conventional; ** = somewhat adaptive; *** = more adaptive; **** = most adaptive. For a detailed explanation of how each regime and regime phase were evaluated please see the discussion and table on its institutional arrangements' approach to conflict and uncertainty in the previous chapters

### Geographic Scope

According to the adaptive approach, “The properties of the whole of the system may be different than the sum of its parts (Costanza et al., 1993).” It is therefore important for cooperation to address the entire geographic scope of the system, as compared to trying

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1 Please note: “DNR” indicates a Danube navigation regime over a particular time period. DNR₁ is the first international navigation regime for the Danube from 1856-1914 and is further subdivided into two stages of regime development (for details of the changes in the institutional arrangements of the first Danube navigation regime please see Chapter 2, Table 2). DNR₁A lasted from 1856-1858 and DNR₁B from 1858-1914. DNR₂ is the second navigation regime for the Danube from 1919-1936. DNR₁ is the third, from 1948 to the present and is subdivided into three stages of regime development (for details of the changes in the third Danube navigation regime please see Chapter 2, Table 6). DNR₁A lasted from 1948 to around 1953, DNR₁B from around 1953 to 1998, and DNR₁C from 1998 to the present. “DWPR” indicates the Danube water protection regime over a particular time period. DWPR₁A Represents the early developments of the Danube water protection regime from the Bucharest Declaration to the Danube River Protection Convention (1985 - 1994); DWPR₁B, the Danube water protection regime from the Danube River Protection Convention to the EU Water Framework Directive (1994 - 2000), DWPR₁C, recent developments of the Danube water protection regime From the EU Water Framework Directive to Today (2000-Present). “NBSR” indicates the Nile benefit sharing régime under the Nile Basin Initiative since 1999.
to understand it by looking at separate parts of the system in fragmented initiatives. In theory, by addressing the whole system participants can consider all relationships between nature and the social system, unlike the conventional approach in which externalities may make this difficult. The cases provide some support for this proposition.

Consistent with the expectations of the adaptive approach, four of the six regimes best able to adjust to change adopted a geographic scope covering most or all of the river system. Since its inception, the Danube water protection regime has taken a watershed approach. However, cooperation in the first phase was limited largely to the main river in practice. The second phase covered almost all of the watershed and some impacted waters in the delta region outside of the watershed. The third phase covers all activities impacting the river and therefore has the ability to take a negotiated problemshed approach, in which geographic scope is determined by the issue at hand. The third phase of the third Danube navigation regime covers most of the navigable main river from Ulm to the Black Sea, but still excludes tributaries, including the Sava which has its own multilateral arrangements for navigation, and new canals, such as the Rhine-Main-Danube Canal. The institutional arrangements of the first two phases of the third navigation regime were only somewhat adaptive even though in principle they also covered the same geographic scope from Ulm to the Black Sea because in practice upstream parts of the river in Germany and Austria were excluded, as were parts of the Lower Danube under Special River Administrations during the second phase. Although these parts were excluded in practice, the stated intent to cover the river up to Ulm can be interpreted as supportive of a more adaptive approach. However, three of the four

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2 Austria was included in the geographic scope of the second phase of the third Danube navigation regime.
regimes least able to adjust to change also cover all of the river system. This indicates geographic scope of cooperation is not itself sufficient to explain the differences between the regimes’ abilities to adjust to change.

Participation

According to the adaptive approach it is important to include participation from a range of stakeholders (Holling, 1978) in order to understand the interactions between the natural and human systems (Glouberman, Campsie, Gemar, & Miller, 2003; Gunderson & Holling, 2002; Holling, 1978), and encourage a dialogue among stakeholders about these (Lessard, 1998). Institutional arrangements providing for ongoing input from diverse kinds of stakeholders from all countries sharing the water system, or with significant interests in it, are expected to make it easier for actor groups to create new interdependencies among themselves (Nooteboom, 2006) and adapt to change, in comparison to the conventional approach which privileges participation from the more powerful participants and from scientists and experts. The cases show mixed support for this proposition.

Looking at the cases best able to adjust to change, the first phase of the Danube water protection regime included participation from all major basin states, but was limited largely to technical experts and diplomats. The second and third phases have expanded opportunities for different stakeholders to participate in a variety of fora, including basin states that are not signatories to the Danube River Protection Convention, non-basin
states, and non-governmental delegates. However, the third Danube navigation regime, another regime that has been able to adapt to changes, privileged input from diplomats and, in the beginning, excluded upstream riparians West Germany and Austria and non-riparian states, even those with significant interests in Danube navigation through prior treaties and investments. Although the initial arrangements allowed for only narrow participation, and were closed to accession from new countries other than Austria, the declared geographic scope of cooperation upstream to Ulm can again be seen as demonstrating an intent to expand participation to at least include all riparians. Over time participation did expand to include the upstream riparians and new riparian countries. In the current regime phase other countries and organizations can participate as observers. Ongoing negotiations may further expand the arrangements for participation.

The first Danube navigation regime’s first phase initially included participation from both riparians and non-riparians, but did not include a mechanism for long-term participation from non-riparians after its envisioned two-year duration. The second phase included participation from both riparians and non-riparians, but in practice made it very difficult for new riparians to fully participate, which was a significant contributor to the regime’s failure. Although the fluvial commission of the second navigation regime included broad participation of riparians and non-riparians, the authority of this commission was very limited. It was therefore ineffective as a forum for managing tensions between the stakeholders, especially since participation in the maritime Danube commission was severely limited. In the case of this second navigation regime the arrangements for participation cannot on its own explain the regime’s failure to adjust, without considering
its limited authority. The Nile benefit sharing regime's arrangements for participation include all basin countries and a broadening variety of other kinds of stakeholders, but the regime negotiations have stalled, with a majority of riparians currently attempting to ratify an agreement over the objections of a minority.

**Range of Issues**

The adaptive approach considers a range of issues including all relevant human-environment interactions (Dietz et al., 2003). Only by addressing a broad range of issues, and not only the few on which they agree, can participants highlight difficult tradeoffs among alternatives (Walters, 1986) and manage tensions (McKelvey, 2001) between them, which will allow them to adjust to changes over time. The cases do not support this proposition. The third Danube navigation regime has been able to adjust to change although it originally focused on only a narrow range of issues. More recently the range of issues for cooperation has expanded to include the environmental impacts of navigation and it remains to be seen how the current negotiations will redefine the range of issues. The Danube water protection regime began with a broad range of issues, including issues on which the participants did not agree. As the regime developed, the multiple fora for cooperation allowed for cooperation on different ranges of issues. However, the Danube River Protection Convention itself focused on only a narrow range of issues, in comparison to the other concurrent forums. Cooperation under the DRPC has nevertheless successfully adjusted over time and now encompasses a broad range of activities. The narrow focus of the DRPC and Belgrade Conventions do not seem to have
posed a significant barrier to the ability of these regimes to adjust to change. Some of the regimes which addressed a broad range of issues have been unable to adapt to changes. Therefore, the range of issues does not on its own seem to explain the differences in the regimes abilities to adjust to change. However, over time the regimes that have adjusted to change have broadened the range of issues they address, suggesting a broader range of issues may be an effect of the ability to adjust to change rather than a cause.

**Authority of Implementing Organization**

The adaptive approach strives to create opportunities for self-organization (TERI & IISD, 2006). Organizations with the authority to adjust the arrangements for multilateral cooperation will be better able to adjust to uncertain future conditions (Benvenisti, 2002). Organizations empowered to design policies based on the whole system will be able to internalize as many interactions as possible and manage tensions between uses and users. While planning should be based on a large scale, authority for implementation can be fragmented across multiple scales and communities of stakeholders in a polycentric approach (Bankes, 2002; Brunner et al., 2005; Folke et al., 2005; Holling, 2001), as long as there is communication across the different fora. The evidence from the cases does not support this proposition.

The implementing organization of the third Danube navigation regime, which has been able to adjust to changes, was given only very limited authority to plan or implement policies and projects. The Bucharest Declaration initiating the first phase of the Danube
water protection regime did not create any implementing organization, but was nevertheless successful in creating a foundation for cooperation, which was later adjusted. The second and third phase of the Danube water protection regime do give the implementing organization the authority to adjust institutional arrangements as needed, which was critical to the changes from one phase to another. Cooperation in subbasins has also developed and show significant potential to manage tensions at different scales, but it emerged only over time, suggesting a polycentric approach to implementation may be an effect of a regime’s ability to adjust, rather than a cause. Other regimes which have not been able to adjust as well to change also delegated significant authority to their implementing organizations. For example, the second phase of the first Danube navigation regime delegated the most authority to its implementing organization of any of the regimes. The European Danube Commission’s authority did help it adjust to change up to a point, at which time its authority was undermined by its inability to manage the tensions between its participants interests or the interests of new stakeholders.

Additional Institutional Features From the Cases

The evidence from the cases provides only modest support for the proposition that an adaptive approach on any one of these institutional arrangements makes it easier for a regime to adjust to changes over time. Out of the analysis of the data three other institutional features emerged, mechanisms for renegotiation, data sharing, and addressing differences in interests. These features emerged as important factors for evaluating the research propositions, beyond the original four institutional arrangements
identified. When these institutional features are considered together with the first four, the evidence from the cases do support the overall proposition that the approach to uncertainty and conflict can explain a regime’s ability to adjust to change.

**Renegotiation**

According to the adaptive approach arrangements cooperation on ecological and social systems is path dependent (Costanza et al., 1993), but also subject to expected and unexpected uncertainty. It is therefore important to establish a process (Gunderson & Holling, 2002) enabling self-organization (TERI & IISD, 2006) or renegotiation of arrangements. Such a process could include policies with scheduled review (TERI & IISD, 2006), such as mechanisms to monitor implementation, evaluate future feedback and reassess policies (Lee, 1993; W. E. Walker, Rahman, & Cave, 2001). Another option is to create contingent policies that automatically adjust based on pre-defined triggers (TERI & IISD, 2006; W. E. Walker et al., 2001). Less formal mechanisms could include considering a range of anticipated conditions and developing policies expected to be able to be implemented and perform well across all of them with little modification (Jowell & UK Government Chief Social Researcher’s Office Cabinet Office, 2003; TERI & IISD, 2006). Policies could also proceed in incremental steps in order to minimize unintended consequences of policy actions (Brunner et al., 2005). The evidence from the cases suggests regimes that are better able to adjust to changes do include mechanisms creating expectations for renegotiation. Two of the four regimes encountering difficulties adjusting to change do not include similar mechanisms.
Although not written into the Bucharest Declaration, the first phase of the Danube water protection regime was widely seen by participants as only the first step in an iterative negotiation process. During the second phase when the Danube River Protection Convention was signed and implemented the participants already anticipated the European Union Water Framework Directive would lead to changes to the DRPC’s arrangements. Although there was no established date to renegotiate the DRPC’s arrangements, it was implicit the EU WFD would require adjustments. The third phase of the Danube water protection regime also does not explicitly include mechanisms for renegotiation, but such a feature is again implicit. The EU WFD includes a timetable for implementation and signposts for evaluating progress. If the regime participants do not make progress on achieving the EU WFD’s standards, they know they will need to further adjust their arrangements.

The first and second phases of the Danube navigation regime did not include any explicit mechanisms for renegotiating their arrangements. In fact, at first glance the Belgrade Convention seems to be the antithesis of an adjustable mechanism. It was originally not open to accession even by Germany, a riparian country. However, the initial arrangements for the geographic scope suggest a different interpretation. In 1948 the Belgrade Convention defined the geographic scope of multilateral cooperation as extending from Ulm, Germany to the Black Sea, but excluded Germany and Austria as original participants. The stipulation cooperation would extend to Ulm suggests the Convention’s signatories anticipated a time in the future when they would revise their
arrangements to include Austria and Germany. The second phase of the regime did expand to include the full participation of Austria, introducing the first non-Communist country, and observers from Germany (although the regime continued to deny Germany full membership). These changes, along with other changes to voting procedures designed to protect minority interests, reinforce the regime’s future willingness to adjust its arrangements, suggested by the geographic scope. The third phase of the Danube navigation regime adopted the 1998 Protocol, which the participants expected to be an interim arrangements, one that could be implemented and perform well across a variety of anticipated future conditions, pending future renegotiations which began officially only a few years later. Although not explicit, each of these regimes included arrangements which created expectations for their renegotiation.

The first phase of the first Danube navigation regime also included a mechanism for renegotiation, a form of contingent clause, which enabled multilateral cooperation to continue despite significant ongoing conflict between riparian and non-riparian stakeholders. In its second phase the regime negotiated only successive limited-duration mandates. Although the arrangements became de facto permanent arrangements, the expiration of the European Danube Commission’s mandate did provide an effective opportunity for renegotiation of the arrangements. Nevertheless this regime was unable to adjust to changing circumstances, suggesting the presence of a mechanism for renegotiation is itself insufficient for adjusting to change. However, the EDC did not include provisions for including full participation from new riparian states, Romania,
Bulgaria, and Serbia,\(^3\) which was at least in part due to the majority voting procedures. Even a sympathetic minority of existing participants could not protect the interests of the new riparian. As a result, Romania actively tried to undermine the authority of the EDC, the lead up to World War I, Germany and its allies were content to see happen. The second phase of the Danube navigation regime contained no mechanism for renegotiation and was unable to adjust to changes.

The Nile benefit sharing regime similarly does not include any mechanism for renegotiation, which is a significant factor in its inability to develop mutually acceptable institutional arrangements. The history of cooperation in the basin demonstrates an unwillingness to renegotiate existing arrangements, even where opportunities for flexibility exist (see the discussion of the 1929 and 1959 Nile Waters Agreements Agreement in Chapter 4). The recent changes in the basin have significantly impacted multilateral cooperation. These changes and expected future changes create significant uncertainty about the likely impacts of current institutional arrangements on future needs. However, under the current arrangements it is unclear how the Nile Basin Initiative proposes to take into account such changes to update benefit sharing arrangements. Countries seem unwilling to discuss tradeoffs if the information used to make assessments will be considered an established fact moving forward, with no possibility to revisit water management decisions as information and circumstances change.

**Data Sharing**

\(^3\) Although Romania was officially admitted as a full participant in 1878. However, it was excluded by majority vote from fully participating in the 1883 EDC Conference to determine arrangements for the proposed Mixed Commission for the newly internationalized part of the river from Braila to the Iron Gates.
According to the adaptive approach to governance of water resources the relationships underlying the ecological and social system are inherently unpredictable and evolve in non-linear and context-dependent ways (Brunner et al., 2005; Costanza et al., 1993; Glouberman et al., 2003; Gunderson & Holling, 2002; Holling, 1978). Therefore, the policy process depends on data collection and sharing procedures (Brunner et al., 2005) to adjust to changes. Such data include information about the history of system dynamics (Costanza et al., 1993), qualitative, interpretive and integrative knowledge (Brunner et al., 2005), both experiential and experimental knowledge (Berkes et al., 2003b; Glouberman et al., 2003), information that characterizes uncertainty and the extent of scientific ignorance and disagreement (Dietz et al., 2003), and information that can be used to determine whether or not a policy needs to be reassessed (W. E. Walker et al., 2001). This information can be used to develop predictions for how the ecological and social system will respond to different policies and then test these predictions (Lee, 1989, 1993; Walters, 1997). The evidence from the cases suggests such explicit testing of predictions is rare in practice. Nevertheless there is some indication regimes with more detailed data collection and sharing procedures are better able to adjust to change, in comparison to regimes with fewer procedures.

The Nile benefit sharing regime does not yet have specific data sharing procedures, which contributes to the difficulty participants have in creating mutually acceptable institutional arrangements. Given the significant uncertainty about future circumstances, countries are unwilling to share data without arrangements for allowing these data to be
updated in the future and used to revise benefit and cost sharing arrangements. Given past experiences in which demands for more data were used to reject proposals for change (see the discussion in Chapter 4 of the projects proposed by the East African Nile Waters Coordinating Committee), some participants may also consider requests for data a strategic tactic to forestall future development. Therefore, data sharing procedures need to be paired with mechanisms for evaluation and renegotiation. The first Danube navigation regime did not detail specifics regarding data sharing. The second Danube navigation regime created technical groups with participation from many countries, but limited to experts who focused primarily on regularizing the Danube for navigation: stabilizing the river system and minimizing variability.

The third Danube navigation regime has been able to adjust to change despite its limited initial data sharing procedures, suggesting such procedures do not on their own explain a regime’s ability to adjust to change. The regime originally gave little significance to data sharing; technical groups were ad-hoc and did not allow all stakeholders to participate equally, and therefore cannot be considered forums for joint fact-finding. In the second phase the technical groups became permanent and open to equal participation from all contracting parties of the Belgrade Convention. Significantly, under the Danube Commission the contracting parties began work on a water balance and created the Working Group for Scientific Hydrology of the Danube basin, which cooperated even with riparian countries not party to the Belgrade Convention. However, for the most part the working groups generally focused on a narrow range of issues, on stabilizing the river system and minimizing variability. In its current phase the third Danube navigation
regime has broadened its data procedures in a best practice manual on sustainable waterway planning, a joint initiative with the International Commission for the Protection of the Danube River, which includes comprehensive environmental monitoring, ongoing input from different kinds of stakeholders, including in the environmental impact assessment process and in applying for environmental permits for the project.

The early efforts of the Danube water protection regime focused on collecting and sharing new data among a variety of stakeholders, for example by creating a uniform monitoring system. Over time its data procedures have further developed, as seen in the process through which it developed the River Danube Basin Management Plan in conformity with the EU WFD. The expectations for the EU WFD’s joint environmental standards and data requirements influenced the earlier phase of cooperation, as participants knew they would have to collect and share data to demonstrate their progress complying with the EU WFD’s standards. The EU WFD standards and data sharing procedures have worked together to encourage adjusting institutional arrangements.

**Address Differences in Interests**

According to the adaptive approach arrangements that try to manage (McKelvey, 2001) and make explicit tensions and differences among stakeholders (Norton, 2001), while also highlighting difficult tradeoffs (Walters, 1986) are expected to make it easier for regimes to adjust to change, in comparison to arrangements that seek to minimize conflict among different stakeholders (Holling, 1978). One approach to addressing different
interests is to explicitly consider tradeoffs in facilitated dialogues. Another is to make decisions through procedures in which minority interests have to be considered, such as by unanimous vote or overwhelming consensus. By preventing a majority from tyrannizing a minority (see for example (Shapiro, 2003)) a unanimous decision rule can help manage tensions among stakeholders, or at least prevent minority interests from being ignored. However, a unanimous decision-making rules also makes it more difficult for participants to adjust to change as even a single dissenter can veto changes. This is why institutional arrangements have to be considered together, to see how they interact to address conflict and uncertainty. Evidence from the cases suggests mechanisms to address differences among interests are important.

All of the regimes experiencing difficulty adjusting to change have weak mechanisms to address differences in participants’ interests. The first Danube navigation regime decided critical issues, such as the participation of new riparian stakeholders, through majority vote in which new stakeholders could not participate and their interests could not be easily protected. The second Danube navigation provided for ad-hoc dispute resolution forums to address disputes between uses, including non-navigational uses. However, in practice the authority of multilateral cooperation was limited along most of the river where planning and implementation remained under riparian control. Therefore, the dispute resolution forum served little function. The Nile benefit sharing regime focuses on a win-win approach and avoids contentious issues, which also makes it difficult to discuss tradeoffs. The lack of provisions for considering how current tradeoffs may change in the future contributes to participants’ unwillingness to discuss their differences.
In comparison, more of the regimes that have been able to adjust to change do have mechanisms to address different interests. In the beginning of the third Danube navigation regime the Belgrade Convention was established through a majority vote, over the protests of the minority and the Danube Commission’s early operating procedures used a majority vote to minimize Yugoslavia’s interests. However, over time the regime has adjusted its decision-making procedures. Some decisions are made by unanimous vote, which means minority interests of participating countries can no longer be ignored. In the most recent phase the admittance of observers provides some opportunity to consider the interests of non-signatory members. The first phase of the Danube water protection regime did not include arrangements for decision-making, but did create spaces in working groups and other fora for participants to cooperate on issues about which they disagreed. In the most recent phase of the water protection regime the ICPDR has taken a stronger role in dispute resolution, which emphasizes that all parties need to consider one another’s interests.

**Revisiting the Research Propositions**

This research began with five propositions, based on the adaptive environmental governance literature, about the kinds of institutional arrangements that make it easier for countries to adjust their international water resource arrangements. The “Dynamic Systems Proposition” claims countries need to integrate understanding of the whole, dynamic social and ecological system, for example by matching the geographic scope of
their cooperation to the geography of the river. My findings challenge the wisdom of this approach and suggest the geographic scope can vary according to the issue being addressed in a specific river system. In some cases it may make sense for the geographic scope of cooperation to include the entire river system. In some cases it might even make sense to expand the geographic scope of cooperation beyond the river system, for example as a way of creating reciprocal obligations. However, a more limited geographic scope of cooperation is not on its own a barrier to future adjustments.

The “Stakeholders Proposition” advises including participation from as broad a range of stakeholders from participating countries as possible. My findings suggest institutional arrangements that lead to an expectation minority interests will be considered, in future decisions of how international water resources should be used, support a regime’s ability to make adjustments. In contrast, institutional arrangements in which minority interests can be ignored and silenced make it more difficult for regimes to adjust to change over time. Minority interests need to be protected, if for no other reason than because a group that is in the majority today may find itself the minority down the road. Unless their interests are considered, such minority parties may undermine the implementation of any cooperative arrangements and seek to impose their own solutions in the future.

My findings challenge the wisdom of defining rules for participation according to the area of the river system or even according to whether or not a country is party to specific institutional arrangements. My findings suggest the distinction between parties and non-parties (or insiders and outsiders) to agreements is fuzzy. In some cases countries from
outside of the river system exert significant influence over use and development of the river and other natural resources within its basin, regardless of whether or not they are party to any particular international arrangements. Similarly, the effects of a riparian country’s use of an international river are felt by the state itself, other riparians, and possibly even non-riparians (Kaeckenbeek, 1962). As a result, the “outsiders” of today may be considered “insiders” in the future. Institutional arrangements need to develop some way of addressing the influence of such countries so it can voice its interests to the cooperating parties, who can then determine how to consider those interests and use this information in decisions about future water planning, as well as provide the country with some awareness of ongoing governance decisions. One approach is for the “outside” country to be an observer to the arrangements, entitling it to some opportunity to participate. Another approach is to develop parallel forums for cooperation in which “outside” countries can participate depending on their interest in the specific issue being addressed. Creating multiple spaces for broad participation can be important as particular actors may be uninterested in a specific issue and unwilling to dedicate resources to participate fully in addressing it. Particular actors may also be unwilling to relinquish their ability to influence decision-making within a particular forum, making it difficult for some actors to participate fully (Najam, 2003) and undermining the legitimacy of the forum and the benefits of deliberation. However, it may be difficult for some stakeholders to participate in multiple forums. For example, nongovernmental organizations tasked with representing civil society are not paid for much of the work they must do to inform themselves about substantive issues and provide input into governance processes, making it costly for them to participate in multiple forums.
Nations with small ministries lack the personnel and capacity to participate in a large number of forums and may find that their interests are underrepresented. Therefore while it may be appropriate in some cases to create new forums for cooperation, in others it may be better to build on existing forums and improve coordination between them.

The “Tensions and Tradeoffs Proposition” claims institutional arrangements should manage tensions but highlight difficult tradeoffs in order to make it easier for regimes to adjust to change, for example by addressing a broad range of issues. My findings suggest an initial focus on a broad or narrow range of issues does not by itself determine a regime’s ability to adjust to future changes. A problemsheded approach, in which institutional arrangements are determined by the issue being addressed, makes it possible to pursue multilateral cooperation in different fora, each addressing different issues. Such an approach emphasizes negotiated approaches and coordination between different forums, rather than centralizing implementation within a single organization prone to seek stability by promoting existing activities at the expense of innovation. It is therefore forward looking. Having multiple fora for implementing cooperation may be especially important when it unclear what is possible or existing fora do not provide adequately opportunities for some groups to participate in water governance or do not adequately protect minority interests.

Regardless of the range of issues institutional arrangements need to discuss tradeoffs and be link their deliberations to implementation. According to Conca, “The most common form of water conflict today is not the interstate water wars foreseen by so many
international relations prognosticators, but rather the societally based conflicts between
the proponents and opponents of controversial ways of manipulating water or the rules
controlling it (Conca, 2006):376).” Despite the ubiquity of conflicts of interest, “There is
little formal effort to develop the structures that enable dialogue or balance the power of
specific interest groups (Moench et al., 2003):11).” Institutional arrangements that
include opportunities to manage tensions over time as stakeholders’ evaluations of the
opportunities and costs of cooperation change support the ability to adjust arrangements
over time.

The “Contingency Proposition” claims planning for different future outcomes makes it
easier to adjust to change than arrangements that expect stability and respond to change
through ad-hoc procedures. Contrary to the conventional wisdom, my findings suggest
the authority of the implementing organization to review operating procedures and
change them does not on its own make it easier for regimes to adjust to change. However,
the implementing organization can assume an important role in supporting the regime’s
other adaptive functions, such as managing tensions between parties. Although the
implementing organization is itself a stakeholder and can therefore not be considered a
neural party, it does have the capacity to convene new forums for engaging stakeholders
in deliberations about contentious issues, for example about how to address unilateral
river use or development.

My findings suggest it is important for institutional arrangements to include review
periods and contingent agreements, which are rarely included in international agreements
even though cooperative arrangements can have unintended consequences. Speaking about adapting to climate change Adger et al comment,

Potentially, any adaptation action can create unintended impacts on other natural and social systems....In practice, there may be considerable uncertainty over the impact of an adaptation action. In some cases the impact may be clear and immediate, and past experience may be a very useful guide. In other cases, for example where the action is innovative, the consequences may not be known. (Adger, Arnell, & Tompkins, 2005:81).

Adaptive water governance is a large scale experiment, with uncertain outcomes. For example, a Romanian participant in the Danube water protection regime said, “There is not exist some sort of a,b,c, you should apply these rules. So, it is difficult to say what could happen in the near future (Interview Danube 20, 2006).” Without knowing what the future will bring, review periods and contingent agreements create expectations and opportunities for participants to renegotiate their arrangements in the future. Along the lines of the maxim, “If you can’t change what you should, change what you can (Wildavsky, 1979:79)”, such mechanisms help the participants move beyond deliberation about ideal strategies to a discussion about arrangements that are currently feasible, while recognizing they are going to be temporary and subject to future renegotiation. By emphasizing implementation and expectations for the future this approach limits the ability of those engaged in water governance to claim they are engaging in adaptive governance when they are not.

The “Monitoring and Review Proposition” claims arrangements that encourage learning from experience support a regime’s ability to adjust to change. My findings suggest regime’s rarely formulate explicit hypotheses to test their expectations about the impacts of policy decisions. Nevertheless, data sharing and review procedures can support a
regime’s ability to adjust to change. In the conventional approach, “A passion for gaining power over nature by acting as if there had always been (and, therefore, always will be) an orderly universe overwhelms everyday observation to the contrary (Wildavsky, 1979):9.” Typically participants search for ideal institutional arrangements even if they are inappropriate to subsequent circumstances (Lankford et al., 2007). For example, short time horizons imposed by efficiency ideals or dictated by short-term consultancies and donor funding cycles exclude time-intensive opportunities for monitoring, evaluation, and learning (Blackstock, 2009). The expectation that circumstances will continue to be as they have been and the desire to maintain a familiar world make it difficult to adjust to changes and make the regime vulnerable to more dramatic change without negotiated solutions. In contrast, developing procedures for data sharing, such as a timetable for sharing specific kinds of data, and discussing how the data will be used to evaluate the existing agreement help participants focus on the future. The process of developing data sharing and review procedures requires participants to focus on implementation and be more realistic about what they can accomplish within a given time period. This supports their ability to develop strategies for renegotiating their arrangements in the future.

Conclusions

Asit K. Biswas, academic, advisor on water governance, president of the Third World Centre for Water Management, and 2006 winner of the Stockholm Water Prize, said

Countries now really have two fundamental choices in terms of managing their transboundary water resources in the future: Carry on as before with only incremental changes and a ‘business as usual’ attitude and thus endow their future
generations with a legacy of mostly inefficient water management practices, including potential serious conflicts on transboundary water bodies, or to continue in earnest in an accelerated effort to plan, manage and use their transboundary watercourses collaboratively, constructively and fairly. (Biswas, 2008):18)

This research finds that the kinds of institutional arrangements that are created for governing international water resources matters for how countries are able to adjust them in the future, but not always in the ways suggested by the literature. Participants in multilateral processes can design adaptive agreements that anticipate surprising changes in the natural and human systems, or in a more conservative approach, that assume the systems will behave in predictable and stable ways. The conservative approach reflects past and current circumstances, but creates significant barriers to addressing the future. In contrast, the adaptive approach to international water governance is a political act of liberation, a way of moving forward in contrast to the past (Gershoni, 2000). Adaptive water governance provides spaces for ongoing, consensus-orientated dialogue among stakeholders about the interdependency of the issues they want to address cooperatively (Bressers, Fuchs, & Kuks, 2004). Similar to the Roman concept of the limes, the adaptive approach imagines the river as a frontier, a space for interaction and dialogue (Plasienkova, 1998), subject to inherent conflict and uncertainty. The tension between the conventional and adaptive approach is likely to be evident in most efforts to govern international rivers. As Walters laments

Management is done by and for people; even the best ideas will be cast aside in favor of easy courses of action like pretending certainty or waiting for problems to take care of themselves. It is just too easy for people to hide behind platitudes like the need for caution, or the importance of detailed understanding before action, or the need to apply methods and models that have stood the test of time (usually without any real test, of course). (Walters, 1986):351)

4 See Chapter 2, footnote 21.
Short-term political considerations may make those who have influence over the conventional approach unwilling to try something new, misunderstanding the adaptive approach as a threat. This research indicates the bigger threat to long-term strategies to cooperative governance of international natural resources comes from the conservative objective of preserving the familiar world. The adaptive approach promises a more resilient long-term strategy, but policy-makers will need to bravely engage change.

Coda: Policy recommendations

The evidence from the Danube and Nile cases provides some insights for the practice of international environmental governance in general.

1. Commit to data sharing and review procedures

Institutional arrangements that create explicit data sharing and review procedures enable participants to compare the actual performance of policies with anticipated performance. Although such an evaluation is rarely undertaken in practice, the arrangements provide ongoing procedures for joint fact-finding and support for participants’ confidence in opportunities to renegotiate their arrangements. Data sharing and review procedures should include a role for a variety of knowledge producers, which can introduce adaptive approaches to counter the regime’s tendency to preserve the status quo. Review procedures also encourage policy-makers to discuss specifics for implementation and be realistic about what they
can achieve at any given time, making it less likely the ideal will become the enemy of the good.

2. Manage tensions and value differences among stakeholders.

Regimes that marginalize or exclude a group of stakeholders are more vulnerable to non-negotiated change. So, rules for participation need to consider minority interests and provide opportunities for the new stakeholders of the future to participate. There should also be some opportunity for interested “outsiders” to participate, such as by being an observer or in parallel forums.

3. An ongoing process is more important then form.

There is no “blueprint” approach or magic strategy (Merrey et al., 2007) by which regimes for international governance of natural resources will be able to adjust to change. The evidence supports the proposition that some elements of an adaptive approach can make it easier for regimes to adjust to change and some elements of a conventional approach can be barriers to cooperation. However, more important than any particular institutional arrangements is that the overarching approach to uncertainty and conflict create expectations for and opportunities to renegotiate agreements. The mechanisms for evaluating and renegotiating arrangements do not always have to be explicit, but it is important the participants expect such opportunities and can act on them in practice.
4. Let the issue determine the institutional arrangements.

A problemshed approach, in which institutional arrangements are determined by the issue being addressed, makes it possible to pursue multilateral cooperation in different fora, each with different institutional arrangements. Such an approach emphasizes negotiated approaches and coordination between different forums, rather than centralizing implementation within a single organization prone to seek stability by promoting existing activities at the expense of innovation. Having multiple fora for implementing cooperation may be especially important when it unclear what is possible or existing fora do not provide adequately opportunities for some groups to participate in water governance or do not adequately protect minority interests.
Appendix 1 Comparison of Conventional and Adaptive Approaches to International Environmental Governance

<table>
<thead>
<tr>
<th>Understanding The Problem</th>
<th>Conventional Governance</th>
<th>Adaptive Governance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge assumptions</td>
<td>Reductionist approach will help to understand the problem: Isolate different parts and reduce the system to its essential elements (Costanza et al., 1993)</td>
<td>Complex systems, integrated approach will help to understand the problem: Assume that the properties of the whole of the system may be different than the sum of its parts (Costanza et al., 1993)</td>
</tr>
<tr>
<td></td>
<td>Relationships underlying observed system behaviors are linear, stable and independent of context (Brunner et al., 2005; Costanza et al., 1993)</td>
<td>Relationships underlying observed system behaviors evolve, are non-linear and context-dependent (Brunner et al., 2005; Costanza et al., 1993)</td>
</tr>
<tr>
<td></td>
<td>Natural systems are considered the object of social management systems (Scoones, 1999)</td>
<td>Natural and social systems are considered interlinked and inseparable (Costanza et al., 1993; Cronon, 1990)</td>
</tr>
</tbody>
</table>

1 This table draws heavily on information included in Table 11.1, p.351 in (Walters, 1986); Figure 2.2, p.14 and Table 2.1, p.18 in (TERI & IISD, 2006); and Table 1.1, p.33-34 in (Brunner et al., 2005), along with information from the other sources cited.

The review is divided into different policy-making stages: Understanding the problem, Policy-making objectives, Policy implementation, Policy Evaluation and Policy Redesign. The stages heuristic builds on the framework developed by Lasswell, Brewer, de Leon and Wildavsky, among others (Brewer & de Leon, 1983; de Leon, 1999; Lasswell, 1951; Wildavsky, 1979). Although there are multiple, significant critiques of this linear approach (see for example (Repetto, 2006; Sabatier, 1999)), the categories of the policy-making process provide a clear basis for comparing conventional international water management approach and adaptive international water management. For example, Young and Haas, Keohane, and Levy employ a similar methodology, dividing international environmental policy-making processes into stages (Haas, Keohane, & Levy, 1993; Young, 2001). However, using the framework is not meant to imply that policy develops linearly.
<table>
<thead>
<tr>
<th>Knowledge generation objectives</th>
<th>Promote scientific consensus on understanding of cause and effect (Walters, 1986)</th>
<th>Uncover and embrace range of possibilities based on experience and understanding of systems dynamics and complexity (TERI &amp; IISD, 2006; Walters, 1986)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Build a single precise prediction (model) of policy that will achieve desired future condition (Bankes, 2002; Walters, 1986)</td>
<td>Begin a dialogue among stakeholders about possible outcomes (Lessard, 1998); Make plurality of values and considerations explicit (Norton, 2001)</td>
<td>Identify signposts (information that should be tracked to identify whether a policy reassessment is needed) or triggers (critical values of signposts that lead to implementation of contingent policies) (W. E. Walker et al., 2001)</td>
</tr>
<tr>
<td>Increase information on unknown social and environmental effects (Holling 1978); Rule out impossible scenarios (Lessard, 1998)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kinds of knowledge important to understanding the issue</td>
<td>Experimental, quantitative, and knowledge from other “hard” methods (Brunner et al., 2005)</td>
<td>Understand interactions between natural and human systems (Glouberman et al., 2003; Gunderson &amp; Holling, 2002; Holling, 1978); Provide information on stocks, flows, and process of resource systems being governed, and on relevant human-environment interactions that are appropriate to the scale of decision-making (Dietz et al., 2003)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Information that characterizes uncertainty and extent of scientific ignorance and disagreement (Dietz et al., 2003)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Information about the history of system dynamics (Costanza et al., 1993)</td>
</tr>
<tr>
<td>Science-based technologies (Brunner et al., 2005)</td>
<td>Qualitative, interpretive and integrative knowledge (Brunner et al., 2005)</td>
<td></td>
</tr>
<tr>
<td>Baseline information (Walters, 1997)</td>
<td>Both experiential and experimental knowledge (Berkes et al., 2003b; Glouberman et al., 2003), integrated into dynamic models that (1) aim to predict the impact of alternative policies, and (2) test these predictions through experimental management (Walters, 1997)</td>
<td></td>
</tr>
<tr>
<td>Scientific assessments within established procedures and boundaries (Brunner et al., 2005)</td>
<td>Multiple perspectives from a range of stakeholders (Holling, 1978)</td>
<td></td>
</tr>
<tr>
<td>Who provides knowledge</td>
<td>Experts</td>
<td>Range of stakeholders (Holling, 1978)</td>
</tr>
<tr>
<td>Policy-Making Objectives</td>
<td></td>
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<tr>
<td>--------------------------</td>
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</tr>
<tr>
<td>Seek to maintain a productive equilibrium (Walters, 1986)</td>
<td>Expect and profit from both anticipated and unanticipated change (Folke et al., 2005; Walters, 1986)</td>
<td></td>
</tr>
<tr>
<td>Achieve a single target (Holling, 2001)</td>
<td>Investigate ecosystem behavior by testing clearly formulated hypotheses about the behavior of an ecosystem being changed by human use (Lee, 1989, 1993)</td>
<td></td>
</tr>
<tr>
<td>Goals are fixed, given, or assumed to separate science from non science, and progress is measurable (Brunner et al., 2005)</td>
<td>Create new interdependencies among actor groups (Nooteboom, 2006); Integrate multiple goals (Brunner et al., 2005)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maintain ecosystem resilience and avoid irreversible flips to other equilibrium states (Holling, 2001)</td>
<td></td>
</tr>
<tr>
<td>Policies should adapt to anticipated conditions (TERI &amp; IISD, 2006)</td>
<td>No regrets: Develop policies that can perform well and be practically implemented under a range of anticipated conditions with no modification (Jowell &amp; UK Government Chief Social Researcher’s Office Cabinet Office, 2003; TERI &amp; IISD, 2006)</td>
<td></td>
</tr>
<tr>
<td>Policies should adapt to unanticipated conditions (TERI &amp; IISD, 2006)</td>
<td>Automatic adjustment: Policies auto-adjust based on pre-defined triggers and actions (TERI &amp; IISD, 2006)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Complex systems principles: Design policies based on principles for effective intervention in complex systems (TERI &amp; IISD, 2006)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formal review: Design policies with scheduled re-</td>
<td></td>
</tr>
<tr>
<td>Role of Uncertainty</td>
<td>Presume certainty in seeking best action (Walters, 1986)</td>
<td>Expect both predictable and unpredictable changes</td>
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<tr>
<td>-----------------------------</td>
<td>----------------------------------------------------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>Discout uncertainty (Brunner et al., 2005)</td>
<td>Incremental steps minimize unintended consequences of policy actions (Brunner et al., 2005)</td>
<td></td>
</tr>
<tr>
<td>Strategies to address uncertainty</td>
<td>Address deviations from predictions on an ad hoc basis (W. E. Walker et al., 2001)</td>
<td>Model uncertainty</td>
</tr>
<tr>
<td></td>
<td>For predictable uncertainty: Use probability, statistics, and statistical decision theory to address anticipated divergence between model predictions and system behavior (Bankes, 2002)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For unpredictable uncertainty: Use inductive models that allow knowledge to emerge during an iterative process, such as multiscenario simulation and analysis, Computer Assisted Reasoning, Agent-Based Modeling, to address “deep uncertainty” (uncertainty that results from complexity of system and adaptive, evolving strategies used by decision-makers) (Bankes, 2002; Lempert, 2002)</td>
<td></td>
</tr>
<tr>
<td>Make policies adaptable</td>
<td>Incorporate mechanisms to monitor implementation, evaluate future feedback and reassess policies (Lee, 1993; W. E. Walker et al., 2001)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adhere to principles for effective intervention in complex adaptive systems (TERI &amp; IISD, 2006)</td>
<td></td>
</tr>
</tbody>
</table>

For an in-depth comparison and discussion of methods for forecasting technologies see (Technology Futures Analysis Methods Working Group, 2004)
<table>
<thead>
<tr>
<th>Strategies to promote learning</th>
<th>Facilitate replication (Ruitenbeek &amp; Cartier, 2001)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scale</strong></td>
<td>Build networks of reciprocal interaction to foster trust and cooperation (TERI &amp; IISD, 2006)</td>
</tr>
<tr>
<td>Centralized decision-making</td>
<td>Build networks of reciprocal interaction to foster trust and cooperation (TERI &amp; IISD, 2006)</td>
</tr>
<tr>
<td>Design policies based on an ecosystem based approach (attempt to internalize as many interactions as possible), but implement policies at multiple scales according to a polycentric approach (cross-level, neither centralized nor decentralized decision-making) (Folke et al., 2005)</td>
<td></td>
</tr>
<tr>
<td><strong>Perception of decision-maker</strong></td>
<td>Promote variation and redundancy (Berkes et al., 2003b) (Glouberman et al., 2003; Holling, 1978)</td>
</tr>
<tr>
<td>Monolithic (Bankes, 2002); Single central authority (Brunner et al., 2005)</td>
<td>Communities of stakeholders (Bankes, 2002); Hierarchies of nested decision-makers (Holling, 2001); Fragmented authority and control (Brunner et al., 2005)</td>
</tr>
<tr>
<td><strong>Role of public participation</strong></td>
<td>Role of conflict</td>
</tr>
<tr>
<td>Public interest perceived as aggregate</td>
<td>Minimize conflict among actors (Walters, 1986); Highlight difficult tradeoffs among alternatives (Walters, 1986); Adaptive tensions should be managed, but not minimized (McKelvey, 2001)</td>
</tr>
<tr>
<td>Public provides input in pre-project discreet events</td>
<td></td>
</tr>
<tr>
<td><strong>Role of conflict</strong></td>
<td>Role of conflict</td>
</tr>
<tr>
<td>Resources needed for implementation</td>
<td>Resources needed for implementation</td>
</tr>
<tr>
<td>Bureaucracy enforces rules and regulations based on expertise and authority (Brunner et al., 2005)</td>
<td>Community-based initiatives compensate for bureaucratic deficiencies; local knowledge, trust and respect are necessary (Brunner et al., 2005)</td>
</tr>
<tr>
<td><strong>Policy Evaluation</strong></td>
<td>Policy Evaluation</td>
</tr>
<tr>
<td>Objectives</td>
<td>Objectives</td>
</tr>
<tr>
<td>Planning is the priority of the policy process, monitoring and evaluating are not (Brunner et al., 2005)</td>
<td>Policy process is dependent on monitoring and evaluation (Brunner et al., 2005)</td>
</tr>
<tr>
<td>Criteria for evaluating policies</td>
<td>Policy Evaluation</td>
</tr>
<tr>
<td>Optimality based on predicted performance (W. E. Walker et al., 2001)</td>
<td>Robustness properties across a range of futures (Bankes 2002) (W. E. Walker et al., 2001)</td>
</tr>
<tr>
<td>Contribution to social learning (W. E. Walker et al., 2001)</td>
<td>Use precise, local measurements (Walters, 1997)</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Use large-scale measurements (Walters, 1997)</td>
<td></td>
</tr>
</tbody>
</table>

### Policy Re-design (Alternatives in (Gunderson & Holling, 2002))

<table>
<thead>
<tr>
<th>None; Policy process ends with implementation</th>
<th>Process seen as continuous</th>
</tr>
</thead>
</table>
Appendix 2  Literature Review of Institutional Features

This is a summary of a review of what the literature (contained in detail in the following table) recommends (1) should be the functions of river basin organizations (RBOs), (2) what operating procedures RBOs should use to promote cooperation, and (3) identifies as important factors affecting the ability of RBOs to facilitate cooperation.

1. RBO Functions
   - *Basin-wide planning*
     A primary function of RBOs is to facilitate regional level planning to enable nations to reap the benefits of cooperation. Towards this goal, the RBO often articulates a shared vision for collaboration, priority concerns, and specific regional actions to address these. Specific sub-regional or national plans may also be included.
     **Specificity of priority concerns:** The specificity of the priorities identified is important to implementing actions to address them. Diffuse, broad concepts of cooperation are difficult to act on. Increasing complexity of proposals may also translate into complex political negotiations. RBOs may clarify and simplify objectives by developing transboundary analyses of critical issues, with the involvement of all stakeholders.
     **Feasibility of priority actions and targets:** The RBO must set reasonable targets and develop strategies to support actions designed to reach them. Unreasonable targets and poorly supported actions are unlikely to promote cooperation or help participants attain shared benefits.
     **Cost sharing of agreed upon projects:** In order to finance regional development projects, RBOs may need to develop systems to share costs between nations.
   - *Data collection and analysis*
     The RBO can develop a centralized database system, where data collected and processed by each nation can be compiled, harmonized, analyzed, and made publicly accessible. RBOs can develop coordinated basin-wide monitoring systems of water use, pollution and environmental quality. The RBO can also identify specific weaknesses in data collection and analysis techniques within the basin, and develop strategies to address these.
   - *Mobilization of funds to support agreed upon projects*
     Many international donors require international agreement before they will agree to finance development projects on transboundary waters. By embodying this principle of cooperation, RBOs can effectively solicit development.
   - *Implementation of projects*
     RBOs can implement projects as joint ventures in which ownership is shared by all participants. Alternately, the RBO may coordinate the implementation of a project by one nation, with the planning and financial support of the others. Evaluation and reporting of implementation is an important function that the
RBOs can perform to promote compliance with agreed upon measures among participants.

- **Dispute settlement mechanisms**
  An RBO can provide a forum for participants to articulate their disputes and to work together to come to agreement. The participants may give the RBO authority to mediate or decide disputes. The authority given to the RBO in this and other domains can significantly impact the ability of the RBO to perform its functions.

- **Decentralization of management responsibilities**
  An RBO can work with different stakeholders to transfer tasks and competencies to the most appropriate departments, agencies, or administrative levels. The objective of this is to guarantee effectiveness and efficiency of measures, create transparency, and stimulate public accountability through participation.

2. Recommended RBO operating procedures

- **Transparency**
  RBOs can engender confidence among participants if their procedures and decisions are as transparent as possible. RBOs can increase transparency by providing regular reports of their current activities to all participants.

- **Fairness**
  It is important that participants feel that they can participate fairly in RBO negotiations. One strategy to articulate fairness may be to specify the water rights of the riparian states. Another may be to specify the conditions for participating in the RBO negotiations.

- **Regularity of meetings**
  Regular meetings of participants can foster collaboration. RBOs can provide a neutral forum for such meetings to occur.

- **Inter-ministerial involvement within nations**
  The relevant sectors within each nation must participate in order for RBOs to coordinate implementation of priority actions. This is coordinated by specific nations.

- **Participation of civil society**
  Civil society bears the effects of most environmental problems and may also be significant contributors to them. By including the participation of civil society the RBO can ensure that the needs of the region’s population are met. This can also help the RBO to build support for implementation of its plans.

- **Participation of private sector**
  In many cases the private sector is responsible for much of the water management within the basin. Their participation is essential to bring about improvements. Industry may also be interested in investing in development projects.

- **Involvement of scientists and experts**
  The expertise of scientists and experts should be included in the RBO’s management plans in order to ensure that the projects identified are appropriate to address the basin’s priority concerns.

- **Involvement of international agencies**
International agencies can provide critical support for all aspects of the RBOs functions.

- **Use of outside consultants to fill capacity deficiencies**
  Outside consultants can fill deficiencies in capacity within the basin. They can also serve as neutral sources for data collection and monitoring, and increase confidence in the data.

- **Cooperative arrangement for joint management**
  An RBO can facilitate the development of a formal framework for regional cooperation on management of the shared waters. In the absence of a formal agreement, RBOs can institutionalize norms and informal arrangements to coordinate cooperation.

3. Other important factors

- **National characteristics**
  - **Political stability**: Violent conflict, changing political systems, and population displacements can severely hinder the capacity of RBOs to coordinate regional water management. The comparative military power in the basin can also impact cooperation.
  - **Economic development**: Wealthier nations can finance development projects in other countries. Therefore, disparities in economic development can positively affect coordination by RBOs. However, if the regional level of economic development is insufficient to support joint projects, it can also negatively affect cooperation. In such cases, international investment can have a significant beneficial impact on cooperation in the basin.
  - **Dependence on shared water**: Nations may have different incentives to cooperate depending on their level of dependence on the shared water, and on the degree of control they have over it.
**Table Format:**
- **Author(s) arranged in chronological order.**
- **Institutional Context** context within which the author(s) referred to the feature or criteria
- **Feature** specific institutional feature or criteria referred to in the literature
- **Clarification** explanation or definition provided by the author(s)
- **Other details provided** related comments or examples provided by the author(s)

**Abbreviation:** (RBO) River Basin Organization

<table>
<thead>
<tr>
<th>Reference</th>
<th>Institutional Context</th>
<th>Feature</th>
<th>Clarification</th>
<th>Other details provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>(D. LeMarquand, 1993)</td>
<td>Criteria for evaluation of RBOs</td>
<td>Efficiency</td>
<td>Ability of governments to solve transboundary problems in a timely and efficient manner</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Responsiveness to public concerns and interests as those affected by policies</td>
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<td></td>
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<tr>
<td></td>
<td>Political accountability to those affected by actions</td>
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<tr>
<td></td>
<td>Information dissemination</td>
<td></td>
<td>Sharing of data with governments and public to inform of emerging water management issues</td>
<td></td>
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<tr>
<td></td>
<td>Constraint of sovereignty and territorial integrity</td>
<td></td>
<td>Institutional arrangements should lessen both of these by elevating environmental considerations over politics</td>
<td></td>
</tr>
<tr>
<td>Institutional Context</td>
<td>Feature</td>
<td>Clarification</td>
<td>Other details provided</td>
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<td></td>
</tr>
<tr>
<td>Features of RBOs</td>
<td>Scope of objectives</td>
<td>Narrow range of issues facilitates success</td>
<td></td>
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<tr>
<td>Joint fact finding</td>
<td>Establishment of a common factual and technical base</td>
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<tr>
<td>Reputation for impartiality</td>
<td>Developed by using consensus as basis for decisions</td>
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<tr>
<td>Fostering of a technical community</td>
<td>Informal network of water managers facilitates cooperation</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Adaptability and flexibility</td>
<td>Ability to address new and changing issues</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independence from governments and government agendas</td>
<td>Governments will not rely on RBO if it provides unwelcome advice; RBO are dependent on governments for staffing with technical personnel and budget</td>
<td>Governments may opt to address issue through arrangements outside of the RBO structure and/or limit the issues within the scope of the RBO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institutional mandate</td>
<td>Authority to pursue objectives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Political will</td>
<td>Government’s desire for cooperation balanced with the constraints on this arising from the geopolitical characteristics of an issue, domestic politics, and the general political situation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institutional evolution</td>
<td>Institutional functions may change</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relationship to sub-national governments</td>
<td>Particularly where the state has primary jurisdictional responsibility</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Relationship to public</td>
<td>Important in reducing public to government disputes</td>
<td></td>
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</tr>
<tr>
<td>Conditions which affect success of RBOs</td>
<td>Population growth</td>
<td></td>
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<tr>
<td>Other existing transboundary issues</td>
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<tr>
<td>Institutional Context</td>
<td>Feature</td>
<td>Clarification</td>
<td>Other details provided</td>
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<tr>
<td>Differences in negotiating capacity</td>
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<tr>
<td>Riparian position</td>
<td></td>
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</tr>
</tbody>
</table>

**Brunnee, 1997**

<table>
<thead>
<tr>
<th>Shortcomings of regimes</th>
<th>Narrow focus of agreement</th>
<th>Not flexible enough to address new issues or inter-sectoral interactions</th>
<th></th>
</tr>
</thead>
</table>

**A. M. Duda, 1994**

<table>
<thead>
<tr>
<th>Key elements of joint institutions</th>
<th>Ecosystem-based, watershed approach targeted to priority areas</th>
<th>In order to sustain aquatic systems more than just the riparian areas need to be considered</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent entity to oversee joint fact-finding</td>
<td>Representatives from all cooperating nations should participate in an impartial organization</td>
<td>This will facilitate the working together of all levels of government more than intermittent meetings or diplomatic processes can</td>
<td></td>
</tr>
<tr>
<td>Written agreement</td>
<td>This should specify joint vision, authority, specific commitments and objectives, time frames and resources for action</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public, stakeholder, jurisdictional involvement</td>
<td>Public may need to be empowered to participate</td>
<td></td>
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</tr>
<tr>
<td>Independent secretariat</td>
<td>Staff and funding must be ensured</td>
<td></td>
<td></td>
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</tbody>
</table>

**Rangeley, 1994**

<table>
<thead>
<tr>
<th>Features of successful RBOs</th>
<th>Need for development</th>
<th>Emphasis on socio-economic benefits, not political aspirations</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Well focused and technically sound objectives</td>
<td>Diffuse mandate (used synonymously with objectives) may create difficulties, a broad mandate can impose an onerous burden on the RBO; The mandate should be flexible to adapt to future needs</td>
<td>Authors differentiate between RBOs that focus on water resource development, on water and water-related development (ex forestry, energy), and on resource development more generally</td>
<td></td>
</tr>
<tr>
<td><strong>Institutional Context</strong></td>
<td><strong>Feature</strong></td>
<td><strong>Clarification</strong></td>
<td><strong>Other details provided</strong></td>
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<tr>
<td>Focus on construction of works instead of on planning</td>
<td>Structure of financing, ownership, and management of water-related projects in the basin need to be specified</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Few member countries</td>
<td>Too many states can create difficulties</td>
<td></td>
<td></td>
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<tr>
<td>Strong commitment by nations</td>
<td></td>
<td></td>
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<tr>
<td>Active support from external donor agencies</td>
<td></td>
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</tr>
<tr>
<td>Council of Ministers should meet regularly</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Functions of RBOs</td>
<td>Data collection and processing</td>
<td>The RBO should centralize information</td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td>Build capacity of personnel and access to technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water allocation</td>
<td>An agreement on water sharing should be developed and allocations monitored</td>
<td>Disputes over an agreement may hold up development</td>
<td></td>
</tr>
<tr>
<td>Raising funds for studies and projects</td>
<td>Funding agencies are often willing to support regional cooperation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost sharing</td>
<td>Shares may be equal or proportional to estimated benefits, catchment areas, population in catchment areas, or gross national product</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation of projects</td>
<td>RBO can implement common works or singly owned projects on behalf of member states, or in some combination with them</td>
<td></td>
<td></td>
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<tr>
<td>Project operation and maintenance</td>
<td></td>
<td></td>
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<tr>
<td>Monitoring water use, control of pollution and protection of environmental conditions</td>
<td>Implementing this will require complimentary legislation in states</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institutional Context Feature</td>
<td>Clarification</td>
<td>Other details provided</td>
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<tr>
<td>Obstacles to RBOs Sovereignty</td>
<td>Leads to general and vague commitments, agreements based on lowest common denominator at which consensus can be reached</td>
<td>Joint participatory processes and checks and balances of institutional framework lessen threats to sovereignty</td>
<td></td>
</tr>
<tr>
<td>Political concerns</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of freshwater framework convention</td>
<td>Fragmented legal structure</td>
<td></td>
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<tr>
<td>Lack of involvement of subnational units of government</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Lack of involvement of other stakeholders</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Disparity in economic status between countries</td>
<td></td>
<td></td>
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<tr>
<td>Time</td>
<td>Many environmental problems require urgent attention, traditional approaches or arbitration can take a long time</td>
<td></td>
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<tr>
<td>Features enabling transboundary water management Interministerial coordination within nations</td>
<td></td>
<td></td>
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<tr>
<td>Joint fact finding</td>
<td>Production of a transboundary water resources analysis through sharing of information</td>
<td>Neutral secretariat may facilitate</td>
<td></td>
</tr>
<tr>
<td>Identification of priority concerns</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development of strategic action plan to address priority concerns</td>
<td>Reduce complex problems into manageable ones with specific actions</td>
<td></td>
<td></td>
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<tr>
<td>Harmonization among nations</td>
<td>Economic advantages should not accrue to any one nation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matching of donor financing with specific needs</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Stakeholder participation</td>
<td></td>
<td></td>
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<tr>
<td>Public participation</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Institutional Context</td>
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<td>------------------------</td>
</tr>
<tr>
<td>Evaluation</td>
<td></td>
<td>Advisory function to governments regarding progress</td>
<td>No threat to sovereignty</td>
</tr>
<tr>
<td>Reporting</td>
<td></td>
<td></td>
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<tr>
<td>Capacity building</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transparency</td>
<td></td>
<td>Needed to build trust</td>
<td></td>
</tr>
</tbody>
</table>

(Schiffler, 1998)

<table>
<thead>
<tr>
<th>Factors by which to assess international water agreements</th>
<th>Consideration of customary international law (^{377})</th>
<th>In particular, the doctrine of limited territorial sovereignty</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Consideration of the water rights of other riparian states, which are not signatories of the international water agreement</td>
<td>Should contain a reference that signatories seek joint negotiations with other concerned states and that rights of other riparians are recognized</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Distribution of the risk of low flow rates</td>
<td>Fluctuations in water flow rates should be taken into account</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water quality and protection of wetlands</td>
<td>These issues should be incorporated into the agreement; Polluter-pays principle should be respected</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monitoring and enforcement of water agreements</td>
<td>Procedures need to be elaborated and an institution created</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Implicit or explicit linkage of the water question with other (political) issues</td>
<td>Interlinkages with other issues will affect water negotiations</td>
<td></td>
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</tbody>
</table>


Factors that affect implementation, compliance, and effectiveness of international accords

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<table>
<thead>
<tr>
<th>Institutional Context</th>
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</thead>
<tbody>
<tr>
<td>Characteristics of the activity</td>
<td>Differences in value of the regulated activities and resources, ease of monitoring, and organization of regulation can be significant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Characteristics of the accord</td>
<td>Procedural and substantive factors can be significant</td>
<td>These include the structure of negotiations, the nature of obligations, precision of duties, implementation and compliance mechanisms, developing an information system, monitoring and reporting procedures, analysis and dissemination of information, dispute resolution mechanisms, and the creation of a secretariat</td>
<td></td>
</tr>
<tr>
<td>International Environment</td>
<td>Compliance or noncompliance of other nations affects willingness to abide by accord; Freeloaders can be important; Involvement of international organizations, nongovernmental organizations and the media can be important</td>
<td>These affect international momentum, which can be significant</td>
<td></td>
</tr>
<tr>
<td>Factors involving the countries</td>
<td>Social, political, economic characteristics of countries can be significant</td>
<td>These include the history of regulation in each country, transparency, leadership, capacity</td>
<td></td>
</tr>
</tbody>
</table>

(H. H. G. Savenije, van der Zaag, Pieter, 2000)

Important functions of RBOs

<p>| Reconciling and harmonizing the interests of riparian countries | Includes information exchange, establishment of procedures to manage crises, human resource development, joint research, joint planning, joint ventures |
|Technical cooperation|</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>Standardization of data collection</td>
<td></td>
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<tr>
<td></td>
<td>Exchange of hydrologic and other information</td>
<td>This can help resolve conflicts based on wrong assumptions</td>
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<tr>
<td></td>
<td>Monitoring water quality and quantity</td>
<td></td>
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<td></td>
<td>Submission for examination and approval of proposed activities which could impact waters</td>
<td></td>
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<tr>
<td></td>
<td>Development of concerted action programs</td>
<td></td>
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<td></td>
<td>Enforcing agreements</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Dispute resolution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Features of effective RBOs</td>
<td>Strong political and financial commitment by cooperating states</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Clear definition of tasks</td>
<td></td>
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<tr>
<td></td>
<td>Well-defined procedures for interaction between the river basin organization and the national agencies</td>
<td></td>
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<tr>
<td></td>
<td>Organizational and incentive structure commensurate with RBOs responsibilities and legal status</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td>A long learning process is involved</td>
<td></td>
</tr>
</tbody>
</table>

*(P. van der Zaag, Savenije, Hubert H.G., 2000)*

<p>| Features that facilitate cooperation in shared river basins | System of technical communication and co-operation | Needed to maintain minimum levels of communication, to prevent conflicts from escalating, to build trust and mutual understanding |</p>
<table>
<thead>
<tr>
<th>Institutional Context</th>
<th>Feature</th>
<th>Clarification</th>
<th>Other details provided</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Adequate capacity</td>
<td>Each nation needs to be able to analyze and develop their negotiating position</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Free access to essential hydrological information</td>
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<tr>
<td></td>
<td>Economic cooperation</td>
<td>A system of open economic co-operation and market access can facilitate the trade of ‘virtual water’</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inclusion of different sectors</td>
<td>Involving other sectors can open up win-win propositions</td>
<td></td>
</tr>
</tbody>
</table>

(Chenoweth, 2001)

Factors influencing data and information exchange in international river basins:  

<table>
<thead>
<tr>
<th>Feature</th>
<th>Clarification</th>
<th>Other details provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatible needs</td>
<td>The potential for mutual benefit from cooperation and lack of perceived clash of interests</td>
<td>Existence of compatible political systems can facilitate negotiations, while differences can create mistrust</td>
</tr>
<tr>
<td>Absence of legacies of mistrust</td>
<td>Historical background of basin affects negotiations</td>
<td></td>
</tr>
<tr>
<td>Political stability</td>
<td>Facilitates development of cooperative structures</td>
<td></td>
</tr>
<tr>
<td>Common language and culture</td>
<td>Simplifies communication and reduces potential for misunderstandings</td>
<td></td>
</tr>
<tr>
<td>Sufficient levels of economic development</td>
<td>Overall level of development facilitates joint funding of cooperative processes</td>
<td></td>
</tr>
<tr>
<td>Increasing water resources stress</td>
<td>May induce cooperation rather than strife</td>
<td></td>
</tr>
<tr>
<td>Perception by basin countries that cooperation is of mutual benefit</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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378 Chenoweth and Feitelson consider information and data exchange critical for cooperation in international river basins, and specifically for confidence building. They define information and data as known facts and associated basic knowledge.
<table>
<thead>
<tr>
<th>Institutional Context</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>External pressure and funding for cooperative initiatives</td>
<td>Can affect perception by basin countries of benefits of cooperation</td>
<td>Significance of may depend on relative value compared to internal resources</td>
</tr>
<tr>
<td></td>
<td>Comparable levels of institutional capacity</td>
<td>Similar technical and administrative skills across basin</td>
<td>Gives rise to common values and a common technical language</td>
</tr>
<tr>
<td></td>
<td>Popular and political concern about water resources management</td>
<td>Increasing stress on water resources will feed concern if it impacts the general community or an empowered community</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Existence of a functional formal or informal cooperative arrangement</td>
<td>Necessary for systematic data and information exchange</td>
<td></td>
</tr>
</tbody>
</table>

(Kliot, 2001)

<table>
<thead>
<tr>
<th>Features of successful RBOs</th>
<th>Broad territorial and functional framework</th>
<th>Enables RBOs to address shared water resources in an almost optimal manner</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Limited territorial sovereignty upheld</td>
<td>Used synonymously with equitable utilization, general legal obligation to use one’s property in a manner which will not cause injury to others</td>
</tr>
<tr>
<td></td>
<td>Reflect current international laws</td>
<td>This refers to principles of equitable utilization of water resources, prevention of harm, consultation and early notification, and comprehensive planning and development</td>
</tr>
<tr>
<td></td>
<td>Significant role of external organizations and agencies</td>
<td>Provided necessary means for implementation</td>
</tr>
<tr>
<td></td>
<td>Congruence of RBO aims with cooperating nations’ foreign policy objectives</td>
<td></td>
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</tbody>
</table>

(J. I. Uitto, Duda, Alfred M., 2002)

<table>
<thead>
<tr>
<th>Factors contributing to success of RBOs</th>
<th>Time</th>
<th>Gaining commitments requires mutual trust, which takes time</th>
</tr>
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<tbody>
<tr>
<td>Institutional Context</td>
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<td>Clarification</td>
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<tr>
<td></td>
<td>Joint fact finding</td>
<td>Creates political buy-in and participation of different nations and interests within nations; Also requires participation of scientific community and can invite civil society participation</td>
</tr>
<tr>
<td></td>
<td>Collective planning process</td>
<td>Essential for initiating joint implementation of projects; Can include participation of civil society</td>
</tr>
<tr>
<td></td>
<td>Political will</td>
<td>Demonstrated through written commitment and establishment of institutions to review progress</td>
</tr>
<tr>
<td></td>
<td>Flexibility of project management</td>
<td>Must be able to respond to changing circumstances</td>
</tr>
<tr>
<td></td>
<td>Monitoring and evaluation</td>
<td>Can increase transparency regarding progress</td>
</tr>
<tr>
<td></td>
<td>Transparency</td>
<td>Information dissemination and public awareness building</td>
</tr>
<tr>
<td></td>
<td>Demonstration projects</td>
<td>On the ground implementation of projects for demonstration of RBO policies to wider public, can also build multi-country confidence in the benefits of cooperation</td>
</tr>
<tr>
<td></td>
<td>Involvement of sub-national governments and different ministries</td>
<td>Necessary for implementation</td>
</tr>
<tr>
<td></td>
<td>Involvement of public sector</td>
<td>NGOs can represent local stakeholders, can help ensure transparency and political support</td>
</tr>
<tr>
<td>Institutional Context</td>
<td>Feature</td>
<td>Clarification</td>
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<td>-----------------------</td>
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<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Issues that need to be addressed</td>
<td>Strong regional coordination unit</td>
<td>To support process</td>
</tr>
<tr>
<td>Capacity building</td>
<td>Setting of priority problems</td>
<td>These should be identified based on an assessment of environmental conditions in waters. This focuses multilateral action on the issues of greatest importance</td>
</tr>
<tr>
<td></td>
<td>Priority actions</td>
<td>Identification of country specific and joint actions to address priority problems</td>
</tr>
<tr>
<td></td>
<td>Harmonization of national legislation and institutions with agreed upon policies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Attraction of investments</td>
<td>To finance agreed upon actions</td>
</tr>
</tbody>
</table>
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