



TRANSBOUNDARY WATERS:
SHARING BENEFITS, LESSONS LEARNED

Thematic Background Paper

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1. DESCRIPTION OF TODAY 'S PROBLEM

1.1. Pressure

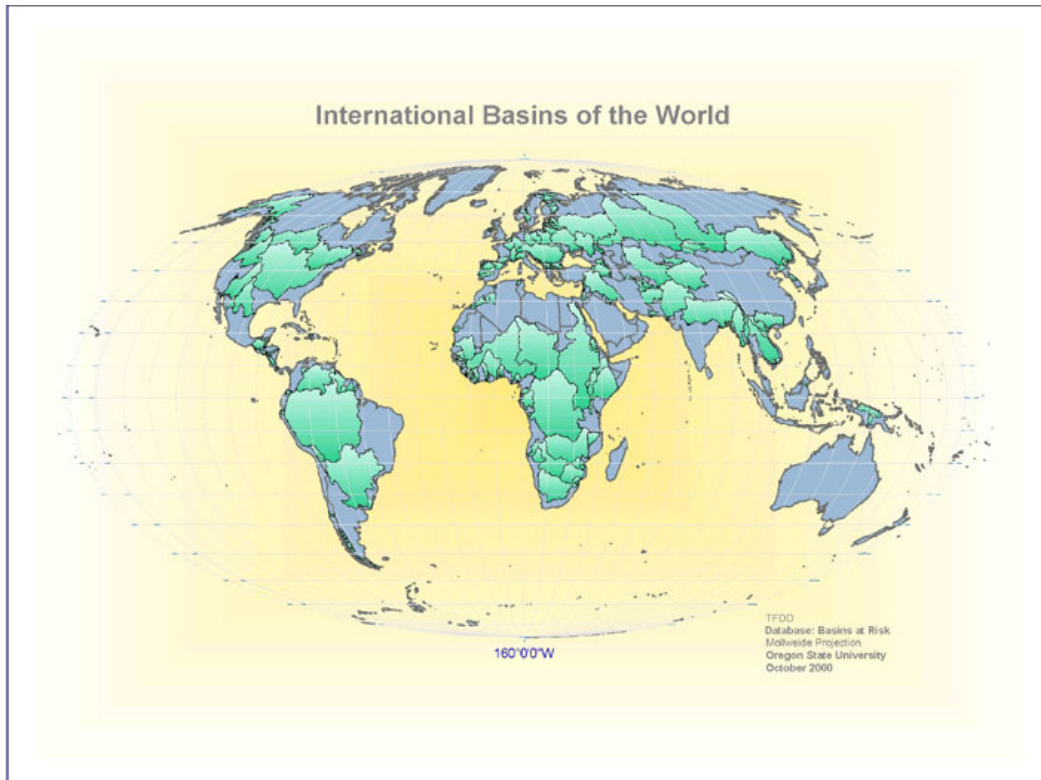
Security studies are only recently recognizing the mutual destabilizing forces of poverty and stability. The process of poverty alleviation is often hampered in regions where human security is at risk. As a consequence, much of the thinking about the concept of "environmental security" has moved beyond a presumed causal relationship between environmental stress and violent conflict to a broader notion of "human security" – a more inclusive concept focusing on the intricate sets of relationships between environment and society.

Within this framework, water resources – including scarcity, distribution, and quality – have been named as the factor most likely to lead to intense political pressures, while threatening the process of alleviating poverty. Water ignores political boundaries, evades institutional classification, and eludes legal generalizations. Worldwide, water demands are increasing, groundwater levels are dropping, water bodies are increasingly contaminated, and delivery and treatment infrastructure is aging.

Although wars over water have not occurred, there is ample evidence showing that the lack of clean freshwater has been linked to poverty and has led to intense political instability, and that acute violence has occasionally been the result. While these disputes also occur at the sub-national level, the human security issue is more subtle and more pervasive. As water quality degrades – or quantity diminishes - over time, the effect on the stability of a region can be unsettling, nowhere more so than in basins which cross political boundaries.

There are 261 watersheds which cross the political boundaries of two or more countries. These international basins cover 45.3% of the land surface of the earth, affect about 40% of the world's population, and account for approximately 60% of global river flow (Wolf et. al 1999). [See Figure 1: International Rivers.] These basins have certain characteristics that make their management especially difficult, most notable of which is the tendency for regional politics to regularly exacerbate the already difficult task of understanding and managing complex natural systems.

Disparities between riparian nations – whether in economic development, infrastructural capacity, or political orientation – add further complications to water resources development, institutions, and management. As a consequence, development, treaties, and institutions are regularly seen as, at best, inefficient; often ineffective; and, occasionally, as a new source of tensions themselves. Despite the tensions inherent in the international setting, riparians have shown tremendous creativity in approaching regional development, often through preventive diplomacy, and the creation of "baskets of benefits" which allow for positive-sum, integrative allocations of joint gains.



A closer look at the world's international basins gives a greater sense of the magnitude of the issues: First, the problem is growing. There were 214 international basins listed in 1978 (United Nations 1978), the last time any official body attempted to delineate them, and there are 261 today. The growth is largely the result of the "internationalization" of national basins through political changes, such as the break up of the Soviet Union and the Balkan states, as well as access to today's better mapping sources and technology.

Even more striking than the total number of basins is a breakdown of each nation's land surface which fall within these watersheds. A total of 145 nations include territory within international basins. Twenty-one nations lie in their entirety within international basins; including these, a total of 33 countries have greater than 95% of their territory within these basins. These nations are not limited to smaller countries, such as Liechtenstein and Andorra, but include such sizable countries as Hungary, Bangladesh, Byelarus, and Zambia.

A final way to visualize the dilemmas posed by international water resources is to look at the number of countries which share each international basin. Nineteen basins are shared by five or more riparian countries: one basin – the Danube, has 17 riparian nations; five basins – the Congo, Niger, Nile, Rhine and Zambezi – are shared by between nine and 11 countries; and the remaining 13 basins – the Amazon, Ganges-Brahmaputra-Meghna, Lake Chad, Tarim, Aral Sea, Jordan, Kura-Araks, Mekong, Tigris-Euphrates, Volga, La Plata, Neman, and Vistula (Wista) – have between five and eight riparian countries.

1.2. State

The scarcity of water in arid and semi-arid environments leads to intense political pressures, often referred to as "water stress." Furthermore, water ignores political boundaries, evades institutional classification, and eludes legal generalizations. The most recent legal document on international waters, the 1997 Convention on the Non-navigational Uses of International Watercourses is vague and occasionally contradictory, and international agencies

historically have been limited in developing a strategy to deal with international water resource disputes.¹

While water *quantity* has been the major issue of this century, water *quality* has been neglected to the point of catastrophe (CAFRW, 1997):

- More than a billion people lack access to safe water supplies;
- Almost three billion do not have access to adequate sanitation;
- Five to ten million people die each year from water-related diseases or inadequate sanitation;
- Twenty percent of the world's irrigated lands are salt-laden, affecting crop production.

Together, these issues – water as a critical, non-substitutable resource, which flows and fluctuates across time and space, for which legal principles are vague and contradictory, and which is becoming relatively more scarce and degraded as world populations and standards of living grow – provide compelling arguments for considering the security implications of water resources management. Add the fact that water has been a cause of political tensions between Arabs and Israelis; Indians and Bangladeshis; Americans and Mexicans; and all ten riparian states of the Nile River, and it is of little surprise that “water” and “war” are two topics being assessed together with increasing frequency.

One should note, however, that the record of acute conflict over international water resources is overwhelmed by the record of cooperation. The last 50 years have seen only 37 acute disputes (those involving violence) while, during the same period, 157 treaties negotiated and signed. The total number of water-related events between nations of any magnitude are equally weighted towards cooperation: 507 conflict-related events, and 1,228 cooperative. Violence over water seems neither strategically rational, hydrographically effective, nor economically viable. Overall, shared interests, human creativity, and institutional capacity along a waterway seem to consistently ameliorate water's conflict-inducing characteristics. These patterns suggest that the more valuable lesson of international water is as a resource whose characteristics tend to induce cooperation, and incite violence only in the exception (Wolf et al. forthcoming).

Nevertheless, it is important to understand there *is* history of water-related violence – but it is a history of incidents at the sub-national level, generally between tribes, water-use sectors, or states/provinces. In fact, there are many examples of internal water conflicts ranging from interstate violence and death along the Cauvery River in India, to California farmers blowing up a pipeline meant for Los Angeles, to much of the violent history in the Americas between indigenous peoples and European settlers. The desert state of Arizona in the United States even commissioned a navy (made up of one ferryboat) and sent its state militia to stop a dam and diversion on the Colorado River in 1934. What we seem to be finding is that geographic scale and intensity of conflict are *inversely* related.

While these disputes can and do occur at the sub-national level, the human security issue is more subtle and more pervasive. As water quality degrades – or quantity diminishes - over time, the effect on the stability of a region can be unsettling. An examination of relations between India and Bangladesh demonstrate these internal instabilities can be both caused and exacerbated by international water disputes. In the 1960s, India built a barrage at Farakka, diverting a portion of the Ganges flow away from its course into Bangladesh, in an effort to flush silt away from Calcutta's seaport, some 160 kilometers to the south. In Bangladesh, reduced upstream flow, while only occurring during a six-week period, resulted

¹ To date, four years after its adoption by the UN General Assembly, the Convention has only been signed by 16 countries and ratified by nine, well below the requisite 35 instruments of ratification needed to bring the Convention into force.

in a number of adverse effects: degraded surface and groundwater, impeded navigation, increased salinity, degraded fisheries, and endangered water supplies and public health. Migration from affected areas for these and economic reasons, have further compounded the problem. Ironically, many of those displaced in Bangladesh have found refuge in India. (It should be noted that India and Bangladesh signed a treaty amicably resolving these issues in 1996.)

Finally, there is the human security issue of water-related disease. It is estimated that between 5 and 10 million people die each year from water-related diseases or inadequate sanitation. More than half the people in the world lack adequate sanitation. Eighty percent of disease in the developing world is related to water. This is a crisis of epidemic proportions, and the threats to human security are self-evident, and not restricted to transboundary waters.

1.3. Response

In general, a pattern which emerges is as follows. Riparians of an international basin implement water development projects unilaterally first on water within their territory, in attempts to avoid the political intricacies of the shared resource. At some point, one of the riparians, generally the regional power,² will implement a project which impacts at least one of its neighbors. This might be to continue to meet existing uses in the face of decreasing relative water availability, as for example Egypt's plans for a high dam on the Nile, or Indian diversions of the Ganges to protect the port of Calcutta, or to meet new needs reflecting new agricultural policy, such as Turkey's GAP project on the Euphrates. This project which impacts one's neighbors can, in the absence of relations or institutions conducive to conflict resolution, become a flashpoint, heightening tensions and regional instability, and requiring years or, more commonly, decades, to resolve.

It feels both counterintuitive and precarious that the global community can let water conflicts drag on to the extent they often do – the Indus treaty took ten years of negotiations, the Ganges thirty, and the Jordan forty – while all the while water quality and quantity degrades to where the health of dependent populations and ecosystems are damaged or destroyed. A re-read through the history of international waters suggest that the simple fact that humans suffer and die in the absence of agreement apparently offers little in the way of incentive to cooperate, even less so the health of aquatic ecosystems. This problem gets worse as the dispute gains in intensity; one rarely hears talk about the ecosystems of the lower Nile, the lower Jordan, or the tributaries of the Aral Sea – they have effectively been written off to the vagaries of human intractability.

Just as the flow of water ignores political boundaries, so too does its management strain the capabilities of global institutions. Currently, there is no agency for the management of transboundary water resources. Several UN agencies, including UNEP, UNDP, UNESCO, WHO, FAO, and UNIDO incorporate water related issues in their charter, as does the World Bank. Recently, all of these agencies collaboratively produced the Comprehensive Assessment of the Freshwater Resources of the World (CAFRW). As well, many global water-related agencies cooperated recently in formation of the Global Water Partnership with the goal to coordinate water policy worldwide. Also established recently is the World Water Council, a self-described "think tank" for world water resources issues. However, none of these institutions incorporates mechanisms for the resolution of transboundary water

² *"Power" in regional hydro-politics can include riparian position, with an upstream riparian having more relative strength vis a vis the water resources than its downstream riparian, in addition to the more-conventional measures of military, political, and economic strength. Nevertheless, when a project is implemented which impacts one's neighbors, it is generally undertaken by the regional power, as defined by traditional terms, regardless of its riparian position.*

resources disputes within its mandate, and initiatives which *have* been taken have been the results of a few dedicated individuals within these agencies. Recently several donor countries, UN agencies, and NGO's have worked together to establish the Global Alliance for Water Security, a body intended to raise awareness and promote capacity building within priority basins – efforts which should help riparian states get ahead of the “crisis curve.”

Generalized legal principles for the management of transboundary waters are currently defined by the Convention on the Non-Navigational Uses of International Watercourses, ratified by the UN General Assembly in 1997. It took 27 years to develop the Convention, highlighting the difficulty of combining legal and hydrologic intricacies. Although it provides many important principles, including responsibility for cooperation and joint management, the Convention is also vague and occasionally contradictory. To date, these principles, and those of the Convention's precursors – the 1966 Helsinki Rules or subsequent draft articles by international legal bodies – have been explicitly invoked in no more than a handful of water negotiations or treaties. However, the Convention offers few practical guidelines for water allocations – the central issue in most water conflict.

International law concerns itself only with the rights and responsibilities between nations. Some political entities, such as Palestinians along the Jordan River or Kurdish peoples along the Euphrates River, who might claim water rights, would not be represented. In addition, cases are heard by the International Court of Justice (ICJ) only with the consent of the parties involved, and there is no practical enforcement mechanism to back up the Court's findings, except in the most extreme cases. A nation with pressing national interests can disclaim entirely the court's jurisdiction or findings. Since its creation in 1945, the ICJ has decided only one case regarding international waters.

- In the absence of detailed water law, adequate institutional capacity, or warfare, the countries that contain or border on the world's 261 international waterways have managed to “muddle through” to a remarkable degree. Cooperative water institutions have developed to a remarkable degree over the centuries. In contrast with the naturally vague and occasionally contradictory global declarations and principles, these institutions developed by co-riparian nations – including bilateral and multilateral arrangements, transboundary management institutions, and unofficial coordination – have been able to focus on specific, regional conditions and concerns.
- The FAO has identified more than 3,600 treaties, for example, relating to international water resources dating between AD 805 and 1984 (the majority of which deal with some aspect of navigation). Since 1814, nations have negotiated a smaller body of treaties that deal with non-navigational issues of water management, including flood control, hydropower projects, or allocations for consumptive or non-consumptive uses in international basins. The TFDD Project has an online collection of 145 of these treaties: it includes treaties established since 1870 that deal with water per se, and excludes those concerned only with boundaries, navigation, or fishing rights (see Table 1).

Table 1. Treaty Statistics Summary Sheet

Signatories

Bilateral 124/145 (86%)

Multilateral 21/145 (14%)

Council 26/145 (18%)

Force 2/145 (1%)

Economic 1/145 (<1%)

None/Not Available 116/145 (80%)

Principal Focus

Water Supply 53/145 (37%)

Hydropower 57/145 (39%)

Flood Control 13/145 (9%)

Industrial Uses 9/145 (6%)

Navigation 6/145 (4%)

Pollution 6/145 (4%)

Fishing 1/145 (<1%)

Unequal Power Relationship

Yes 52/145 (36%)

No/Unclear 93/145 (64%)

Information Sharing

Yes 93/145 (64%)

No/Not Available 52/145 (36%)

Monitoring

Provided 78/145 (54%)

No/Not Available 67/145 (46%)

Water Allocation

Equal Portions 15/145 (10%)

Complex but Clear 39/145 (27%)

Unclear 14/145 (10%)

None/Not Available 77/145 (53%)

Conflict Resolution

Council 43/145 (30%)

Other Governmental Unit 9/145 (6%)

United Nations/Third Party 14/145 (10%)

None/Not Available 79/145 (54%)

Non-Water Linkages

Money 44/145 (30%)

Land 6/145 (4%)

Political Concessions 2/145 (1%)

Other Linkages 10/145 (7%)

No Linkages 83/145 (57%)

Enforcement

Source: Hamner and Wolf (1998).

Despite their rich history, a reading of these 145 treaties reveals that the legal management of transboundary rivers is still in its conceptual infancy. More than half of these treaties have no monitoring provisions and, perhaps as a consequence, two-thirds do not delineate specific allocations and four-fifths have no enforcement mechanism. Moreover, the treaties that do specify quantities allocate a fixed amount to all riparian nations but one, and that one nation must then accept the balance of the river flow, regardless of fluctuations. Finally, multilateral basins are, almost without exception, governed by bilateral treaties, precluding the integrated basin management long-advocated by water managers.

Nevertheless, it is important to note that once cooperative water regimes are established through treaty, they turn out to be impressively resilient over time, even between otherwise hostile riparians, and even as conflict is waged over other issues.

Effective international and regional agreements, institutions for water sharing and basin management as well as forums and mechanisms for the resolution of international water disputes are needed. For millions of people the local source of water also happens to be a transboundary watercourse. When appropriate, these people should be assured access to and given a role in the management of the water by the authorities in their own state. At the same time the state authorities should guarantee an acceptable level of water quality and quantity for downstream countries.

Means need to be found for incorporating the wider public in the management of transboundary waters and for ensuring greater access to information. This would increase awareness and support for efforts to improve water policies.

An institutional framework providing for regular exchange of information is needed. It should allow riparians to manage the watercourse in the best interest for all and to increase transparency between different water use sectors as well as the professionals and experts engaged in water management.

In order to guarantee that water is used efficiently and responsibly the appropriate allocation of water, taking into account water productivity for all users (domestic, agricultural, industrial, environmental) of the shared resource, is important. A balance between economic progress, public well being and environmental integrity must be reached in every basin.

2. Success Stories and Lessons Learned

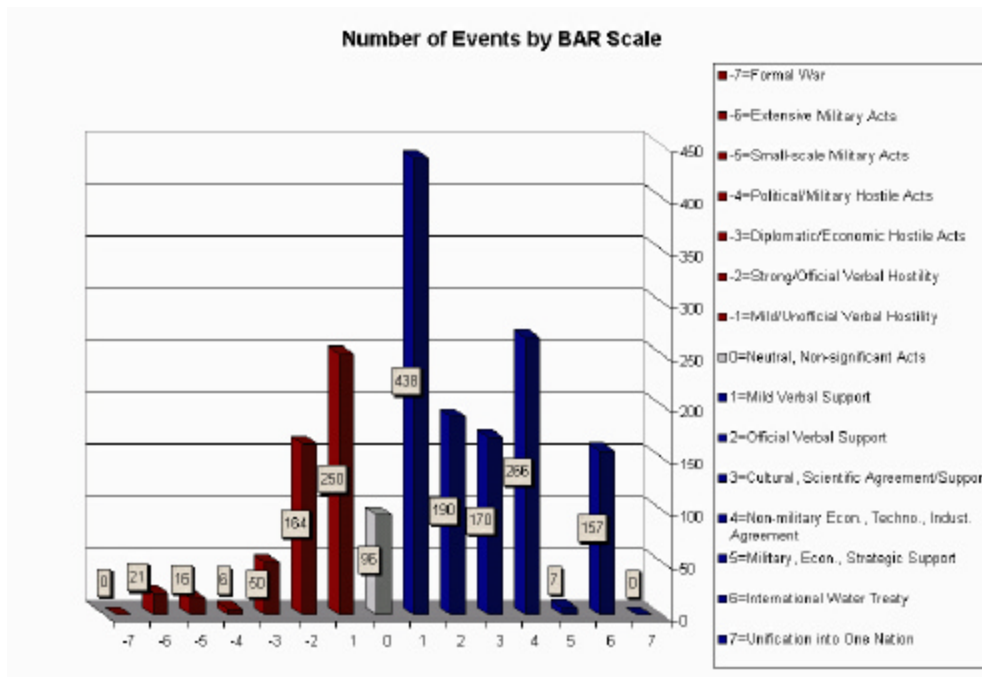
In the largest empirical study of conflict and cooperation over international waters undertaken to date, several colleagues and I attempted to compile a dataset of every reported interaction between two or more nations, whether conflictive or cooperative, which involved water as a scarce and/or consumable resource or as a quantity to be managed – i.e. where water is the *driver* of the event³, over the past 50 years.

Our overall distribution of events over the 50-year period of assessment is shown below in Figure 2: Number of Events by BAR Scale.⁴

³ Excluded are events where water is incidental to a the dispute, such as those concerning fishing rights, access to ports, transportation, or river boundaries. Also excluded are events where water is not the driver, such as those where water is a tool, target, or victim of armed conflict.

⁴ The Basins at Risk (BAR) Scale delineates events along a spectrum of conflict and cooperation, as shown in Figure 2.

Figure 2:



In general, we delineated a total of 1,831 events, and found the following:

No events on the extremes. In modern times, there has been no war (-7 on the BAR Scale) fought over water resources. In fact, one has to go back 4,500 years to find the single historical example of a true “water war,” to a dispute between the city-states of Lagash and Umma on the Tigris-Euphrates (Wolf 1998).

Likewise, there is no example of nations voluntarily unifying because of water resources (+7 on the BAR Scale).⁵

Most interactions are cooperative. Cooperative events are more than twice as common as conflictive events – there are 1,228 cooperative events (67.1%) and 507 conflictive events (27.7%). Ninety-six events (5.2%) were delineated as neutral or non-significant.

Most interactions are mild. Seven-hundred-eighty-four events, or 42.8% of all events, fall between mild verbal support (+1) and mild verbal hostility (-1). If we add the next level on either side – official verbal support (+2) and official verbal hostility (-2) – we account for 1,138 events, or 62% of the total. Another way to look at this is that almost two-thirds of all events are only verbal and, of those, more than two-thirds are reported as having no official sanction at all.

Water acts as an irritant. Water resources can make good relations bad and bad relations worse. Threats and disputes have raged across boundaries with relations as diverse as those between Indians and Pakistanis and between Americans and Canadians. Water was the last and most contentious issue resolved in negotiations over a 1994 peace treaty between Israel and Jordan, and was relegated to “final status” negotiations – along with other of the most difficult issues such as Jerusalem and refugees – between Israel and the Palestinians.

⁵ Two international basins were “lost,” however, when the two Germanies and the two Yemens unified.

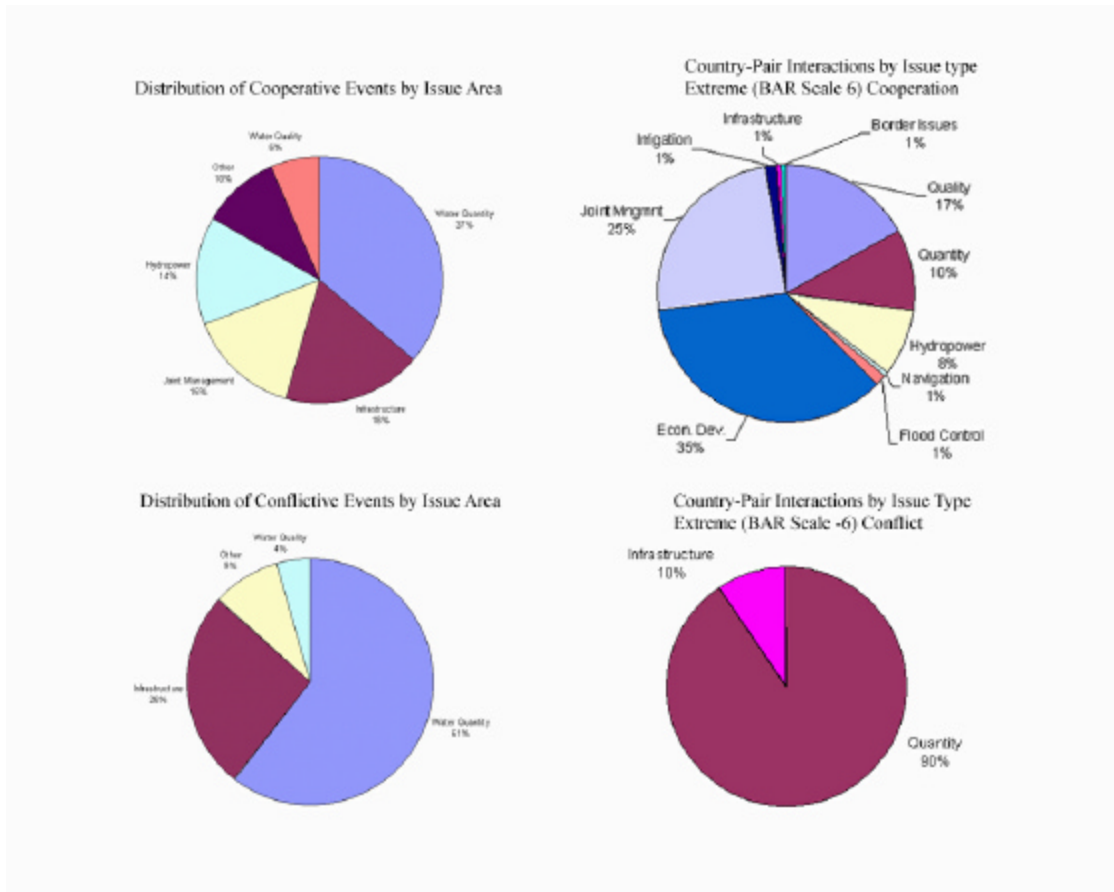
Water acts as unifier. Despite their complexity, the historical record shows that water disputes do get resolved, even among bitter enemies, and even as conflicts rage over other issues. Some of the most vociferous enemies around the world have negotiated water agreements or are in the process of doing so. The Mekong Committee has functioned since 1957, exchanging data throughout the Vietnam War. Secret "picnic table" talks have been held between Israel and Jordan since the unsuccessful Johnston negotiations of 1953-55, even as these riparians until only recently were in a legal state of war. The Indus River Commission survived through two wars between India and Pakistan. And all ten Nile riparians are currently involved in negotiations over cooperative development of the basin.

Overall, the major water-related issues are quantity and infrastructure. Figure 3 shows the number of events by issue area and the distribution of those events. Sixty-seven percent of events are primarily about water quantity and infrastructure (which are often inextricably related). Quality-related events only account for 5% of the total. (See Figure 3: Number of Events by Issue Area).

Nations cooperate over a wide variety of issues. Figure 3 also shows the distribution of cooperative events, and indicates a broad spectrum of issue types. If we look specifically at treaties, the most cooperative type of event, the breadth of cooperative issues is even wider, including quantity, quality, economic development, hydropower, and joint management.

Nations conflict over quantity and infrastructure. Finally, Figure 3 shows the distribution of conflictive events by issue area – 87% relate to water quantity and infrastructure. Again, if we look specifically at extensive military acts, the most extreme cases of conflict, almost 100% of events fall within these two categories.

Figure 3: Number of Events by Issue Area



Dams and diversions plus a high level of animosity and/or the absence of a transboundary institution. Table 2 shows the relationship between dam density per basin and the level of dispute. Dams, by themselves, seem to be moderate indicators – Table 2 shows a 12% drop in overall conflict/cooperation level in basins with high dam density versus basins with low dam density (see Table 2: Development and Institutional Capacity). Yet when we factor in the institutional capacity, as measured by the presence or absence of treaties, the differences are enhanced. Basins without treaties and high dam density are 29% lower in their average conflict/cooperation levels than basins without treaties and low dam density – more than twice the difference between similar densities but ignoring treaties. Conversely, the relationship between dam density and conflict level all but disappears in basins with treaties – only a 2% drop from low to high density. Even restricting ourselves to high dam density basins, there is a 26% drop in conflict/cooperation levels from basins with treaties to those without.

To further assess the role of treaties as institutional mechanisms capable of mitigating conflict, we analyzed the impact of treaties on annual levels of conflict/cooperation for each country pair. We found that in the three year period following treaty signature, average levels of conflict/cooperation were significantly higher (3.0 on the BAR Scale) than in “normal” years (2.2). We also found, perhaps surprisingly, that in the three year period preceding treaty signature, the average level of conflict/cooperation was no different (2.3) than in “normal” years.⁶ Treaty years, naturally, were the most cooperative (5.7).

Institutions matter.

In general, we find that most of the parameters previously identified as indicators of water conflict are actually only weakly linked to dispute. These parameters include: climate, water stress, dependence on hydropower, or dams or development *per se*. In fact, our study suggests that institutional capacity within a basin, whether defined as water management bodies or treaties, generally positive international relations, or higher levels of development, are as important, if not more so, than the physical aspects of a system. The relationship is hypothesized as follows:

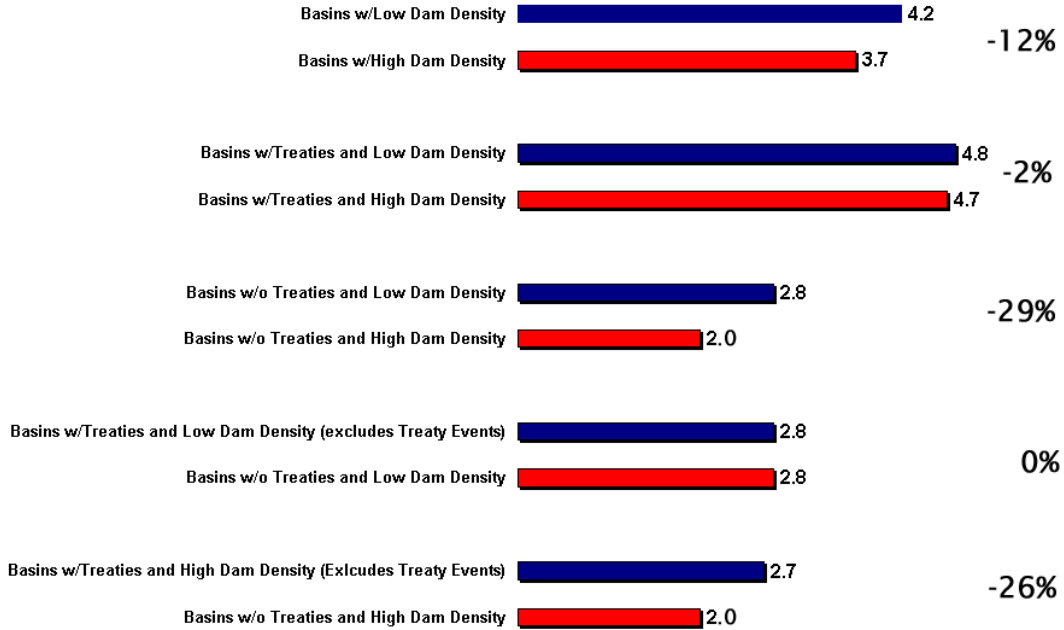
“The likelihood and intensity of conflict rises as the rate of change within a basin exceeds the institutional capacity to absorb that change.”

If institutional capacity is a driver, then it would stand to reason that the most significant indicators would be related to extremely rapid changes, either on the institutional side or in the physical system. The most rapid changes institutionally are associated with “internationalized” basins – i.e. basins whose management institution was developed under a single jurisdiction, but which was shattered as that jurisdiction suddenly became divided among two or more nations. On the physical system side, the most rapid change is typically the development of a large-scale dam or diversion project. But here, too, the institutional capacity makes a difference. In other words, high levels of animosity and/or the absence of a transboundary institution can exacerbate the setting, while positive international relations and/or the presence of transboundary institutions can mitigate the negative effects of such projects.

⁶ We had hypothesized that the years immediately preceding treaties would have a higher conflict level, assuming that a conflict is necessary to drive parties to negotiate to begin with.

TABLE 2:

Development and Institutional Capacity: Basin Setting and Corresponding BAR Scale



One productive approach to the development of transboundary waters has been to examine the benefits in the basin from a regional approach. This has regularly required the riparians to get past looking at the water as a commodity to be divided – a zero-sum, rights-based approach – and rather to develop an approach which equitably allocates not the water, but the benefits derived therefrom – a positive-sum, integrative approach.

The **Boundary Waters Agreement between Canada and the United States of America**, for example, allocates water according to equal benefits, usually defined by hydropower generation. This results in the seemingly odd arrangement that power may be exported out of basin for gain, but the water itself may not. In the 1964 treaty on the Columbia, an arrangement was worked out where the USA paid Canada for the benefits of flood control and Canada was granted rights to divert water between the Columbia and Kootenai for hydropower. Likewise, the 1975 Mekong accord defines "equality of right" not as equal shares of water, but as equal rights to use water on the basis of each riparian's economic and social needs. The relative nature of "beneficial" uses is exhibited in a 1950 agreement on the Niagara, flowing between the USA and Canada, which provides a greater flow over the famous falls during "show times" of summer daylight hours, when tourist dollars are worth more per cubic meter than the alternate use in hydropower generation (for further details see annex). In many water-related treaties, water issues are dealt with alone, separate from any other political or resource issues between countries – water *qua* water. By separating the two realms of "high" and "low" politics, or by ignoring other resources which might be included in an agreement, some have argued, the process is either likely to fail, as in the case of the 1955 Johnston accords on the Jordan, or more often to achieve a sub-optimum development arrangement, as is currently the case on the Indus agreement, signed in 1960. Increasingly, however, linkages are being made between water and politics, between water and other resources. These multi-resource linkages may offer more opportunities for creative solutions to be generated, allowing for greater economic efficiency through a "basket" of benefits.

Mekong Basin: In 1957 the creation of the Mekong Committee for Coordination of Investigations of the Lower Mekong Basin was the first example of UN involvement in a program to develop an international river basin. The new Mekong Agreement was signed in 1995 after a relatively short period of negotiation benefiting from a shared data base, long-established relationships, and familiarity of the key players with the provisions of relevant international jurisprudence. The Mekong Agreement clearly states the mutual commitment to cooperate. It established the Mekong River Commission as the international body that implements the Agreement and seeks cooperation on all aspects of water management (for further details see annex).

Indus Basin: Despite three wars and numerous skirmishes since 1948, India and Pakistan, with World Bank support, have managed to negotiate and implement a complex treaty on sharing the waters of the Indus River system. The Indus Water Treaty was finally signed in 1960. During periods of hostility, neither side has targeted the water facilities of the other nor attempted to disrupt the negotiated arrangements for water management (for further details see annex).

Nile River Basin: The political will to achieve a basin-wide agreement and framework for long-term cooperation on the part of the ten Nile Basin riparian states is gathering pace. In 1992 representatives of all ten states agreed upon a Nile River Basin Action Plan with the task of developing a cooperative scheme for the management of the Nile. In 1995 the World Bank, together with UNDP and the Canadian International Development Agency, accepted the request from the Nile riparian states to give impetus to the project. In 1999 the Nile Basin Initiative was launched, with the membership of all Basin States. The international community has facilitated an ongoing dialogue between the riparians of the Nile Basin to a process of dialogue and joint planning (for further details see annex).

Danube River Basin: The Danube Convention is a vital legal continuation of a tradition of regional management along the Danube dating back 140 years. As a document, it provides a legal framework for integrated watershed management and environmental protection along a waterway with wide-spread potential for disputes. The Environmental Program for the Danube River is also a basin-wide international body that actively encourages public and NGO participation throughout the planning process. This proactive stakeholder participation may help preclude future disputes both within countries and as a consequence, internationally (for further details see annex).

Jordan River Basin: Even while Israel and Jordan were legally at war, Israeli and Jordanian water officials met several times a year at so called „Picnic Table Talks“. As a result, when the Jordan-Israel Peace Treaty was signed in 1994, it was possible to include a well-developed annex acknowledging that, „water issues along their entire boundary must be dealt with in their totality“ (for further details see annex).

3. Issues and Policy Implications

Given these lessons, what can the international community do?

3.1. International Institutions:

Water dispute amelioration is as important, more effective, and less costly, than conflict resolution. Watershed commissions should be developed for those basins which do not have them, and strengthened for those that do.

Three characteristics of international waters – the fact that conflict is invariably sub-acute, that tensions can be averted when institutions are established early, and that such institutions are tremendously resilient over time – inform this recommendation. Early intervention can be far less costly than conflict resolution processes. In some cases, such as

the Nile, the Indus, and the Jordan, as armed conflict seemed imminent, tremendous energy was spent getting the parties to talk to each other. In contrast, discussions in the Mekong Committee, the multilateral working group in the Middle East, and on the Danube, have all moved beyond the causes of immediate disputes on to actual, practical projects which may be implemented in an integrative framework.

3.2. Funding and Development Assistance Agencies:

Water-related needs to be coordinated and focused, relating quality, quantity, groundwater, surfacewater, and local socio-political settings in an integrated fashion. Funding should be commensurate with the responsibility assistance agencies have for alleviating the global water crisis.

Ameliorating the crux of water security – human suffering – often rests with agencies that, given the size of the crisis, are extraordinarily underfunded. One can contrast the resources spent on issues such as global change and arms control, laudable for their efforts to protect against potential loss of life in the future, to the millions of people now dying because they lack access to clean fresh water. Agencies such as USAID, CIDA, GTZ, and JICA have the technical expertise and experience to help, yet are hindered by political and budgetary constraints. Funding agencies often are hamstrung by local politics. A powerful argument can be made that water-related disease costs the global economy US\$125 billion per year, while ameliorating the diseases would cost US\$7-50 billion in total (Gleick 1998). Programs such as USAID's Project Forward, which integrates water management with conflict resolution training, offer models for the future.

Donor agencies are able to provide expertise and financial resources, accelerating the rate at which activities are undertaken and to foster the transfer of experience between regions and countries. To maximise effectiveness, United Nations Agencies, Regional Banks and other organizations need to cooperate and coordinate their efforts.

The effective development of a process of engagement and discussion requires considerable third-party support and process financing. Donors contribute only a small proportion of total financial flows in transboundary water management. Therefore it is important to identify further innovative funding mechanisms.

3.3. Private Industry:

Private industry has historically taken the lead in large development projects. As the emphasis in much of world water shifts to a smaller scale, and from a focus on supply to one on demand management and improved quality, private industry has much to offer.

Private industry has three traits that can be harnessed to help ameliorate the world water crisis: their reach transcends national boundaries, their resources are generally greater than those of public institutions, and their strategic planning is generally superb.

The private sector can be a source of resource mobilization, complementing its comparative advantages to manage the design, construction and operation of water and energy facilities located in transboundary basins. In addition to mobilizing investment and management efficiency, the private sector can be an important source of innovation and creativity. Public-private- partnerships can be encouraged by developing an enabling environment for involvement of the private sector in financing interventions promoted by River Basin Organisations. This includes national legal frameworks that provide credibility and security, and reduce political risks.

Historically, private companies such as Bechtel and Lyonnaise des Eaux have been involved primarily in large-scale development projects, while the smaller-scale projects have been left to development assistance agencies. Recently, a shift in thinking has taken place in some

corporate board rooms. Bank of America, for example, was not involved in the California-wide process of water planning until recently, when its president noticed that practically *all* of the bank's investments relied on a safe, stable supply of water. This was true whether the investments were in micro-chip manufacturing, mortgages, or agriculture. When the bank became involved in the "Cal-Fed Plan," it brought along its lawyers, facilitators and planning expertise, and its financial resources. Subsequently, progress was made in several areas where previously there had been impasse.

3.4. Universities and Research Agencies:

Universities and research agencies can best contribute to alleviation of the water crisis in three major ways: 1) Acquire, analyze, and coordinate the primary data necessary for good empirical work; 2) Identify indicators of future water disputes and/or insecurity in regions most at risk; and 3) Train tomorrow's water managers in an integrated fashion.

The internet's initial mandate is still one of the best: to allow communication between researchers around the world to exchange information and enhance collaboration. The surplus of primary data currently threatens an information overload in the developed world, while the most basic information is often lacking in the developing world. Data availability not only allows for greater understanding of the physical world but, by adding information and knowledge from the social, economic and political realms, indicators showing regions at risk can be identified.

3.5. Civil Society:

Inherent in our recognition that the most serious problems of water security are those at the local level, is the attendant recognition that civil society is among the best suited to address local issues.

One recurrent pattern in water resources development and management has been a series of projects or approaches in opposition to local values, customs and other cultural processes. Examples of these include large projects such as dams that have displaced hundreds of thousands of people and wiped out sites of cultural and religious heritage, projects promoting water markets among religious groups for whom the idea is sacrilege, or activities as seemingly minor as cutting down a tree sacred to a village djinn. In recent years, as a consequence, those affected by a project have been increasingly involved in the decision-making process, and such efforts must be strongly encouraged.

Mechanisms to facilitate stakeholder participation should be incorporated into the design phase of a project as well as actual implementation, so that stakeholders participate in the discussion and planning process as much as possible.

An important role for NGOs is to channel feedback from civil society in the development of transboundary waters. NGOs can act as facilitators for activities aimed at increasing public participation and involvement. They can mobilize expertise and provide independent judgment and long term commitment that is different from the support normally obtained from professional consultant companies.

Annex: Case Studies of Transboundary Dispute Resolution

A) Danube River Convention

River Basin:	Danube
Dates of Negotiation:	1985-1994
Relevant Parties:	All riparian states of the Danube. Convention is the first designed through the process of public participation, including NGO's, journalists, and local authorities

The Problem

Prior to World War II, the European Commission of the Danube, with roots dating back to the 1856 Treaty of Paris and made up of representatives from each of the riparian countries, was responsible for administration of the Danube River. The primary consideration at the time was navigation, and the Commission was successful at establishing free navigation along the Danube for all European countries. By the mid-1980's, it becomes clear that issues other than navigation were gaining in importance within the Danube basin, notably problems with water quality. The Danube passes by numerous large cities, including four national capitals (Vienna, Bratislava, Budapest, and Belgrade), receiving the attendant waste of millions of individuals and their agriculture and industry. In addition, thirty significant tributaries have been identified as "highly polluted." The breakup of the USSR has also contributed to water quality deterioration, with nascent economies finding few resources for environmental problems, and national management issues being internationalized with re-drawn borders. Recognizing the increasing degradation of water quality, in 1985 the (at the time) eight riparians of the Danube signed the "Declaration of the Danube Countries to Cooperate on Questions Concerning the Water Management of the Danube," commonly called the Bucharest Declaration. This Declaration led in turn to the 1994 Danube River Protection Convention.

Background

The Danube River basin lies at the heart of central Europe and is Europe's second longest river, at a length of 2,857 km. The river's basin drains 817,000 km² including all of Hungary, most of Romania, Austria, Slovenia, Croatia, and Slovakia; and significant parts of Bulgaria, Germany, the Czech Republic, Moldova, and Ukraine. Territories of the Federal Republic of Yugoslavia -- Bosnia and Herzegovina, and small parts of Italy, Switzerland, Albania and Poland are also included in the basin. The Danube River discharges into the Black Sea through a delta that is the second largest wetland area in Europe. The river is shared by a large and ever-growing number of riparian states that for decades were allied with hostile political blocs; some of which are currently locked in intense national dispute. As a consequence, conflicts in the basin tended to be both frequent and intricate, and their resolution especially formidable.

Attempts at Conflict Management

World War II created new political alliances for the riparians, resulting in a new management approach. At a 1948 conference in Belgrade, the East Bloc riparians -- a majority of the delegates -- shifted navigation over to the exclusive control of each riparian. By the 1980's, though, quality considerations had led to the Bucharest Declaration of 1985, which reinforced the principle that the environmental quality of the river depends on the environment of the basin as a whole, and committed the riparians to a regional and integrated approach to water basin management, beginning with the establishment of a

basin-wide unified monitoring network. Basin-wide coordination was strengthened at meetings in Sofia in September 1991, in which the riparians elaborated on a plan for protecting the water quality of the Danube. At that meeting, the countries and interested international institutions met to draw up an initiative to support and reinforce national actions for the restoration and protection of the Danube River. With this initiative, named the Environmental Program for the Danube River Basin, the participants agreed to create an interim Task Force to coordinate efforts while a convention to steer the program was being negotiated.

Outcome

The principle of "participation" has been taken seriously in the work of the Environmental Program and the Coordination Unit. Initially, each riparian country was responsible for identifying two individuals to help coordinate activity within the basin. The first, a "country coordinator," usually a senior official, would act as liaison between the work of the program and the country's political hierarchy. The second, a "country focal point," would coordinate the actual carrying out of the work plan.

In July 1992, the coordination unit held a workshop in Brussels to help facilitate communication between the coordinators, the focal points, and the donor institutions. Representatives from each of the (by then) eleven riparians and 15 donor and non-governmental organizations attended. An important outcome of the workshop was that the participants themselves designed a plan for each issue covered. One issue, for example, was an agreement to produce national reviews of data availability and priority issues within each country. The information would be used by prefeasibility teams funded by donors who were to identify priority investments in the basin. During the workshop, participants developed the criteria for the national reviews and agreed on a schedule for their completion.

The principle of participation was carried one level deeper at the third Task Force meeting in October 1993 in Bratislava. At that meeting, the Task Force agreed to prepare a "Strategic Action Plan" (SAP) for the Danube basin, with the provision that, "consultation procedures should be strengthened." This last point is particularly noteworthy because it is the first time public participation has been required during the development of an international management plan. This concept rejects the principle that internal politics within nations ought to be treated as a geopolitical "black box," whose workings are of little relevance to international agreements, and instead embraces the vital need for input at all levels in order to ensure that the plan has the support of the people who will affect, and be affected by, its implementation.

In principle, the individuals who participated in the workshops would form a nucleus that would not only have input in the drafting of a SAP, but would be involved in reviewing future activities that would be implemented as part of the Plan. By July 1994, two consultation meetings were held in each of the nine countries.

On 29 June 1994, in Sofia, the Danube River basin countries and the European Union signed the Convention on Cooperation for the Protection and Sustainable Use of the Danube River (the Danube River Protection Convention) The Convention notes that the riparians of the Danube, "concerned over the occurrence and threats of adverse effects, in the short or long term, of changes in conditions of watercourses within the Danube River Basin on the environment, economies, and well-being of the Danubian States," agree to a series of actions, including:

- striving to achieve the goals of a sustainable and equitable water management, including the conservation, improvement and rational use of surface waters and ground water in the catchment area as far as is possible;
- cooperating on fundamental water management issues and take all appropriate legal, administrative and technical measures, to at least maintain and improve the

current environmental and water quality conditions of the Danube River and of the waters in its catchment area and to prevent and reduce as far as possible adverse impacts and changes occurring or likely to occur;

- setting priorities as appropriate and strengthening, harmonizing, and coordinating measures taken and planned to be taken at the national and international level throughout the Danube Basin aimed at sustainable development and environmental protection of the Danube River.

The Danube Convention is a vital legal continuation of a tradition of regional management along the Danube dating back 140 years. As a political document, it provides a legal framework for integrated watershed management and environmental protection along a waterway with tremendous potential for conflict.

In recent years, the riparian states of the Danube River have extended the principle of integrated management, and established a program for the basin-wide control of water quality, which, if not the first such program, has claims to being probably the most active and the most successful of its scale. The Environmental Program for the Danube River is also the first basin-wide international body that actively encourages public and NGO participation throughout the planning process, which, by diffusing the confrontational setting common in planning, may help preclude future conflicts both within countries and, as a consequence, internationally.

B) Euphrates Basin

River Basin:	Tigris-Euphrates
Dates of Negotiation:	Meetings since mid-1960's to present
Relevant Parties:	Iraq, Syria, Turkey

The Problem

In 1975, unilateral water developments came very close to provoking warfare along the Euphrates River. The three riparians to the river -- Turkey, Syria, and Iraq -- had been co-existing with varying degrees of hydropolitical tension through the 1960's. At that time, population pressures drove unilateral developments, particularly in southern Anatolia, with the Keban Dam (1965-73), and in Syria, with the Tabqa Dam (1968-73).

Background

Bilateral and tripartite meetings, occasionally with Soviet involvement, had been carried out between the three riparians since the mid-1960's, although no formal agreements had been reached by the time the Keban and Tabqa dams began to fill late in 1973, resulting in decreased flow down-stream. In mid-1974, Syria agreed to an Iraqi request that Syria increase the flow from the Tabqa dam by 200 MCM/yr. The following year, however, the Iraqis claimed that the flow had been dropped from the normal 920 m³/sec to an "intolerable" 197 m³/sec, and asked that the Arab League intervene. The Syrians claimed that less than half the river's normal flow had reached its borders that year and, after a barrage of mutually hostile statements, pulled out of an Arab League technical committee formed to mediate the conflict. In May 1975, Syria closed its airspace to Iraqi flights and both Syria and Iraq reportedly transferred troops to their mutual border. Only mediation on the part of Saudi Arabia was able to break the increasing tension, and on June 3, the parties arrived at an agreement that averted the impending violence. Although the terms of the agreement were not made public, Iraqi sources are cited as privately stating that the agreement called for Syria to keep 40% of the flow of the Euphrates within its borders, and to allow the remaining 60% through to Iraq.

Attempts at Conflict Management

The Southeast Anatolia Development Project (GAP is the Turkish acronym) has given a sense of urgency to resolving allocation issues on the Euphrates. GAP is a massive undertaking for energy and agricultural development that, when completed, will include the construction of 21 dams and 19 hydroelectric plants on both the Tigris and the Euphrates. [1.65] million hectares of land are to be irrigated and 26 billion kWh will be generated annually with an installed capacity of 7,500 MW. If completed as planned, GAP could significantly reduce downstream water quantity and quality.

A Protocol of the Joint Economic Committee was established between Turkey and Iraq in 1980, which allowed for Joint Technical Committee meetings relating to water resources. Syria began participating in 1983, but meetings have been in intermittent at best.

A 1987 visit to Damascus by Turkish Prime Minister Turgut Ozal reportedly resulted in a signed agreement for the Turks to guarantee a minimum flow of 500 m³/s across the border to Syria. According to Kolars and Mitchell (1991), this total of 16 BCM/yr. is in accordance with prior Syrian requests. However, according to Naff and Matson (1984), this is also the amount that Iraq insisted on in 1967, leaving a potential shortfall. A tripartite meeting between Turkish, Syrian and Iraqi ministers was held in November 1986, but yielded few results.

Talks between the three countries were held again in January 1990, when Turkey closed the gates to fill the reservoir behind the Ataturk Dam, the largest of the GAP dams, essentially shutting off the flow of the Euphrates for 30 days. At this meeting, Iraq again insisted that a flow of 500 m³/s cross the Syrian-Iraqi border. The Turkish representatives responded that this was a technical issue rather than one of politics and the meetings stalled. The Gulf War, which broke out later that month, precluded additional negotiations.

Outcome

In their first meeting after the war, Turkish, Syrian, and Iraqi water officials convened in Damascus in September 1992, but broke up after Turkey rejected an Iraqi request that flows crossing the Turkish border be increased from 500 m³/sec to 700 m³/sec. In bilateral talks in January 1993, however, Turkish Prime Minister Demirel and Syrian President Assad discussed a range of issues intended to improve relations between the two countries. Regarding the water conflict, the two agreed to resolve the issue of allocations by the end of 1993. Although an agreement has not, to date, been reached, Prime Minister Demirel declared at a press conference closing the summit that, "There is no need for Syria to be anxious about the water issue. The waters of the Euphrates will flow to that country whether there is an agreement or not."⁷ The issue remains unresolved.

C) Jordan River Watershed

River Basin:	Jordan River and tributaries (directly); Litani (indirectly)
Dates of Negotiation:	1953-1955; 1980's through the present
Relevant Parties:	United States (initially sponsoring); U.S. and Russia (sponsoring multilateral negotiations) Riparian entities: Israel, Jordan, Lebanon, Palestine, Syria

7 Cited in Gruen, George. "Recent Negotiations Over the Waters of the Euphrates and Tigris." *Proceedings of the International Symposium on Water Resources in the Middle East: Policy and Institutional Aspects*. Urbana, Ill, October 24-27, 1993.

The Problem

The Jordan River flows between five particularly contentious riparians, two of which rely on the river as their primary water supply. By the early-1950's, there was little room left for any unilateral development of the river without impacting on other riparian states. The Johnston negotiations, named after U.S. special envoy Eric Johnston, attempted to mediate the dispute over water rights among all the riparians in the mid-1950's. Egypt also was included in the negotiations, because of its preeminence in the Arab world. The initial issue was an equitable allocation of the annual flow of the Jordan watershed among its riparian states -- Israel, Jordan, Lebanon, and Syria. Water is and continues to be a highly contentious issue among these countries, along with issues of land, refugees, and political sovereignty. Until the current Arab-Israeli peace negotiations, which began in 1991, political problems were always handled separately from resource problems. Some experts have argued that by separating the two realms of "high" and "low" politics, each process was doomed to fail. The initiatives that were addressed as strictly water resource issues, namely -- the Johnston Negotiations of the mid-1950's, attempts at "water-for-peace" through nuclear desalination in the late 1960's, negotiations over the Yarmuk River in the 1970's and 1980's, and the Global Water Summit Initiative of 1991 -- all failed to one degree or another, because they were handled separately from overall political discussions. The resolution of water resources issues then had to await the Arab-Israeli peace talks to meet with any tangible progress.

Background

In 1951, several states announced unilateral plans for the Jordan watershed. Arab states began to discuss organized exploitation of two northern sources of the Jordan -- the Hasbani and the Baniyas. The Israelis made public their "All Israel Plan," which included the draining of Huleh Lake and swamps, diversion of the northern Jordan River and construction of a carrier to the coastal plain and Negev Desert -- the first out-of-basin transfer for a watershed in the region.

In July 1953, Israel began construction on the intake of its National Water Carrier at the Bridge of Jacob's Daughters, north of the Sea of Galilee and in the demilitarized zone between Israel and Syria. Syria deployed its armed forces along the border and artillery units opened fire on the construction and engineering sites. Syria also protested to the U.N. and, though a 1954 resolution allowed Israel to resume work the USSR vetoed the resolution. The Israelis then moved the intake to its current site at Eshed Kinrot on the northwestern shore of the Sea of Galilee. It was against this tense background that President Dwight Eisenhower sent his special envoy, Eric Johnston, to the Mideast in October 1953 to try to mediate a comprehensive settlement of the Jordan River system allocations, and design a plan for its regional development.

Attempts at Conflict Management

Johnston worked until the end of 1955 to reconcile U.S., Arab, and Israeli proposals in a Unified Plan amenable to all of the states involved. His dealings were bolstered by a U.S. offer to fund two-thirds of the development costs. His plan addressed the objections of both Arabs and Israelis, and accomplished no small degree of compromise, although his neglect of groundwater issues would later prove a significant oversight. Though they had not met face to face for these negotiations, all states agreed on the need for a regional approach. Israel gave up on integration of the Litani River, and the Arab states agreed to allow out-of-basin water transfers. The Arabs objected, but finally agreed, to storage at both the (unbuilt) Maqarin Dam and the Sea of Galilee, so long as neither side would have physical control over the share available to the other. Israel objected, but finally agreed, to international supervision of withdrawals and construction. Allocations under the Unified Plan, later known as the Johnston Plan, were also delineated. Although the agreement was never ratified, both sides have generally adhered to the technical details and allocations, even while proceeding with unilateral development. Agreement was encouraged by the United States, which promised funding for future water development projects only as long as the Johnston Plans

allocations were adhered to. Since that time to the present, Israeli and Jordanian water officials have met several times a year, as often as every two weeks during the critical summer months, at so-called "Picnic Table Talks" at the confluence of the Jordan and Yarmuk Rivers to discuss flow rates and allocations.

Outcome

By 1991, several events combined to shift the emphasis on the potential for 'hydro-conflict' in the Middle East to the potential for 'hydro-cooperation.' The Gulf War in 1990 and the collapse of the Soviet Union caused a realignment of political alliances in the Mideast that finally made possible the first public face-to-face peace talks between Arabs and Israelis, in Madrid on October 30, 1991. During the bilateral negotiations between Israel and each of its neighbors, it was agreed that a second track be established for multilateral negotiations on five subjects deemed 'regional,' including water resources.

Since the opening session of the multilateral talks in Moscow in January 1992, the Working Group on Water Resources, with the United States as "gavel-holder," has been the venue by which problems of water supply, demand and institutions have been raised among the parties to the bilateral talks, with the exception of Lebanon and Syria. The two tracks of the current negotiations, the bilateral and the multilateral, are designed explicitly not only to close the gap between issues of politics and issues of regional development, but to use progress on each to help catalyze the pace of the other, in a positive feedback loop towards "a just and lasting peace in the Middle East." The idea is that the multilateral working groups provide forums for relatively free dialogue on the future of the region and, in the process, allow for personal ice-breaking and confidence building to take place. Given the role of the Working Group on Water Resources in this context, the objectives have been more on the order of fact-finding and workshops, rather than tackling the difficult political issues of water rights and allocations, or the development of specific projects. Likewise, decisions are made through consensus only.

The pace of success of each round of talks has vacillated but, in general, has been increasing. By the third meeting in 1992, it became clear that regional water-sharing agreements, or any political agreements surrounding water resources, would not be dealt with in the multilaterals. Rather the role of these talks would be to deal with non-political issues of mutual concern, thereby strengthening the bilateral track. The goal in the Working Group on Water Resources became to plan for a future region at peace, and to leave the pace of implementation to the bilaterals. This distinction between "planning" and "implementation" became crucial, with progress only being made as the boundary between the two is continuously pushed and blurred by the mediators.

The multilateral activities have helped set the stage for agreements formalized in bilateral negotiations -- the Israel-Jordan Treaty of Peace of 1994, and the Interim Agreements between Israel and the Palestinians (1993 and 1995). For the first time since these states came into being, the Israel-Jordan peace treaty legally spells out mutually recognized water allocations. Acknowledging that, "water issues along their entire boundary must be dealt with in their totality," the treaty spells out allocations for the Yarmuk and Jordan Rivers, as well as Arava/Araba ground water, and calls for joint efforts to prevent water pollution. In addition, "[recognizing] that their water resources are not sufficient to meet their needs," the treaty calls for ways of alleviating the water shortage through cooperative projects, both regional and international. The Interim Agreement also recognizes the water rights of both Israelis and Palestinians, but defers their quantification until the final round of negotiations.

D) Indus Water Treaty

River Basin:	Indus River and tributaries
Dates of Negotiation:	1951-1960
Relevant Parties:	India, Pakistan

The Problem

Even before the partition of India and Pakistan, the Indus posed problems between the states of British India. The problem became international only after partition, though, and the attendant increased hostility and lack of supralegal authority only exacerbated the issue. Pakistani territory, which had relied on Indus water for centuries, now found the water sources originating in another country, one with whom geopolitical relations were increasing in hostility.

Background

Irrigation in the Indus River basin dates back centuries. By the late 1940's the irrigation works along the river were the most extensive in the world. These irrigation projects had been developed over the years under one political authority, that of British India, and any water conflict could be resolved by executive order. The Government of India Act of 1935, however, put water under provincial jurisdiction, and some disputes did begin to crop up at the sites of the more-extensive works, notably between the provinces of Punjab and Sind.

In 1942, a judicial commission was appointed by the British government to study Sind's concern over planned Punjabi development. The Commission recognized the claims of Sind, and called for the integrated management of the basin as a whole. The Commission's report was found unacceptable by both sides, and the chief engineers of the two sides met informally between 1943 and 1945 to try to reconcile their differences. Although a draft agreement was produced, neither of the two provinces accepted the terms and the dispute was referred to London for a final decision in 1947.

Before a decision could be reached, however, the Indian Independence Act of 15 August 1947 internationalized the dispute between the new states of India and Pakistan. Partition was to be carried out in 73 days, and the full implications of dividing the Indus basin seem not to have been fully considered, although Sir Cyril Radcliffe, who was responsible for the boundary delineation, did express his hope that, "some joint control and management of the irrigation system may be found." (Mehta, p. 4) Heightened political tensions, population displacements, and unresolved territorial issues, all served to exacerbate hostilities over the water dispute.

As the monsoon flows receded in the fall of 1947, the chief engineers of Pakistan and India met and agreed to a "Standstill Agreement," which froze water allocations at two points on the river until 31 March 1948, allowing discharges from headworks in India to continue to flow into Pakistan.

On 1 April 1948, the day that the "Standstill Agreement" expired, in the absence of a new agreement, India discontinued the delivery of water to the Dipalpur Canal and the main branches of the Upper Bari Daab Canal. At an Inter-Dominion conference held in Delhi on 3-4 May 1948. India agreed to the resumption of flow, but maintained that Pakistan could not claim any share of those waters as a matter of right. (Caponera, p. 511) This position was reinforced by the Indian claim that, since Pakistan had agreed to pay for water under the Standstill Agreement of 1947, Pakistan had recognized India's water rights. Pakistan countered that they had historic rights, and that payments to India were only to cover operation and maintenance costs. (Biswas, p. 204)

While these conflicting claims were not resolved, an agreement was signed, later referred to as the Delhi Agreement, in which India assured Pakistan that India will not withdraw water delivery without allowing time for Pakistan to develop alternate sources. Pakistan later expressed its displeasure with the agreement in a note dated 16 June 1949, calling for the "equitable apportionment of all common waters," and suggesting turning jurisdiction of the case over to the World Court. India suggested rather that a commission of judges from each side try to resolve their differences before turning the problem over to a third party. This stalemate lasted through 1950.

Attempts at Conflict Management

In 1951, Indian Prime Minister Nehru, whose interest in integrated river management along the lines of the Tennessee Valley Authority had been piqued, invited David Lilienthal, former chairperson of the TVA, to visit India. Lilienthal also visited Pakistan and, on his return to the U.S., wrote an article outlining his impressions and recommendations (the trip had been commissioned by Collier's Magazine— international water was not the initial aim of the visit). His article was read by Lilienthal's friend David Black, president of the World Bank, who contacted Lilienthal for recommendations on helping to resolve the dispute. As a result, Black contacted the prime ministers of Pakistan and India, inviting both countries to accept the Bank's good offices. In a subsequent letter, Black outlined "essential principles" that might be followed for conflict resolution. These principles included:

- the water resources of the Indus basin should be managed cooperatively;
- the problems of the basin should be solved on a functional and not on a political plane, without relation to past negotiations and past claims.

Black suggested that India and Pakistan each appoint a senior engineer to work on a plan for development of the Indus basin. A Bank engineer would be made available as an ongoing consultant.

Both sides accepted Black's initiative. The first meeting of the Working Party included Indian and Pakistani engineers, along with a team from the Bank, as envisioned by Black, and met for the first time in Washington in May 1952.

When the two sides were unable to agree on a common development plan for the basin in subsequent meetings in Karachi, November 1952, and Delhi, January 1953, the Bank suggested that each side submit its own plan. Both sides did submit plans on 6 October 1953, each of which mostly agreed on the supplies available for irrigation, but varied extremely on how these supplies should be allocated.

The Bank concluded that not only was the stalemate likely to continue, but that the ideal goal of integrated watershed development for the benefit of both riparians was probably too elusive an arrangement at this stage of political relations. On 5 February 1954, the Bank issued its own proposal, abandoning the strategy of integrated development in favor of one of separation. The Bank proposal called for the entire flow of the eastern rivers to be allocated to India, and all of the western rivers, except for a small amount from the Jhelum, to be allocated to Pakistan. According to the proposal, the two sides would agree to a transition period while Pakistan would complete link canals dividing the watershed, during which India would continue to allow Pakistan's historic use to continue to flow from the eastern rivers.

The Bank proposal was given to both parties simultaneously. On 25 March 1954, India accepted the proposal as the basis for agreement. Pakistan viewed the proposal with more trepidation, and gave only qualified acceptance on 28 July 1954. The Pakistanis considered the flow of the western rivers to be insufficient to replace their existing supplies from the eastern rivers, particularly given limited available storage capacity. To help facilitate an agreement, the Bank issued an aide memoire, calling for more storage on the western rivers and suggesting India's financial liability for "replacement facilities" -- increased storage

facilities and enlarged link canals in Pakistan, which could be recognized as the cost replacement of pre-partition canals.

By 1959, the Bank evaluated the principal issue to be resolved as follows: which works would be considered "replacement" and which "development". stated differently, for which works would India be financially responsible. To circumvent the question, Black suggested an alternate approach in a visit to India and Pakistan in May. Perhaps one might settle on a specific amount for which India is responsible, rather than arguing over individual works. The Bank might then help raise additional funds among the international community for watershed development. India was offered help with construction of its Beas Dam, and Pakistan's plan, including both the proposed dams would be looked at favorably. With these conditions, both sides agreed to a fixed payment settlement, and to a ten-year transition period during which India would allow for Pakistan's historic flows to continue.

In August 1959, Black organized a consortium of donors to support development in the Indus basin and raised close to \$900 million, in addition to India's commitment of \$174 million. The Indus Water Treaty was signed in Karachi on 19 September 1960 and government ratifications were exchanged in Delhi in January 1961.

Outcome

The Indus Water Treaty addressed both the technical and financial concerns of each side, and included a timeline for transition. The main points of the treaty included:

- an agreement that Pakistan would receive unrestricted use of the western rivers, which, with minor exceptions, India would allow to flow unimpeded;
- provisions for three dams, eight link canals, three barrages, and 2500 tube wells to be built in Pakistan;
- a ten-year transition period, from 1 April 1960 to 31 March 1970, during which water would continue to be supplied to Pakistan according to a detailed schedule;
- a schedule for India to provide its fixed financial contribution of \$62 million, in ten annual installments during the transition period;
- additional provisions for data exchange and future cooperation.

The treaty also established the Permanent Indus Commission, made up of one Commissioner of Indus Waters from each country. The two Commissioners would meet annually in order to:

- establish and promote cooperative arrangements for the treaty implementation;
- promote cooperation between the parties in the development of the waters of the Indus system;
- examine and resolve by agreement any question that may arise between the parties concerning interpretation or implementation of the Treaty;
- submit an annual report to the two governments.

In case of a dispute, provisions were made to appoint a "neutral expert." If the neutral expert fails to resolve the dispute, negotiators can be appointed by each side to meet with one or more mutually agreed-upon mediators. If either side (or the mediator) views mediated agreement as unlikely, provisions are included for the convening of a Court of Arbitration. In addition, the treaty calls for either party, if it undertakes any engineering works on any of the tributaries, to notify the other of its plans and to provide any data that may be requested.

Since 1960, no projects have been submitted under the provisions for "future cooperation," nor have any issues of water quality been submitted at all. Other disputes have arisen, and been handled in a variety of ways. The first issues arose from Indian non-delivery of some

waters during 1965-66, but became instead a question of procedure and the legality of commission decisions. Negotiators resolved that each commissioner acted as government representatives and that their decisions were legally binding.

One controversy surrounding the design and construction of the Salal Dam was resolved through bilateral negotiations between the two governments. Other disputes, over new hydroelectric projects and the Wuller Barrage on the Jhelum tributary, have yet to be resolved.

E) Mekong Committee

River Basin:	Mekong River
Dates of Negotiation:	Committee formed 1957
Relevant Parties:	Cambodia, Laos, Thailand, Vietnam (directly), China, Myanmar (indirectly)

The Problem

As is common in international river basins, integrated planning for efficient watershed management is hampered by the difficulties of coordinating between riparian states with diverse and often conflicting needs. The Mekong, however, is noted mostly for the exceptions as compared with other basins, rather than the similarities. For example, because the region is so well watered, allocations per se are not a major issue. Also, negotiations for joint management of the Mekong were not set off by a flashpoint, but rather by creativity and foresight on the part of an authoritative third party -- the United Nations -- with the willing participation of the lower riparian states.

Background

The Mekong is the seventh largest river in the world in terms of discharge (tenth in length). Rising in China, it then flows 4200 kilometers through Myanmar, Laos, Thailand, Cambodia, and finally through the extensive delta in Vietnam into the South China Sea. The Mekong is also both the first successful application of a comprehensive approach to planning development of an international river and, at the same time, is one of the least developed major rivers in the world, in part because of difficulties inherent in implementing joint management between its diverse riparians.

A 1957 study performed by the United Nations Economic Commission for Asia and the Far East (ECAFE) noted that harnessing the main stem of the Mekong would allow hydropower production, expansion of irrigated land, a reduction of the threat of flooding in the delta region, and the extension of navigability of the river as far as northern Laos. As had earlier studies, the ECAFE report emphasized the need for comprehensive development of the river, and close cooperation between the riparians in coordinating efforts for projects and management. To facilitate coordination, the report suggested the establishment of an international body for exchanging information and development plans between the riparian states. Ultimately, the report suggested, such a body might become a permanent agency responsible for coordinating joint management of the Mekong basin. When the report was presented in the tenth-anniversary meeting of ECAFE in Bangkok in March 1957, representatives from the four lower riparian states themselves adopted a resolution calling for further study.

Attempts at Conflict Management

In mid-September 1957, after ECAFE's legal experts designed a draft charter for a "Coordination Committee," the lower riparians convened again in Bangkok as a "Preparatory Commission." The Commission studied, modified, and finally endorsed a statute that legally

established the Committee for Coordination of Investigations of the Lower Mekong (Mekong Committee), made up of representatives of the four lower riparians, with input and support from the United Nations. The statute was signed on 17 September 1957.

The Committee was composed of "plenipotentiary" representatives of the four countries, meaning that each representative had the authority to speak for their country. The Committee was authorized to, "promote, coordinate, supervise, and control the planning and investigation of water resources development projects in the Lower Mekong Basin."

The first Committee session was on 31 October 1957, as was the first donation from the international community -- 60 million francs (about \$120,000) from France. With rapid agreement between the riparians came extensive international support for the work of the Committee. By 1961, the Committee's resources came to \$14 million, more than enough to fund field surveys, which had been agreed to as priority projects. By the end of 1965, twenty countries, eleven international agencies, and several private organizations had pledged a total of more than \$100 million. The Secretariat itself was funded by a special \$2.5 million grant made by UNDP. This group of international participants has been dubbed "the Mekong club," which has infused the international community with "the Mekong spirit."

Outcome

The early years were the most productive for the Mekong Committee. Networks of hydrologic and meteorologic stations were established and continued to function despite hostilities in the region, as have programs for aerial mapping, surveying, and leveling. Navigation has been improved along the main stem of the river.

The work of the Committee has also helped overcome political suspicion through increased integration. In 1965, Thailand and Laos signed an agreement on developing the power potential of the Nam Ngum River, a Mekong tributary inside Laos. Since most of the power demand was in Thailand, which was willing to buy power at a price based on savings in fuel costs, and since Laos did not have the resources to finance the project, an international effort was mobilized through the Committee to help develop the project. As a sign of the Committee's viability, the mutual flow of electricity for foreign capital between Laos and Thailand was never interrupted, despite hostilities between the two countries.

By the 1970's, the early momentum of the Mekong Committee began to subside, for several reasons. First, the political and financial obstacles necessary to move from data gathering and feasibility studies to concrete development projects have often been too great to overcome. A 1970 Indicative Basin Plan marked the potential shift between planning and large-scale implementation, including immense power, flood control, irrigation, and navigation projects, and set out a basin development framework for the following thirty years. In 1975, the riparians set out to refine the Committee's objectives and principles for development in support of the Plan in a "Joint Declaration on Principles," including the first (and so far only) precise definition of "reasonable and equitable use" based on the 1966 Helsinki Rules ever used in an international agreement. The plan, which included three of the largest hydroelectric power projects in the world as part of a series of seven cascading dams, was received with skepticism by some in the international community (Kirmani 1990, p. 203). At the current time, while many projects have been built along the tributaries of the Mekong within single countries, and despite the update of the Indicative Plan in 1987 and a subsequent "Action Plan" which includes only two low dams, no single structure has been built across the main stem.

Second, while the Committee continued to meet despite political tensions, and even despite outright hostilities, political obstacles did take their toll on the Committee's work. Notably, the Committee became a three-member "Interim Committee" in 1978 with the lack of a representative government in Cambodia. Cambodia rejoined the committee as a full participant in 1991, although the Committee still retained its "interim" status until 1995. Likewise, funding and involvement from the United States, which had been about 12% of

total aid to the Committee, was cut off in June 1975 and has not been restored to significant levels.

Renewed activity came with the signing of the Paris Peace Agreement in 1991, after which Cambodia requested the reactivation of the Mekong Committee. The four lower riparians took up the call and spent the next four years determining a future direction for Mekong activities. The results of these meetings culminated in a new agreement, signed in April 1995, in which the Mekong Committee became the Mekong Commission. While it is too early yet to evaluate this renewed body, the fact that the riparians have made a new commitment to jointly manage the lower basin speaks for the resiliency of agreements put into place in advance of hot conflict. It should also be noted that Myanmar and China are still not party to the agreement, effectively precluding integrated basin management.

F) Nile Waters Agreement

River Basin:	Nile River
Dates of Negotiation:	1920-1959 -- Treaties signed in 1929 and 1959
Relevant Parties:	Egypt, Sudan (directly); other Nile riparians (indirectly)

The Problem

As the Nile riparians gained independence from Colonial powers, riparian disputes became international and consequently more contentious, particularly between Egypt and Sudan. The core question of historic versus sovereign water rights is complicated by the technical question of where the river ought best be controlled – upstream or down.

Background

With the end of World War I, it became clear that any regional development plans for the Nile Basin would have to be preceded by some sort of formal agreement on water allocations. In 1920, the Nile Projects Commission was formed, with representatives from India, the United Kingdom, and the United States. The same year saw publication of the most extensive scheme for comprehensive water development along the Nile, now known as the Century Storage Scheme.

The plan worried some Egyptians, and was criticized by nationalists, because all the major control structures would have been beyond Egyptian territory and authority. Some Egyptians saw the plan as a British means of controlling Egypt in the event of Egyptian independence.

Attempts at Conflict Management

In 1925, a new water commission made recommendations, based on the 1920 estimates that would lead finally to the Nile Waters Agreement between Egypt and Sudan on 7 May 1929. Four billion cubic meters of water per year (BCM/yr) was allocated to Sudan but the entire timely flow (from January 20 to July 15) and a total annual amount of 48 BCM/yr. was reserved for Egypt. Egypt, as the downstream state, had its interests guaranteed by:

- Having a claim to the entire timely flow. This claim meant that any cotton cultivated in Sudan would have to be grown during the winter months.
- Having rights to on-site inspectors at the Sennar dam, outside of Egyptian territory.
- Being guaranteed that no works would be developed along the river or on any of its territory that would threaten Egyptian interests.

In accord with this agreement, one dam was built and one reservoir raised, with Egyptian acquiescence.

The Aswan High Dam, with a projected storage capacity of 156 BCM/yr., was proposed in 1952 by the new Egyptian government, however debate over whether it was to be built as a unilateral Egyptian project or as a cooperative project with Sudan kept Sudan out of negotiations until 1954. The negotiations that ensued, and were carried out with Sudan's struggle for independence as a back-drop, focused not only on what each country's legitimate allocation would be, but whether the dam was even the most efficient method of harnessing the waters of the Nile.

The first round of negotiations between Egypt and Sudan took place between September and December 1954, even as Sudan was preparing for its independence, scheduled for 1956. Negotiations broke off inconclusively, then briefly, and equally inconclusively, resumed in April 1955. Relations then threatened to degrade into military confrontation in 1958, when Egypt sent an unsuccessful expedition into territory in dispute between the two countries. In the summer of 1959, Sudan unilaterally raised the Sennar dam, effectively repudiating the 1929 agreement.

Sudan attained independence on 1 January 1956, but it was with the military regime that gained power in 1958 that Egypt adopted a more conciliatory tone in the negotiations that resumed in early 1959. Progress was speeded in part by the fact that any funding that would be forthcoming for the High Dam would depend on a riparian agreement. On 8 November 1959, the Agreement for the Full Utilization of the Nile Waters (Nile Waters Treaty) was signed.

Outcome

The Nile Waters Treaty had the following provisions:

- The average flow of the river is considered to be 84 BCM/yr. Evaporation and seepage were considered to be 10 BCM/yr., leaving 74 BCM/yr. to be divided.
- Of this total, acquired rights have precedence, and are described as being 48 BCM for Egypt and 4 BCM for Sudan. The remaining benefits of approximately 22 BCM are divided by a ratio of 7 1/2 for Egypt (approx. 7.5 BCM/yr.) and 14 1/2 for Sudan (approx. 14.5 BCM/yr.). These allocations total 55.5 BCM/yr. for Egypt and 18.5 BCM/yr. for Sudan.
- If the average yield increases from these average figures, the increase would be divided equally. Significant decreases would be taken up by a technical committee, described below.
- Since Sudan could not absorb that much water at the time, the treaty also provided for a Sudanese water "loan" to Egypt of up to 1,500 MCM/yr. through 1977.
- Funding for any project that increases Nile flow (after the High Dam) would be provided evenly, and the resulting additional water would be split evenly.
- A Permanent Joint Technical Committee to resolve disputes and jointly review claims by any other riparian would be established. The Committee would also determine allocations in the event of exceptionally low flows.
- Egypt agreed to pay Sudan £E 15 million in compensation for flooding and relocations.

Egypt and Sudan agreed that the combined needs of other riparians would not exceed 1,000-2,000 MCM/yr., and that any claims would be met with one unified Egyptian-Sudanese position. The allocations of the Treaty have been held to until the present.

Ethiopia, which had not been a major player in Nile hydropolitics, served notice in 1957 that it would pursue unilateral development of the Nile water resources within its territory, estimated at 75-85% of the annual flow, and suggestions were made recently that Ethiopia may eventually claim up to 40,000 MCM/yr. for its irrigation needs both within and outside of

the Nile watershed. No other state riparian to the Nile has ever exercised a legal claim to the waters allocated in the 1959 treaty.

In recent years, the situation has shifted dramatically, as the Nile Initiative has guided a dialog between all of the riparians of the basin to a process of dialog and joint planning. Those close to the process suggest that a new treaty, inclusive of all riparians, is on the horizon.

G) La Plata Basin

River Basin:	La Plata
Dates of Negotiation:	La Plata Basin Treaty signed 1969
Relevant Parties:	Argentina, Bolivia, Brazil, Paraguay, Uruguay

The Problem

A cooperative management body has been in place on the La Plata basin since 1969. While generally successful and productive, the cooperative nature of basin management is being strained by the size and possible economic and environmental impacts of the proposed "Hydrovia" project, which is designed to improve barge transportation and represents the largest project for river development proposed to date.

Background

The La Plata River basin drains more than two million km² of southeastern South America, including territory in Argentina, Bolivia, Brazil, Paraguay, and Uruguay. It encompasses some of the major rivers of the continent -- the Paraná, the Paraguay, and the Uruguay -- and the largest wetlands in the world-- the Pantanal.

The states of the basin have traditionally been willing to cooperate with management of the watershed, and have stressed the river's binding them to each other. A 1969 umbrella treaty, to which all of the riparians are signatories, provides a framework for joint management of the basin.

This framework is being tested with a current river transportation proposal to dredge and straighten major portions of the Paraná and the Paraguay, including through the Pantanal wetlands. The initial backers of the proposal, which was dubbed "Hydrovia" ("waterway" in Spanish and Portuguese), were the governments of the La Plata basin states. The project would allow year-round barge transportation -- current conditions only allow for barges during the three dry months -- and open up a major transportation thoroughfare for land-locked sections of the riparian states. Environmentalists and those whose livelihoods depend on traditional economies have expressed trepidation at the project.

Attempts at Conflict Management

The La Plata Basin Treaty of 1969 provides an umbrella framework for several bilateral treaties between the riparians and a direction for joint development of the basin. The treaty requires open transportation and communication along the river and its tributaries, and prescribes cooperation in education, health, and management of 'non-water' resources (e.g., soil, forest, flora, and fauna). The foreign ministers of the riparian states provide the policy direction and a standing Inter-Governmental Coordinating Committee is responsible for ongoing administration.

Basin states agree to identify and prioritize cooperative projects, and to provide the technical and legal structure to see to their implementation. The treaty also has some limitations, notably the lack of a supra-legal body to manage the treaty's provisions. The necessity to go

through each country's legal system for individual projects has resulted in some delays, or halts, in project implementation.

The treaty's success has been in the area of transportation, so it is not altogether surprising that the "Hydrovia" project has been put forward. The first meeting of the backers of the project was in April 1988, out of which the Intergovernmental Commission on the Paraná-Paraguay Hydrovia was formed.

Outcome

Positions between supporters and opponents of the project have sharpened, however these positions are based on very little information. The Inter-American Development Bank has only recently helped to finance a technical and environmental feasibility study.

H) Salween River

River Basin:	Salween River
Dates of Negotiation:	Joint working group established in 1989
Relevant Parties:	Myanmar, Thailand (directly); China (indirectly)

The Problem

The Salween basin is a good case of river planning in advance of conflict. Preliminary meetings are being held between Myanmar and Thailand, and some project feasibility studies are being implemented although, to date, no basin-wide plan, nor any main-stem project, has been implemented.

Background

The Salween originates in the Tibetan plateau and drains an area of 320,000 km² in China, Myanmar, and Thailand before it flows into the Gulf of Martaban. Despite the fact that studies since the 1950's have identified tremendous hydropower potential, the Salween is a relatively undeveloped basin -- with only one major hydro-electric project at Baluchaung. The power companies of Thailand and Myanmar, as well as private Japanese concerns, have pursued individual feasibility studies but it is only since the 1970's that the potential of the basin as a whole have been investigated.

Attempts at Conflict Management

In June 1989, following the visit of a Thai government delegation to Rangoon, a joint technical committee was established between Thailand and Myanmar, made up primarily of representatives from the power companies of the two countries. Since that time, the committee has continued to meet and to pursue feasibility studies, but no project or management body has been developed. To date, China has not been included in discussions.

Outcome

As mentioned, the Salween is a basin in its earliest stages of development. What is noteworthy is that technical and management discussions have been proceeding in advance of major development projects, thus allowing for integrated management almost from the beginning.

Discussions have included issues outside of hydropower, and studies have suggested linkages between power, irrigation and drinking water diversions, barge transportation, and related surface infrastructure. Complicating management issues is the fact that sections of the watershed include regions of ethnic unrest and the tensions brought about by the international drug trade. Nevertheless, the basin offers the opportunity for integrated

management to be implemented in advance of any flashpoint brought about by unilateral development.

I) Aral Sea

River Basin:	Aral Sea and its tributaries, notably the Syr Darya and the Amu Darya
Dates of Negotiation:	Agreements signed in 1992 and 1993
Relevant Parties:	Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan (directly); Afghanistan, Iran, and China (indirectly); Russia has been a ctive observer

The Problem

The environmental problems of the Aral Sea basin are among the worst in the world. Water diversions, agricultural practices, and industrial waste have resulted in a disappearing sea, salinization, and organic and inorganic pollution. The problems of the Aral, which previously had been an internal issue of the Soviet Union, became internationalized after its collapse in 1991. The five new major riparians – Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan – have been struggling since that time to help stabilize and, eventually to rehabilitate, the watershed.

Background

The Aral Sea was, until comparatively recently, the fourth largest inland body of water in the world. Its basin covers 1.8 million km², primarily in what used to be the Soviet Union, and what is now the independent republics of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. Small portions of the basin headwaters are also located in Afghanistan, Iran, and China. The major sources of the Sea, the Amu Darya and the Syr Darya, are fed by glacial meltwater from the high mountain ranges of the Pamir and Tien Shan in Tajikistan and Kyrgyzstan.

Irrigation in the fertile lands between the Amu Darya and the Syr Darya dates back millennia, although the Sea itself remained in relative equilibrium until the early 1960's. At that time, the central planning authority of the Soviet Union devised the "Aral Sea plan" to transform the region into the cotton belt of the USSR. Vast irrigation projects were undertaken in subsequent years, with irrigated area expanding by over one-third from 1965 to 1988.

Such intensive cotton monoculture has resulted in extreme environmental degradation. Pesticide use and salinization, along with the region's industrial pollution, have decreased water quality, resulting in high rates of disease and infant mortality. Water diversions, sometimes totaling more than the natural flow of the rivers, have reduced the Amu Darya and the Syr Darya to relative trickles – the Sea itself has lost 75% of its volume, half its surface area, and salinity has tripled, all since 1960. The exposed seabeds are thick with salts and agricultural chemical residue, which are carried aloft by the winds as far as the Atlantic and Pacific oceans and further contribute to air pollution and health problems in the region.

Attempts at Conflict Management

The intensive problems of the Aral basin were internationalized with the breakup of the Soviet Union. Prior to 1988, both use and conservation of natural resources often fell under the jurisdiction of the same Soviet agency, each of which often acted as powerful independent entities. In January 1988, a state committee for the protection of nature was formed, which was elevated later to the Ministry for Natural Resources and Environmental Protection in 1990. The Ministry, in collaboration with the Republics, had authority over all

aspects of the environmental and the use of natural resources. This centralization came to an end with the collapse of the Soviet Union in 1991.

The five major riparians were initially regulated by ad hoc intergovernmental agreements based on Soviet quotas. In February 1992, the five republics negotiated an agreement to coordinate policies on their transboundary waters.

Outcome

The Agreement on Cooperation in the Management, Utilization and Protection of Interstate Water Resources was signed on 18 February 1992 by representatives from Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. The Agreement calls on the riparians, in general terms, to coordinate efforts to “solve the Aral Sea crisis,” including exchanging information, carrying out joint research, and adhering to agreed-to regulations for water use and protection. The Agreement also establishes the Interstate Commission for Water Management coordination to manage, monitor, and facilitate the Agreement. Since its inception, the Commission has prepared annual plans for water allocations and use, and defined water use limits for each riparian state.

In a parallel development, an Agreement on Joint Actions for Addressing the Problems of the Aral Sea and its Coastal Area, Improving of the Environment and Ensuring the Social and Economic Development of the Aral Sea Region was signed by the same five riparians on 26 March 1993. This Agreement also established a coordinating body, the Interstate Council for the Aral Sea, which was designated as the organization having primary responsibility for “formulating policies and preparing and implementing programs for addressing the crisis.” Each state’s minister of water management is a member of the Council. In order to mobilize and coordinate funding for the Council’s activities, the International Fund for the Aral Sea was created in January 1993.

A long term “Concept” and a short-term “Program” for the Aral Sea was adopted at a meeting of the Heads of Central Asian states in January 1994. The Concept describes a new approach to development of the Aral Sea basin, including a strict policy of water conservation. The Aral Sea itself was recognized as a legitimate water user for the first time. The Program has four major objectives:

- to stabilize the environment of the Aral Sea;
- to rehabilitate the disaster zone around the Sea;
- to improve the management of international waters of the basin; and
- to build the capacity of regional institutions to plan and implement these programs.

Phase I of the Program, which will cost \$260 million over three years, began implementation in 1995. These regional activities are supported and supplemented by a variety of governmental and non-governmental agencies, including the European Union, the World Bank, UNEP, and UNDP.

Despite this forward momentum, some concerns have been raised about the potential effectiveness of these plans and institutions. Some have noted that not all promised funding has been forthcoming. Others, Dante Caponera (1995), for example, have noted duplication and inconsistencies in the agreements, and warns that they seem to accept the concept of “maximum utilization” of the waters of the basin. Vinogradov (1996) has noted especially the legal problems inherent in these agreements, including some confusion between regulatory and development functions, especially between the Commission and the Council.

J) The International Joint Commission: Canada and the USA

River Basin:	All transboundary waters along the US-Canada boundary
Dates of Negotiation:	1905-1909
Relevant Parties:	Canada (originally negotiating through UK), United States

The Problem

Canada and the United States share one of the longest boundaries in the world. Industrial development in both countries, which in the humid eastern border region primarily has relied on water resources for waste disposal, had led to decreasing water quality along their shared border to the point where, by the early years of the twentieth century, it was in the interest of both countries to seriously address the matter. Prior to 1905, only *ad hoc* commissions had been established to deal, as they arose, with issues relating to shared water resources. Both States considered it within their interests to establish a more-permanent body for the joint management of their shared water resources.

Background

Canada and the United States share a 6,400 km boundary between the main portions of their provinces and states, and an additional 2,400 km between the Canadian Northwest Territories and Alaska. Crossing these boundaries are some of the richest waterways in the world, not least of which are the vast water resources of the five Great Lakes. The *ad hoc* commissions which until then had been established to resolve water-related issues were not sufficient to handle the growing problem. Even the International Waterways Commission, established in 1905, only dealt with issues on a case-by-case basis.

Attempts at Conflict Management

As Canada and the United States entered into negotiations to establish a permanent body to replace the International Waterways Commission, the tone of the meeting was informed by the concerns of each state. For the United States, the overriding issue was sovereignty. While it was interested in the practical necessity of an agreement to manage transboundary waters, it did not want to relinquish political independence in the process. This concern was expressed by the United States position that absolute territorial sovereignty be retained by each state over the waters within its territory -- tributaries should not be included in the Commission's authority. In addition, the new body might retain some of the *ad hoc* nature of prior bodies, so as not to acquire undue authority. Canada was interested in establishing an egalitarian relation with the United States. It was hampered not only because of the relative size and level of development of the two states at the time, but also because Canadian foreign policy was still the purview of the United Kingdom -- negotiations had to be carried out between Ottawa, Washington, and London. Canada wanted a comprehensive agreement, which would include tributaries, and a Commission with greater authority than the bodies of the past.

Outcome

The "Treaty Relating to Boundary Waters between the United States and Canada," signed between the United Kingdom and the United States in 1909, reflects the interest of each negotiating body. The Treaty establishes the International Joint Commission with six commissioners, three appointed by the governments of each State. Canada accepted US sovereignty concerns to some extent -- tributary waters are excluded. The United States in turn accepted the arbitration function of the Commission and allowed it greater authority than the US would have liked.

The Treaty calls for open and free navigation along boundary waters, allowing Canadian transportation also on Lake Michigan, the only one of the Great Lakes not defined as a

boundary water. Although it allows each State unilateral control over all of the waters within its territory, the Treaty does provide for redress by anyone affected downstream. Furthermore, the Commission has "quasi-judicial" authority: any project which would affect the "natural" flow of boundary waters has to be approved by both governments. Although the Commission has the mandate to arbitrate agreements, it has never been called to do so. The Commission also has investigative authority -- it may have development projects submitted for approval, or be asked to investigate an issue by one or another of the governments. Commissioners act independently, not as representatives of their respective governments.

Water quality has been a focal concern of the Commission, particularly in the waterways of the Great Lakes. The Great Lakes-St. Lawrence River system contains one-fifth of the world's surface fresh water and includes the industrial lifelines of each State. Perhaps as a consequence, the antipollution provisions of the Treaty met little opposition on either side. A 1972 "Great Lakes Water Quality Agreement" calls for the States both to control pollution and to clean up waste waters from municipal and industrial sources. This led to the signing of a new Agreement in 1978, and a comprehensive Protocol in 1987, each of which expanded the Commission's authorities and activities with respect to water quality.

These agreements define specific water quality objectives -- the 1987 Protocol called on the Commission to review "Remedial Action Plans," prepared by governments and communities, in 43 "Areas of Concern" -- yet allow the appropriate level of government of each side to develop its own plan to meet objectives. The 1987 Protocol implemented an "eco-system" approach to pollution control, and called for the development of "lakewide management plans" to combat some critical pollutants. It also included new emphasis on nonpoint source pollution, groundwater contamination, contaminated sediment, and airborne toxics. In 1991, the two States signed an "Agreement of Air Quality" under which the Commission was given limited authority over joint air resources.

The International Joint Commission has met some criticism over the years; most recently some have questioned whether the limited authority of the Commission -- politically necessary when the Commission was established -- is really conducive to the "eco-system" approach called for in the 1987 Protocol or whether greater supra-legal powers are necessary. Others have questioned the commitment of the Commission to the process of public participation. Nevertheless, given the vast amount of water resources under its authority, and the myriad layers of government to which it must be responsible, the Commission stands out as an institution which has effectively and peacefully managed the boundary waters of two nations over some ninety years, reconciling or averting more than 130 disputes in the process