



Joint institutional arrangements for addressing transboundary water resources issues—lessons for the GEF

Alfred M. Duda and David La Roche

The lofty goals of the 1992 Earth Summit regarding sustainable development will not be achieved without major improvements in the management of transboundary water resources. This paper describes the serious nature of water-related conflicts and environmental damage associated with degradation of marine ecosystems, coastal zones, and shared surface/groundwater systems. Traditional approaches such as international conventions, watercourse agreements with basin organizations, and arbitration have generally fallen short of their objectives. This article suggests that a middle ground centered on multicountry institutional arrangements for joint fact finding, evaluation, and problem resolution may be a more productive approach over the short term to achieve sustainable development. The experience of the International Joint Commission (Canada and U.S.) is described as a way of providing a neutral ground for building trust among nations, for 'leveling the playing field' among small and large countries, and for providing mechanisms for countries to work jointly toward sustainable development of their shared resources without relinquishing their sovereignty. The Global Environment Facility (GEF) is playing a catalytic role in assisting countries to address transboundary water resources issues. The paper describes GEF's Operational Strategy and discusses the implications of joint institutional arrangements for the international waters focal area. Given that the environmental security of many nations rests on improved transboundary cooperation, the GEF provides a pragmatic opportunity for countries to cooperatively address these pressing problems. © 1997 Published by Elsevier Science Ltd

The world's water resources are under enormous stress, and the ecosystems, people, and economic development that depend on these resources face an uncertain future. The oceans have been fished out; estuaries have become eutrophic; and coastal zone wetlands have been drained, paved, farmed, or converted to aquaculture. Marine mammals and aquatic birds have become laden with toxic chemicals; diversions of water for agriculture have dried up rivers and lakes; pollution discharges have created health problems; and groundwaters have been overpumped and contaminated. Progress in addressing these issues has been disappointing within single nations, and resolving such concerns among nations in transboundary situations often seems impossible.

As is noted elsewhere in this article, there have been many attempts at site-specific regional and international agreements addressing transboundary issues. On a regional basis, perhaps thousands of

agreements exist that mostly address water quantity and navigation issues. However, there is no single freshwater framework convention that addresses transboundary issues, and the complex web of global and regional conventions for marine waters has yet to be proven effective. If traditional legal approaches and instruments were adequate and effective, or if they incorporated environmental concerns, then these pressing problems would be substantially mitigated. As noted in this paper, these transboundary issues are critical, and they have enormous implications for food security, for displacement of peoples, and for sustainable development.

This article explores an intermediate alternative between the two extremes of global or framework conventions and arbitration for resolving transboundary water resources disputes and preventing environmental degradation. It is based on the reality that sovereignty and political concerns will likely inhibit adoption of effective global conventions for sustainable water resources management and that measurable progress will almost always have to come from specific, multicountry institutional arrangements focusing on a particular geographic area—a shared

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river basin, an area of marine waters, or a geographic portion of the ocean containing migratory fish stocks. The alternative involves the middle ground of a multicountry institution charged with joint fact-finding, evaluation, and reporting to governments regarding progress in addressing the transboundary water resources and environmental concerns. It is based on almost 90 years of experience of the International Joint Commission (Canada and U.S.) which was created by the Boundary Waters Treaty of 1909. Various lessons learned regarding processes to ease country collaboration are evident from this, as well as other joint management arrangements, and these lessons have important ramifications for implementation of Agenda 21 and for the host of bilateral and multilateral institutions which need to play a role in addressing transboundary water issues.

Transboundary water resources demand urgent attention

Few issues have a greater impact on human life and the health of our planet than the way water resources are managed. Today, some 20 years after the United Nations Water Conference held in Mar del Plata and some five years after the Earth Summit held in Rio de Janeiro, there is a much greater appreciation among technical specialists of the water crisis facing the globe. However, the awareness of what water scarcity, contamination, and degradation of water-related ecosystems really means for the world has not been acknowledged in the political community nor have institutions been established to effectively address the issues.

There is no question that water scarcity and unsustainable water use threaten development in many countries. With projected population increases, many countries face dire predictions for near term water scarcity as described by Postel (1992). Competition for water for farming, human consumption, and industry is already keen, and environmental needs are often ignored. Water scarcity means that food security is threatened. Combined with reduced productivity from waterlogged and salinized land as well as reduced productivity in eroded uplands, a strong case has been made for upcoming world-wide food shortages (Brown, 1996). Already, tens of millions of people have been turned into 'environmental refugees', tens of millions more have migrated to large cities from the countryside, and the number of refugees may approach one hundred million in the next century (Fell, 1996).

Freshwater basins

All these pressures have important transboundary implications. Not only will existing water conflicts and disputes among nations get worse but new ones will be created, unilateral withdrawals may create regional conflicts, and ultimately the water environment and its associated biodiversity will suffer. Both McCaffrey (1993) and the World Bank (Kirmani and Rangeley, 1993) point out well-known freshwater basin conflicts such as the Nile and Ganges basins, the Jordan River

and aquifers in Palestine, the Aral Sea Basin, the Tigris and Euphrates, the United States and its neighbours, and the Parana Basin in Latin America. Other conflicts over development are evident in the Danube, Don, Mekong and Zambezi basins. These conflicts raise serious environmental issues ranging from recharge of groundwater to protection of wetlands, reduced flows, and impacts on fisheries. In some cases, the conflicts between diversions for irrigation and environment have catastrophic ecological results as evidenced by destruction of the Aral Sea by five Central Asian Republics as well as diversions in the Colorado Basin of the U.S. and Mexico that virtually eliminate flows to the Gulf of California.

Contamination of transboundary basins is growing across the globe. While transboundary rivers suffer from pollution on every continent, lakes have been particularly hard-hit due to their vulnerability to environmental degradation. In Europe, lakes Constance and Ohrid have special commissions to deal with transfrontier pollution. In Africa, Lake Victoria in particular suffers from eutrophication and other complex problems (World Bank, 1996), while Lakes Malawi and Tanganyika suffer from sedimentation and overfishing. In Latin America, Lakes Titicaca and Poopoo are threatened by diversions for irrigation, mining, and sewage. And on the border between Canada and the U.S., complex toxic pollution problems still impair uses of the five Great Lakes.

Linkages to marine ecosystems

The increase in pollution of rivers has important ramifications for ecological degradation of estuaries, coastal zones, and marine waters. A clear example is provided by the Danube, which collects pollution released in 14 countries on its way to the Black Sea. As noted by the World Bank (1993), nitrogen and phosphorus from municipal sewage and agricultural sources as well as toxic substances from industries and agriculture cause huge economic losses in the Black Sea. The Sea is on the verge of collapse due to pollution, nutrient overenrichment, overfishing, and conversion of wetland habitat to agriculture. The channelization and diking of the river floodplains and delta for flood control, navigation, and agriculture has reduced flood storage, pollution trapping capabilities, and fish habitat.

Pollution from inland areas degrades portions of the Mediterranean, various estuaries of Asia from the Bay of Bengal to the Yellow Sea and the South China Sea, coastal population centres of Africa, the Plata basin in South America and the U.S. coast. Problem waterbodies such as the Baltic Sea need \$20-\$30 billion in remedial measures to address pollution and habitat (Kindler and Lintner, 1993). Even more will be needed to restore the eutrophic, dead zone in the Gulf of Mexico caused by Mississippi River pollution or to reduce contamination in the Volga that is plaguing the Caspian Sea (Wolfsan, 1990). It is clear that these transboundary water resources issues also involve single country basins that drain to multicountry marine waters.

These interconnections are very complex, with multiple causes of ecosystem degradation and

subsequent economic and social impacts. It is not just pollution or conversion of important wetland habitat, such as loss of mangroves due to conversion to shrimp ponds in Asia, that creates transboundary conflicts in marine waters. Overfishing is an enormous problem due to open access without adequate management regimes, overcapacity in fishing fleets with modern technology and government subsidies creating distortions in markets. All 15 oceanic fisheries are being fished at or beyond capacity and 13 are in a state of decline, some possibly lost forever (Brown, 1996; Epstein, 1996). Examples in the Northwest Atlantic (Epstein, 1996), and the Gulf of Thailand (Suvapepun, 1991) show over-exploitation and changes in fish species to less desirable ones that likely represent permanent changes. Almost one billion people rely on fish as their primary source of protein. With the oceans being fished out and irrigation expansion being stalled by costs and adverse environmental impacts, there is a serious threat to food security in the near future that has transboundary water implications.

Persistent toxic pollutants

Another transboundary problem looms significant for the future and adds to the new imperative for action on pollution abatement. It involves contamination of water and food—especially fish and shellfish—with chemicals produced by industry that persist in the environment, cycle from one media to another (from atmosphere to water), are ingested with food, and bioaccumulate in fish, wildlife and humans. While some of these toxic substances have been recognized as problems for two decades, a new generation of odourless, toxic chemicals has been identified as causing complex health risks in humans. Some of the persistent toxic substances are discharged by industry, some are released as air pollution and fall as 'acid rain', and many others leak from waste sites, as documented by Duda (1989) for the North American Great Lakes basin. These persistent organic pollutants (POPs) have only recently been recognized in the Great Lakes region because their impacts were masked by gross pollution, as described by Duda and Nawar (1996).

Many of these chemicals (see Table 1) mimic hormones and disrupt development of human, fish, and wildlife offspring in causing metabolic, neurological, immune system, and behavioural abnormalities (International Joint Commission, 1993). New evidence even shows that accumulations of these chemicals in food interfere with sexual development in fish and wildlife—males become feminized and sometimes females become masculinized. Many of

these chemicals, heavy metals, and commonly utilized pesticides are still in widespread use.

Of particular concern is that today's pesticides and chemicals in fish, wildlife, and humans are not only harming this generation but also the next generation as the developing fetus becomes laden with toxics in pregnant women. New epidemiological evidence in the Great Lakes region has found that women who consumed Great Lakes fish (contaminated by various chemicals) gave birth to infants with significantly more cognitive, behavioural, and physical deficiencies than women who did not (International Joint Commission, 1993; Gilbertson, 1996). Since toxic pollution of the Great Lakes may not be as severe as in the former Soviet Union, Eastern Europe and Asia, the chances are high that human health problems due to exposure to POPs will become increasingly evident.

Traditional institutional approaches may be insufficient

Transboundary water resources problems are more frequently encountered than many people think. Asia, Africa, and Latin America each have over 60% of their land area as a part of transboundary river basins. Fully 23 countries in Africa have at least three-quarters of their area in portions of transboundary basins compared to 13 nations in Europe and 8 in Asia. A listing of some prominent transboundary lakes, rivers, and marine ecosystems is included in Table 2. With the widespread nature of transboundary systems, with increasing water scarcity, and with various threats to food security (green revolution conflicts with environment, overfishing, and accumulation of POPs), a new urgency is evident for instruments to help resolve these problems.

A great deal of fragmentation exists with the legal frameworks available to address transboundary water concerns. In addition to numerous legal agreements, there are various non-binding policy documents, action plans, and strategies that have been adopted by global and regional organizations. These offer guidance to governments as they formulate laws and strategies and implement programmes. They can also be utilized by regional and global entities in the development of programmes and instruments. The Mar del Plata action plan, the Dublin Statement, and Agenda 21 are representative.

Global and regional legal frameworks

The architecture of marine agreements is quite complex. These agreements are consistent with and operate within the legal framework of the 1982 U.N.

Table 1 Chemicals known to disrupt endocrine systems

DDT and its degradation products	Dioxins	Cadmium
DEHP (di (20-ethyl hexyl) phthalate)	Furans	Lead
Synthetic pyrethroids	PCBs	Mercury
Triazine herbicides	HCB	Kelthane
EBDC fungicides	Methoxychlor	Kepone
Alkyl phenols (detergents and anti-oxidants)	Octochlorostyrene	Lindane

Source: Duda and Nawar (1996).

Table 2 Major transboundary rivers, lakes, and enclosed seas

International rivers	Number of countries	Lake or sea	Number of countries
Danube River	14	Mediterranean Sea	18
Niger River	10	Black Sea	17
Zaire River	9	Baltic Sea	9
Nile River	9	South China Sea	9
Rhine River	8	North Sea	9
Zambezi River	8	Aral Sea	8
Amazon River	8	Caspian Sea	6
Mekong River	6	Lake Chad	6
Elbe	5	Lake Superior	2
Plata	5		
Ganges River	4	Lake Victoria	5
Colorado River	2	Lake Tanganyika	4

Source: Duda (1994).

Convention on the Law of the Sea (UNCLOS), which entered into force in 1994. It provides a global framework for the protection and management of the marine environment and its living and non-living resources. It is reinforced by a web of global and regional agreements, including those on regional seas, pollution from land-based sources, wetlands, protected areas and species, fisheries, hazardous substances, and biodiversity.

With respect to international freshwater basins (including rivers, lakes, reservoirs, and transboundary groundwaters), no single binding legal instrument articulates a global consensus on sound use, conservation, and development of the resources. However, a large number of bilateral and multilateral agreements and management authorities exist. In addition, the nonbinding Dublin Statement and draft articles undertaken by the International Law Commission (ILC) on the Law of Non-Navigational Uses of International Watercourses (McCaffrey, 1992) represent some measure of international consensus, and the Bellagio Draft Groundwater Treaty (Hayton and Utton, 1989) provides an acknowledged framework for protecting the sustainability of transboundary groundwater supplies. The International Law Association (ILA) initiated work in this area with its 'Helsinki Rules' of 1966. In Europe, the environmental aspects of transboundary basins were included in the European Community's Convention on the Protection and Use of Transboundary Watercourses and International Lakes which just entered into force in 1996.

While there are thousands of conventions and agreements for transboundary waters, most emphasize primarily quantity and navigation issues. Pollution-related conventions also exist. For example, the Boundary Waters Treaty of 1909 created the International Joint Commission (Canada and U.S.) which addressed pollution of the Great Lakes for the first time in 1912. In Europe, the International Commission for the Protection of the Rhine Against Pollution (Bern Convention, 1963) and the International Standing Commission for the Protection of Lake Constance Against Pollution (1960) have a long history. Other regional agreements in Europe for the North Sea (Treaty of Bonn, 1967, Oslo Convention, 1972, Paris Convention, 1974), the Baltic

Sea (Helsinki Convention, 1974), and the Mediterranean (Barcelona Convention, 1972) have been modified over time to be more specific and to address land-based sources of marine pollution.

There are criticisms that global or regional conventions are not stringent enough and compliance is poor. One example is the International Convention for the Prevention of Pollution by Ships (MARPOL). Another involves the modest record of effectiveness of regional framework agreements like the Mediterranean, Baltic, and North Sea, where much restoration remains to be accomplished even though progress has been recorded. Hinssen and van der Schans (1994) criticize the lack of action in the North Sea over the years despite dozens of overlapping agreements and a series of ministerial conferences. Indeed, Europe has over 100 bilateral and multilateral conventions and treaties addressing transboundary waters (UNECE, 1994). The lesson may be that specific agreements for specific basins are needed before real progress can occur in environmental matters. This was shown by the succession of more stringent agreements on the North American Great Lakes beginning in 1972 and action programmes developed by the Rhine Commission (1987), the International Commissions for the Protection of the Moselle and Saar (1990), and the International Commission for the Protection of the Elbe (1991) aimed at protecting the North Sea from negative effects of the river waters.

Importance of sovereignty

The long wait before joint action commences that has been experienced in Europe and North America illustrates the nature of the challenge for developing countries that lack the basic resources of the North. The lack of progress in dealing with well-known water quantity conflicts described earlier is rooted in the desire of countries not to 'give away' their future, i.e. not to 'relinquish their sovereignty... over the most precious development resource, water'. This helps to account for why global treaties (often known as customary international law) most often are general and vague, sinking to the lowest common denominator in order to generate agreement among many nations. This concern for sovereignty also explains the 30 year controversy over the ILA's 'Helsinki Rules' of 1966

and many versions of the ILC's draft articles (McCaffrey, 1992) with their controversies over 'equitable and reasonable use' and 'appreciable harm'.

The political reality is that sovereignty issues—especially between developed and developing countries—will remain an overriding concern. Domestic policy and actions are often seen to be separate from international policies and actions. However, for water quality, quantity, and ecosystem concerns, changes are often needed in each country's domestic policies and activities, including changes in subnational sectoral policies and activities. Unfortunately, traditional international approaches do not involve subnational units of government nor other stakeholders. This challenge of finding workable linkages to lower levels of government and stakeholders in multilateral institution building continues to remain a significant barrier. Consequently, global conventions or regional framework conventions may not be sufficient to address transboundary water resources issues. Since site specific actions are needed to address the particular problems of each basin or marine ecosystem anyway, some other approach is needed.

Arbitration may not be effective

On the opposite end of the spectrum from negotiated conventions is the approach involving arbitration of disputes, which is often the only recourse for a damaged downstream nation. As noted by Sand (1993), governments have tended to avoid international judicial and liability-based dispute processes. While he cites over 170 environmental treaties with dispute resolution provisions that mostly refer to the International Court of Justice, very few have been exercised due to procedural burdens. The *Trail Smelter* and *Lake Lanoux* arbitrations are among the most famous (Sand, 1993). *Trail Smelter* (between Canada and the U.S.) took 15 years from initiation of claims to an award. Water resources and environmental problems cannot wait such long periods because damage will have already occurred.

Such adjudicatory proceedings are unpredictable, confrontational and create losers. A dispute in the Northwestern Atlantic over the declining fishing was taken to the World Court by Canada and the U.S. (Springer, 1995). After delays, many people were disappointed by the decision, which favoured Canada. However, both countries have overfished the region, so some other institutional arrangement was needed anyway and little was gained by an adversarial process. Establishing a progressive joint management regime would have been more appropriate to work through the disputes with the stakeholders so the fishery would not have collapsed. As Sand (1993) has noted, only two notable cases of intergovernmental dispute adjudications have occurred in 50 years.

Joint institutional management arrangements

If global and regional conventions remain insufficient because of sovereignty issues, and arbitration is not

timely nor effective, what is left? A more pragmatic alternative involves the creation of joint management institutions among countries in the specific transboundary basin or that participate in harvesting of fish stocks.

The International Joint Commission (Canada and U.S.)—IJC—established under the Boundary Waters Treaty of 1909 represents one example. Other different types of joint commissions exist as well. The commissions facilitating the work in restoring the Baltic and the Northeast Atlantic as well as joint commissions for the Rhine, Moselle and Elbe were cited earlier. Other boundary commissions exist for the Mexico-U.S. border and specific watercourse joint commissions exist in Nordic countries as described by UNECE (1994) such as the Finnish-Swedish Frontier Rivers Commission with its regulatory authority in handling permit applications for activities that may affect the aquatic environment.

In Africa, the World Bank commissioned a study of international river basin organizations (Rangeley et al., 1994). Basin organizations for the Senegal, Gambia, and Niger rivers and the Lake Chad Basin Commission were created, not to facilitate the work of cooperating governments or to review their performance, but to focus on executing projects from donors. As noted by the Bank's review, performance has been disappointing. The organizations created large institutional structures, large premises for their staff, and were not effective in achieving regional cooperation. The organizations seem to do their own work in competition with technical staff in the ministries. This creates internal conflicts and polarization among sectoral ministries rather than facilitating cooperation. Many of these organizations include provisions for dispute resolution by the International Court of Justice, but they have not been exercised.

Sand (1993), Paisley and McDaniel (1993) and Duda (1994) describe key elements needed of such joint institutions to overcome concerns of sovereignty and competition with sectoral ministries as well as to facilitate joint fact-finding for building trust among nations. Paisley and McDaniel (1993) term this to be the principle of 'informed negotiated consent' and believe it should be considered by the ILC as part of combining the principles of 'equitable utilization' and 'no appreciable harm' to address transboundary watercourse disputes of all manner. In fact, this is how the IJC operates in its work of preventing watercourse disputes along the border between Canada and the U.S. These processes may hold interest for countries in building mutual trust for collaborating to address their transboundary water resources problems.

The international joint commission (Canada and U.S.)—Key processes

While the United States and Canada are, in historical terms, relatively new societies blessed with enormous natural resources, a few astute men in the two countries understood early in the twentieth century

that the shared transboundary region would have an uncertain economic future without a credible mechanism to address the full range of issues that would likely emerge over time. The result of the work of these early visionaries is the Boundary Waters Treaty of 1909. The essence of the Treaty is to be found in the Preamble, where the notion of *preventing* disputes is given equal weight with the objective of *settling* existing ones. This commitment to prevent disputes, which in latter day parlance goes by the fancier name of anticipatory planning, was, and continues to be, a unique feature in international agreements.

Commission functions

The IJC is comprised of six Commissioners, three from each country. The Canadian Commissioners are selected by the Prime Minister, and the three United States Commissioners by the President. Historically, the IJC has drawn its substantive expertise from a small professional staff and from a broad array of expertise from the agencies and departments of government at the federal and the state/provincial levels who work on joint technical committees.

Under terms of the Treaty the IJC has two general responsibilities. First, it provides for the regulation or approval of obstructions and diversions in boundary waters, waters flowing from boundary waters, or transboundary waters below the boundary if such works affect the levels and flows across the boundary. The IJC's findings on such issues are binding and cannot be challenged in the domestic courts of either country. As is evident, this particular IJC responsibility relates to water quantity issues.

The second function of the IJC is its joint fact-finding and report responsibility. Under terms of the Treaty the two governments exercise the option of referring to the IJC questions or differences of opinion that arise. While the Commission's findings and recommendations to the governments are advisory, the IJC has an excellent history of having its recommendations adopted by the two governments, at times even in advance of the Commission's final report. In fact, the advisory nature of IJC findings may, paradoxically, enhance its effectiveness. While the creation of supra-national institutions may have threatened national sovereignty elsewhere, the IJC is still under the control of the two Parties. It has, by contrast, exercised moral suasion and has often created an atmosphere of constructive tension between itself and the governments, a setting that seems to have been more productive than that experienced in other settings by institutions that were created as supra-national entities.

Water quantity disputes

Since its inception the International Joint Commission has received over ninety water quantity-related referrals from the United States and Canadian governments. These issues have included requests ranging from the uses of tidal power in the Maine-New Brunswick area

to the Washington State-British Columbia boundary. The Commission was directly involved in matters related to the construction and regulation of the St. Lawrence Seaway and the joint Canada-United States Columbia River hydropower development project. It has also handled investigatory work regarding irrigation diversions, navigation, compensating works, drainage, flood control, coal mining, and fisheries.

Governments give the IJC responsibilities because of its history of impartiality. This arises as a result of how the Commission works. Specifically, the Commission works by consensus, using the concepts of joint fact finding, joint problem definition, and jointly arrived at conclusions. The strengths and weaknesses of the consensus decision making approach are well known. When consensus works well, the result is a product that is characterized by richness, comprehensiveness, and is measured and fair. When it does not work well, it leads to paralysis. Unlike those of most other boundary commissions, the IJC Commissioners do not act under instruction of or as representatives of their governments. They act in a consensual and unitary fashion based on the facts—as an 'arbiter of facts'.

Great Lakes water levels are a continuing responsibility of the Commission. The issues of Great lakes levels do not often lend themselves to clear separations of the respective national interests, but rather force the Commission to engage issues of fairness (and benefit sharing) between and among the competing interests that have an interest in Great Lakes levels. These interests include hydropower, navigation, public sanitation and health, various riparian uses, recreational boating and fishing, and agriculture. Commission problem solving on Great Lakes levels have employed some of the most sophisticated uses of public information and participation practices anywhere in the world. The Commission considers the mutual obligations of both upstream and downstream states to protect water resources unless both parties agree that an adverse impact or risk of it occurring is acceptable. This principle of 'informed negotiated consent' is described by Paisley and McDaniels (1993). Explicit sharing of technical information about proposed alternatives and options to control possible harm are key elements for building mutual trust and determining the equitable sharing of benefits.

Joint fact-finding role

In the end, what has made the IJC investigations, and the sometimes unpopular precedents they have established, palatable to governments has been the joint fact finding approach used by the IJC itself and by the institutions it creates to assist it in its work. Generally, when nations engage in bilateral discussions, each side brings to the table a set of pre-established 'facts' that become the subject of a negotiation. In the IJC process, each board or committee is composed of experts, in equal national numbers from national and subnational governments, who are expected to work in their personal and professional capacity to jointly

establish the facts and agree on their meaning. Most of the participants in the IJC process embrace this concept and thrive in this positively charged setting. The result of their work, jointly developed and sealed by consensus on their part and on the part of the Commissioners, is difficult for the governments to ignore.

Water quality management

An outcome of the IJC fact-finding and reporting responsibility has been an additional responsibility having been given to it by the two governments. In 1972 the United States and Canada signed the Great Lakes Water Quality Agreement (herein after the Agreement). In the 1960s it was becoming apparent that the lower Great Lakes, (Erie and Ontario), were undergoing such rapid eutrophication that their continued productivity was in doubt. Beaches were closed; fish were dying; and the water tasted terrible and looked worse. The IJC had been the effective voice carrying this message to the governments for some time and, as a consequence of their vigilance, the two countries assigned to the IJC the responsibility of being the evaluator of governmental progress to clean up the lakes, consistent with their obligations under both the Treaty and the Agreement.

The Agreement established continuing mechanisms under the IJC to facilitate meaningful progress through binational monitoring and oversight functions of:

- a Water Quality Board (made up of national and subnational government officials in the basin) to evaluate progress in Great Lakes cleanup and protection;
- a Science Advisory Board (made up of researchers) to evaluate independently the scientific adequacy of approaches taken by the governments; and
- a binational secretariat based in Canada to support Board operations.

Through the years, the Water Quality Board reviewed progress of programmes under the Agreement and served as a forum for all jurisdictions in the basin to review critically each other's successes and failures and to come to consensus on new abatement programmes to be undertaken. The Science Advisory Board advises the Commission on scientific implications of the state of the lakes and in a proactive manner on science policy. These two types of Boards—both providing advice to the Commission and the Commission in turn providing recommendations to governments—represent a series of checks and balances to ensure that the Agreement objectives are reached.

The Commission interacts with its Boards and conducts a public participation programme to solicit citizen and stakeholder advice on the work of the Boards. It then has the responsibility to advise and tender recommendations to governments. It is also charged with preparing a 'report card' for the public and jurisdictions on how well the governments and jurisdictions are living up to commitments made in the agreement. These joint institutions foster international and multijurisdictional cooperation.

Water quality and pollution prevention issues are difficult to resolve in normal diplomatic processes, often involving complicated technical, legal, institutional and political issues. The Commission's Boards review facts and subsequently provide advice to the IJC. The IJC then involves the public in reviewing that advice; it officially tenders its impartial recommendations to the governments; and then it has the opportunity to follow up at the highest political levels of government with its access to senior officials. These joint institutions tend to create checks and balances, empowering mechanisms, up-front involvement of stakeholders, access for the public to become involved, and oversight mechanisms.

The Commission does not do the work, and does not implement the Agreement. The Parties are responsible for implementation, and the Commission is responsible for the investigatory work that makes facts available for all to see. Credibility of the IJC is essential to the Parties and its ability to involve the public and stakeholders in its work as well as subnational levels of government adds to its credibility. With the checks and balances that exist in terms of political appointments of Commissioners, governments still oversee this institution and have relinquished no sovereignty to this advisory body.

Global Environment Facility

Two years before the Earth Summit, the Global Environment Facility (GEF) was established as a pilot programme to test new approaches to respond to global environmental challenges in its four focal areas of climate change, biodiversity conservation, ozone depletion, and international waters. In March 1994, after 18 months of negotiations, agreement was reached in Geneva to transform the GEF from its pilot phase into a permanent financial mechanism. The restructured facility, with its \$2 billion trust fund, is open to universal participation (currently 156 countries) and builds upon the partnership between the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP) and the World Bank—its implementing agencies. In addition to the four focal areas, activities to address land degradation are also eligible for funding insofar as they relate to the focal areas.

In restructuring the GEF, governments ensured that it fully embodied the principles that were set out in the Rio conventions as well as Agenda 21. The GEF serves as a mechanism for international cooperation for the purpose of providing new and additional grant and concessional funding to meet the agreed incremental costs of measures that achieve global environmental benefits in the four focal areas. In October 1995, the GEF Council adopted an operational strategy, which represents the strategic framework for action of the permanent GEF in its four focal areas. According to the strategy's principles, the GEF will fund projects and programmes that are country-driven and based on national priorities designed to support sustainable development.

GEF operational strategy

In the international waters area, GEF's objective is to contribute as a catalyst to the implementation of a more comprehensive, ecosystem-based approach to managing international waters and their drainage basins as a means of achieving global environmental benefits. The GEF implementing agencies assist countries to find means of collaborating with neighbouring countries so that they change the ways human activities are undertaken in different economic sectors so that transboundary conflicts and problems can be resolved. The goal is to help countries use the full range of technical, economic, financial, regulatory and institutional measures needed to operationalize sustainable development strategies for transboundary waters and their drainage basins.

The Operational Strategy (GEF, 1996a) outlines priorities to be addressed in this focal area. GEF activities focus on threatened transboundary waterbodies and the most imminent threats to their ecosystems, including:

- Control of land-based sources of pollution that degrade the quality of international waters. Prevention of releases of persistent toxic substances and heavy metals, as well as nutrients and sediments, into basins of international waters with rare and endangered species or unique ecosystems, is of particular importance. A particularly high priority is placed on interventions to address persistent organic pollutants (POPs).
- Prevention and control of land degradation where transboundary environmental concerns result from desertification or deforestation.
- Prevention of physical and ecological degradation of critical habitats (such as wetlands, shallow waters and reefs) that sustain biodiversity and provide shelter and nursing areas for threatened and endangered species.
- Improved management measures to reduce exploitation of living and non-living resources and address problems like overfishing or excessive withdrawal/diversion of water from transboundary basins.
- Control of ship-based sources of contaminants and non-indigenous species which are transferred in ballast water and can disrupt ecosystems.

In its first five years, 63 developing countries and those in economic transition have participated in GEF

projects or project preparation activities (totaling \$173 million) that address transboundary water issues. Table 3 provides a listing of transboundary freshwater river basin, lake basin, and large marine ecosystems that have received GEF funding. A wide variety of situations in all five economic development regions of the world are represented. In some basins such as the Danube, recipient countries work together with developed countries (Germany and Austria on the Danube River) to address their shared transboundary water resources problems. Danube Basin recipient countries include: Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Moldova, Romania, Slovakia, Slovenia, Ukraine and potentially Serbia.

Strategic joint fact-finding

Typically, GEF international water projects begin with GEF implementing agencies assisting the cooperating nations in undertaking strategic work. As noted in the Operational Strategy, this is done so that collaborating nations can each establish an inter-ministerial technical team to assemble information on the water-related environmental problems/conflicts and share this information with colleagues from the other nations in a committee setting. In this way, a transboundary water resources analysis can be produced that contains the facts of the dispute, conflict or problem. This factual analysis can serve as a start for determining environmental and water priorities. It also allows very complex basin problems to be divided into smaller, more manageable ones, each with a specific action programmes for resolution.

As part of the process, the countries determine what actions, policy changes, regulatory developments, and sectoral programmes are needed to resolve the priority problems, threats, or conflicts. The multinational committees consider these actions, formulate a strategic action programme, and at the same time determine what national actions each country will undertake (with help of implementing agency regular programmes, if needed) to incorporate the necessary actions into the country programmes, policies, and economic development plans. These steps allow for harmonization of actions among nations so that economic advantages do not accrue. The World Bank is often asked to hold a donors' meeting at the end of the process, so that donors can be matched up with specific needs for resolving transboundary problems,

Table 3 GEF international waters projects

Transboundary river basins ^a	Transboundary lake basins	Large marine ecosystems
Danube (14)	Lake Victoria (3)	Gulf of Guinea (5)
Dnipro (3)	Lake Tanganyika (4)	East Asian Seas (9)
Bermejo (2)	Lake Malawi (3)	Black Sea (6)
Okavango (3)	Lake Titicaca (2)	Mediterranean (18)
Tumen (4)	Lake Ohrid (2)	Gulf of Aqaba (3)
Aral Sea Basin (5)		Red Sea (6)
		W. Indian Ocean (8)

Source: GEF (1996b).

Table includes projects underway or in preparation with GEF funding.

^aFigure in () indicates number of countries.

for building capacity of the regional joint collaborative institution, and for funding baseline and additional (GEF financing) interventions.

The Operational Strategy (GEF, 1996a) contains guidance on these participatory processes that countries might find useful in developing collaborative arrangements with their neighbours. It also mandates the participation of stakeholders, the public and other levels of government in the project. This allows for the building of linkages among ministries with international responsibilities, sectoral ministries, and subnational levels of governments and stakeholders whose activities need to be changed to resolve the threat, conflict, or problem.

Through GEF international waters projects, participating countries are exposed to joint fact-finding, to participative, joint management planning processes, and to new, more comprehensive approaches to ecosystem management. In essence, they can try out the process of 'informed negotiated consent' proposed by Paisley and McDaniels (1993) to see if they can focus on sharing facts and jointly determining how to respond. The resulting GEF project provides an opportunity for the collaborating countries to diffuse political issues by focusing on technical fact-finding. They can learn about their shared transboundary ecosystem, learn how their sectoral activities and policies impact the water system, and learn to work together in joint problem solving—all without legalistic commitments and in a spirit of pragmatic cooperation, because each country has a stake in the water issues. This joint effort may be able to build a sense of trust among participating individuals, and the experience may eventually lead to more formal and sustainable legal frameworks among nations in order to keep the initiative moving after the GEF project.

GEF's catalytic role helps to integrate transboundary water issues into national development plans, encourages the transfer of environmentally sound technology and knowledge and helps to strengthen the capacity of developing countries to play their full part in implementing needed interventions in different sectors. In essence, the GEF helps nations put together the essential pieces of a more comprehensive, ecosystems-based approach for managing transboundary waters as a means to operationalize sustainable development. GEF funds the transaction costs of these processes, it leverages the participation of other programmes and forms of development assistance, and it provides links to other GEF focal areas so that countries can effectively set priorities to achieve multiple benefits of GEF interventions.

Lessons learned—the pressing agenda ahead

To help implement the consensus reached at Dublin and Rio, institutions at both the national and international levels need to be strengthened, and partnerships at the subnational level need to be created. This is the case not only for developing countries but also for developed nations. In many ways, the more affluent nations have a more difficult job ahead due to the large

costs associated with cleanup of toxic residual problems and investments that constrain less costly responses.

For resolving transboundary water resources conflicts, both developing and developed nations clearly have much left to accomplish. The lack of workable global and regional legal and institutional arrangements has resulted in damage to transboundary water resources that goes beyond the issue of water scarcity. It involves degradation of transboundary surface, subsurface, coastal and marine environments due to unsustainable policies and sectoral activities. Pollution, overfishing, conversion of wetlands, and now the indiscriminate discharges of persistent organic pollutants that pose real ecosystem and human health threats have created an enormous environmental deficit. Duda and Nawar (1996) estimated a one trillion dollar deficit in the U.S. alone in remedial actions needed to address POPs and hazardous chemicals. The longer humankind waits to act, the larger the cleanup and ecosystem restoration bill gets for future generations.

The experience to date suggests that international or regional framework conventions for addressing these issues have fallen short of their objectives. Their final provisions often sink to the lowest common denominator due to disparity in economic status among nations and because of sovereignty issues. Arbitration and adjudicatory proceedings often occur after-the-fact, after damage is done, and are not viable for protecting ecosystems. Most effective seem to be basin or site-specific conventions or agreements that get progressively more stringent over time and that utilize joint bodies to facilitate collaboration. However, effective joint institutional arrangements are few and far between.

The institutional underpinnings for regional collaboration are critical for making progress on transboundary water issues. This paper argues that the procedures and processes used by the U.S. and Canada along its shared border could be used in other settings by both developed and developing nations to make progress on water-related transboundary issues. Lemarquand (1993) and Duda (1994) outline key elements of these joint participatory processes that might be useful to countries with a desire to begin collaboration on transboundary issues. In fact, the IJC serves as a forum and a catalyst for devising joint water or environmental management programmes for apportioning waters and for determining patterns of flow regulation for equitable benefit sharing. The message is not that treaties like the Boundary Waters Treaty must be enacted among countries before progress can be made. Rather, the message is that the joint participatory processes and the checks and balances embodied by the institutional framework make a country's decision to begin cooperation with neighbouring nations less threatening to national sovereignty and more appealing to countries wishing to operationalize sustainable development strategies.

The key elements begin at the top with political consensus for countries working together collaboratively on technical fact-finding in a joint committee structure. Checks and balances on this

committee structure may involve a political steering committee of high level officials (like a commission) with responsibility for overseeing processes and for consensus opinions being transmitted to collaborating governments. Equal numbers from each country should participate to level the 'playing field' somewhat. Once the conflicts or problems are described, the joint committees may examine alternative solutions or options for moving forward. They may wish to consult with stakeholders such as the private sector or NGOs, and they may choose to have representatives of subnational governments as members of the technical committees. The findings of the technical committees should be discussed by the political committee and consensus views should be transmitted to governments for action. Likewise, if commitments on action were being reviewed, the status of implementation as compiled by the technical committee should be jointly discussed by the political committee and findings reported to all governments. Since the committees only have advisory functions, governments do not lose their sovereignty and political checks and balances still exist.

Such approaches may provide a participative approach to determining transboundary priorities, evaluating a range of options (with their benefits and costs to riparian states), and developing joint management programmes of action. Once facts are exchanged among country ministerial officials, with a neutral secretariat facilitating the fact-finding, a sense of trust may develop and eventually the process may be used as a means of verifying that collaborating nations are doing their share—not cheating on commitments. Confidence in this verification function is the key to building relationships among nations. They need to feel that they are 'in this together' and that transparency actually exists, rather than one country gaining at the others' expense. In fact, the jointly examined alternatives might reveal options that were never discussed and could lead to benefit sharing so that all countries are better off. Once confidence is built, collaborating nations may move to the next, formal steps for building institutions and establishing joint commitments for action. This is how the IJC evolved over its 85 year history. Rather than just resolving conflicts, it is now focusing on preventing transboundary conflicts.

The widespread extent and severity of transboundary degradation of the water environment, the increasing concerns over water scarcity and water use conflicts, and the international community's inability to address adequately these concerns with effective institutions have significant implications for the Global Environment Facility. GEF may be able to fund institutional approaches to addressing transboundary problems without requiring conventions to be adopted among countries. Consequently, the approach of 'learning by doing' and the process of jointly preparing a strategic action programme for addressing transboundary priority problems can begin the building of trust that is necessary to secure commitments among countries. Through the GEF project, such as has occurred in the GEF Danube Basin or Black Sea

projects, collaborating country officials can begin to understand the need for joint action among nations, and practical steps with incremental costs may end up being funded with GEF grants.

Transboundary water resources conflicts cannot be solved overnight. They take time, good will, and a capacity for collaborating countries to undertake the necessary fact-finding for cutting through rhetoric, politics and fear. With population pressure and demands on irrigated agriculture to feed a burgeoning world on the increase, the environmental security of dozens of nations may rely on sharing water resources and sustaining a productive water environment, including sustainable fisheries. On most continents, sustainable development cannot proceed without causing enormous disputes among countries which need to share their water resources. This is precisely why addressing transboundary water resources issues is so important and why the existence of GEF provides a unique opportunity for collaborating nations to try to develop and test out joint management regimes for shared freshwater basin, coastal zone and marine transboundary waters.

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