Hydrodiplomacy:
Negotiating a Regional Ridge to Reef Approach to the World’s Water Crisis

Georgia Kayser


For many of us, water simply flows from a faucet, and we think little about it beyond this point of contact. We have lost a sense of respect for the wild river, for the complex workings of a wetland, for the intricate web of life that water supports.

Sandra Postel, Last Oasis: Facing Water Scarcity, 1993

I. INTRODUCTION

As the world’s population increases and agricultural demands with it, as temperatures rise and available water resources are depleted, the world’s water crisis will impact human and environmental health everywhere and be a challenge for future generations. Only about one-third of one percent of the available water on the earth is accessible for human needs (97 percent is salt water and two percent resides in glaciers and snow/ice). Currently, forty percent of the world’s people live in river basins that suffer from water stress (Mathews et al., 2004). United Nations Environment Program (UNEP). Reports that available freshwater is now well beyond levels that can be sustained at current demands much less meet future needs. UNEP projects one in every three people will live in water-scarce countries by 2050 (Millennium Ecosystem Report, 2006, WRU/UNEP/UNDP/WB, 1996). Scarcity is not the only problem: one-fifth of the world’s people lack clean drinking water and almost half lack sanitary services, further impacting human health. Furthermore, overharvesting, pollution, climate change, invasive species, and ozone depletion are all impacting the sustainability of the earth’s fresh and marine resources. The health of these resources—from the ridges of the river basins to the watersweath they feed throughout the basin, to the seas and the groundwater beneath—is all physically interconnected and integrally tied to the human populations whose livelihoods the resources impact. To further complicate the situation, forty percent of the world’s rivers are shared by more than one country. The fluid nature of water and its transboundary nature make management, monitoring, rule enforcement, and conflict negotiation of water resources a challenge. The sustainability of water resources is at risk in many regions of the world as freshwater resources are degraded, yet there is not a single international framework that adequately outlines the water problem and provides a set of basic principles for sustainable use of water resources or a forum for watershed cooperation and negotiation.

This paper points to the future challenges of water resources management and then outlines how the governance of water resources could be better connected so that management mirrors the physical resources it governs. It then outlines how the governance of water resources could be better oriented toward implementation and performance to facilitate sustainable management of the resource. This paper outlines recommendations for water resources management on three fronts—the international, regional, and local level. It begins with a framework that already exists—the Regional Seas and River Basin Organizations (RBOs)—and makes recommendations as to how each could be expanded and improved. It recommends that international development and environmental organizations assist transboundary waters and their member countries through an International Waters Convention to coordinate water quality monitoring and watershed assessments, assist in the identification of comparative advantages, and facilitate negotiation and cooperative efforts among nations that share water resources. These organizational mechanisms are recommended so that conflict over the transboundary waters and increased scarcity can be avoided in the future. Two already functioning Regional Seas Programmes protect some of the world’s most biologically diverse marine ecosystems, yet have few resources. Many member states and significant portions of the world’s populations serve as a potential starting point for action in two programmes—the Wider Caribbean and the East Asian Seas. Where cooperation fails, countries will bear the costs of a decline in development standards, increased competition over scarce water resources, increased demands from agriculture and urbanization and, thus, heightened political tensions (Human Development Report, 2006).

II. THE CHALLENGES

II.A. Divided Waters, Dividing Goals

Although the waters of the rivers and oceans are physically linked, the international conventions and regional organizations that govern them divide these bodies of water into coastal and freshwater resources, each guided by a separate institution. Personal interests further divide parties as they compete over the often scarce resource. In the international arena, coastal zones are under the auspices of the Regional Seas Programme at UNEP, each sea with its own programme; while inland waters are cut up into about 2,000 international instruments or agreements governing the use of most of the world’s shared waters (Transboundary Freshwater Dispute Database, 2006; Regional Seas Programme, 2006). International monitoring of water and sanitation is then split up among the World Health Organization (WHO), United Nations Education, Science and Cultural Organization (UNESCO), and the United Nations Development Program (UNDP) with Non Government Organizations and resources outside of many developing countries responsible for the financing of the infrastructure.

At the river basin level, agriculture, industry, households, and governments all have a vested stake in the quality and quantity of the resource they receive. Pollution, scarcity, and overharvesting impact all stakeholders, organizations, and interested parties, who compete for this physically linked resource. The fluid nature of water, its transboundary nature, the large number of users and uses, the nested layers of governments and rules, and the challenges of monitoring make the management of these common pool resources difficult. This paper, therefore, does not suggest that agreements that currently exist should be replaced. Instead, it suggests the building blocks from which future stakeholders and their water resources could be linked to improve management of the physically connected resource. The Regional Seas, of which 16 organized programs exist, and the River Basins, of which 263 are shared by more than one country, are the building blocks.

II. B. Anthropogenic Sources of Unsustainable Water Resources Management

The Global International Waters Assessment outlines the major problems on river basins across the world to be: unsustainable use of freshwaters, pollution, overfishing, and global climate change (GIWA, 2006). Scarcity and pollution from land based sources—unsustainable human activities, which include agricultural run-off, improperly disposed of industrial waste (oils and heavy metals), untreated sewage, and sedimentation from deforestation and unmanaged solid waste—have direct effects on human health and development. Although pollution impacts
coastal zones more than other areas, it brings nations together less than any other issue. Pollutants, commonly referred to as Land-Based Sources of Pollutants (LBP's) include wastewater, livestock operations, runoff from deforestation, chemicals, pesticides and fertilizers from agriculture, and oil. LBPs contribute greater pollution loads to rivers, estuaries, and subsequently to the seas than any other source.

Figure 1 - Global Marine Pollutants

Coastal and marine ecosystems are among the most productive. They supply food to local populations, employment to coastal communities, and those that harbor coral reefs are some of the most biologically rich ecosystems on earth. Fisheries and fish products provide direct employment to nearly 38 million people (FAO, 2004) while one-sixth of the world’s population relies on fish as their main or sole source of animal protein. Anthropogenic sources currently threaten these ecosystems (UNEP, 2006). Pollution and destruction of coastal marine habitats threatens this food source and the economic base of coastal communities. The Regional Seas Programme in its attempt to identify anthropogenic threats, the LBPs, in annexes or technical protocols in only half of the programmes; however, and when mentioned in protocols, they are often not ratified.

Integrally linked to the pollution problem is the development problem—when people lack access to clean water, their choices and freedoms are constrained by ill health, poverty, and vulnerability (Human Development Report, 2006). Today, 1.1 billion people in developing countries have inadequate access to water and 2.6 billion have inadequate access to basic sanitation. Those numbers grow exponentially if one adds the criteria of safe, treated water, and sanitation. The transport of disease through drinking water supplies, as well as the amount of untreated wastewater reaching groundwater, water courses, and coastal water is an international human and environmental crisis. Diarrhea, an example of a waterborne disease, is the third leading cause of death in the developing world. Waterborne diseases, especially gastrointestinal and diarrheal diseases, reduce the absorption of food and nutrition, decrease childhood growth rates, drain energy levels, decrease attendance at school, reduce the number of hours one is physically able and willing to work, and increase morbidity and mortality rates, especially in children (Billing et al., 1999). The physically interconnected nature of rivers, groundwater, and coastal waters exacerbates the severity of the water crisis on human development.

Integrally linked to the development problem is the scarcity problem. There is increasing awareness that growing water demands place some river basins under great stress to meet water demand. Currently, agriculture generates the greatest demand for water. Worldwide, 75 percent of water resources are devoted to agriculture. In developing countries, 80 percent of the water is used by agriculture, while 42 percent is used by agriculture in high-income Organization for Economic Cooperation and Development (OECD). Irrigation represents the single source of demand in water-stressed basins. Agriculture uses about 2600 kilometers per year, industry uses 800 kilometers per year, and municipal or domestic claims about 400 kilometers per year (UNDP, IWMI, Forthcoming). In high-income OECD countries, 20 percent is used for domestic purposes and another 38 percent is used by industry. In developing countries, after agriculture, 10 percent is used by industry and another 10 percent is used for domestic purposes (FAO, 2006). Households in water scarce regions already have to make tradeoffs between the use of water for domestic purposes and the use of water for agriculture. These demands will only increase as populations grow and agricultural demands with it, and as climate change reduces the available supply of fresh water.

To this end, after outlining the challenges to water resources management and the problems that threaten the sustainability of water resources worldwide, this paper outlines what exists internationally, on regionally shared seas and on transboundary watersheds. It then points to the advantages of issue linkages and partnerships between freshwater and coastal water treats and the institutions that currently guide them. Recommendations focus on four levels of water resources management—International, Regional Seas, River Basin Organizations, and local level or municipal governments. It then addresses the international community that is divided into...
many different UN organizations and a diverse body of NGOs and recommends that the international regime could be better organized under the auspices of a guiding international framework convention. The benefits of an international framework are fourfold: 1) it would bring the problem to the forefront of the international agenda, 2) provide greater funding to the water resources management, 3) organize an epistemic community, and 4) assist in negotiation and dispute resolution.

III. BACKGROUND

III.A Existing Institutions

III.A.1 International Waters: Negotiations, Treaties and the Institutions that Govern Them

Principles for water use have been outlined in three major water conventions: the UN Convention on the Law of the Sea, the UN Convention on the Non Navigational Uses of International Watercourses, and the UN Economic Commission for Europe Convention on Protection and Use of Transboundary Watercourses and Lakes.

The UN Convention on the Law of the Sea is an extensive document that outlines a general obligation of states to protect and preserve the marine environment (Article 192). However, in accordance with the Rio Declaration, the Law of the Sea (LOS) recognizes that states have a sovereign right to exploit their natural resources (Article 193) (Hunter, et al, 2002). All states shall monitor and assess and then communicate in the form of reports any substantial pollution (Article 204 – 206). The LOS recognizes that each state has a duty not to transfer pollution onto another (Article 195) (Hunter et al, 2002). The LOS does not provide guidance for specific situations, but instead endorses a regional approach (Quing-Nan, 1987).

UNEP’s Regional Seas Programme, born from the Convention on the Law of the Sea in 1974 and spawned by the 1972 UN Stockholm conference on the Human Environment, has largely been at the forefront of action on activities affecting transboundary coastal waters (GPA, 2005). The Regional Seas Programme is one of UNEP’s most significant achievements in the past 30 years (UNEP, Regional Seas Programme, 2006). The regional approach asks local organizations to be responsive to local problems and concerns and provides appropriate solutions tailored to local ecological and political conditions as well as funding (Hunter et al, 2002).

The UN Convention on the Non Navigational Uses of International Watercourses, adopted in 1997, and the 1992 UN Economic Commission for Europe Convention on Protection and Use of Transboundary Watercourses and Lakes codify basic principles of water management. The 1997 Convention, which has only 16 of the 25 signatories necessary for it to come into force, includes "no significant harm and prior notification of works." The 1992 Convention for Europe would require 19 more signatories for it to become global. It focuses on issues of water quality, considers the river basin an ecological unit and bases water needs on current and not historical use (UNDP, 2006). According to the 2006 Human Development Report, the political challenge is to put these frameworks into operation. Therein lies the objective of the subsequent proposal.

III. A.2 Regional Seas Programmes

The Regional Seas Programme was formed to address the accelerating degradation of the world’s oceans and coastal areas by engaging neighboring countries in comprehensive and specific actions to protect their shared marine environment. There are 16 such programmes. They cover the seas off the coasts of West Africa, Wider Caribbean, Baltic, Black Sea, Mediterranean, Red Sea, South East Pacific, the Caspian Sea, East Africa, East Asian, North East Atlantic, North East Pacific, North West Pacific, ROPME Sea, and the South Asia Sea. Of these, half address Land Based Pollutants (LBP) – the Wider Caribbean, the Mediterranean, the Red Sea, the Baltic and the West Africa’s Atlantic coast. The seas surrounding North America and the South Atlantic off the coast of South America, as well as the North East Atlantic do not have a Regional Seas Programme. (A list of the Regional Seas Programmes, their conventions, action plans, and protocols coordinating body or secretariat and member states are listed in the table in Appendix I.

The colored areas represent the seas covered by Regional Seas Programmes. The white areas are where no program yet exists.

The Regional Seas Programme has been applauded for its success as a facilitating body to the regional seas and the governing bodies of each around the world. The four components in the regional sea agreements include: 1) action plans for research, assessment, and monitoring; 2) legally binding conventions; 3) technical protocols and annexes that focus on threats; and 4) financial and institutional provisions to support these activities (Hunter et al, 2002; UNEP, Regional Seas, 2005). The programs seem quite similar, but function with varying authority and varying effectiveness. One of the more successful is the Mediterranean. Most of the Regional Seas Programmes are criticized for their lack of continuity. Some seas lack programs and others have only partially functioning protocols and action plans.
III.A.3 River Basin Organizations

Most agreements concerning transboundary freshwater resources are bilateral and relate to specific rivers and lakes that form or cut across boundaries (Kliot 2001; Cosgrove 2003). Of these treaties, 39 percent concentrate on hydroelectric generation; 37 percent focus on water supply; and 23 percent can be divided between: flood control (9 percent), industrial uses (6 percent), pollution (4 percent) and navigation (4 percent) (Beach, et al., 2000). These treaties have created governing organizations, or River Basin Organizations (RBOs), that are as diverse as the goals and cultures they represent.

Increasingly, international attention focuses on cooperation and integrated watershed management of transboundary watersheds to meet the demands placed on these resources by the riparian nations. Regional and multinational governance structures have sprung up to meet this demand. These organizations bring together national governments, technocrats who monitor and share data, and stakeholder groups and local communities that are able to organize and participate in the conservation and preservation of water resources for present and future generations. A culture can develop around watershed health (Lee, et al. 2001). Political and social organizations around the environmental construct of the watershed can bring huge improvements to water quality and the ecosystem that result in significant social, economic, and health benefits for those who live in the watershed. RBOs create forums to coordinate activities, share information, and develop integrated management approaches to solve river basin problems.

IV. POLICY RECOMMENDATIONS

Moving Forward in the Governance of Marine and Freshwater Resources

IV. A Regional Seas Approach

The ultimate goal of global environmental governance is to improve the environment and the lives of those in it so they can realize their potential as human beings. Increasingly, we see that the regional approach is a means to this end. In water resources management, the Regional Seas Programmes could better support and provide the necessary resources to river basins and their RBOs, especially those with high population densities, or those with the greatest sources of pollution to the seas, affecting the livelihoods of those within the river basin.

IV.A.1 Strengthen Regional Seas Programmes that Already Exist

There are Regional Seas Programmes created to protect pieces of the ocean where little or no action plans or protocols yet exist. Programs should also be formed in the vulnerable marine ecosystems where no such program: South Asian Seas, the North West Pacific, the North East Pacific and the Southwest Atlantic. The programs, their conventions and action plans form a basis and a cooperative framework for countries who share marine resources, providing steps to remediate degraded seas, and opportunities for funding valuable shared international environmental resources. Program formation demonstrates the international community the value the states place on marine biodiversity and coastal livelihoods, and their willingness to coordinate efforts.

The Regional Seas Organizations that do exist could have a greater impact if offices could be physically located close to the sea with a coordinating officer at UNEP.

IV.A.2 Expand Monitoring and Evaluation to Identify Major Threats to the Seas

The role of the Regional Seas Programmes could be expanded so as to identify the largest problems negatively impacting each regional sea. By monitoring the most critical watersheds, those river basins that are the largest polluters could be identified. Countries that share marine water resources, the fisheries within and marine resources like coral reefs that bring revenue from tourism, could be better informed to identify existing problems. To do this, water quality monitoring at the mouths of watersheds could identify the anthropogenic sources of pollution that are most destructive to marine resources. This might then stimulate action at the national level.

All of the Regional Seas Programmes have protocols for monitoring and collecting water quality data (Transboundary Freshwater Dispute Database, 2006). Resources, however, are not always available and priorities are not set. Resources could be better allocated by UNEP and larger NGOs working to protect biodiversity in especially highly compromised marine hotspots to assist each Regional Seas Programme in monitoring. This would ensure that, at least, the mouths of the rivers, where the greatest amount of pollution enters the sea, are monitored and water quality data collected. This data would allow Regional Seas Programmes and their member states to better understand the largest pollution problems. Goals and improvement of degraded waters could then start with the largest polluters, be they metals such as mercury, lead, cadmium; or pesticides; organic toxins; radioactive contaminants; excess nitrogen or sedimentation. Regular monitoring of the biological, physical, and chemical components of aquatic ecosystems is thus highly recommended.

GEMStat, the newest UN Global Environmental Monitoring System (GEMS) Water Programme, is dedicated to providing environmental water quality data and information used in water assessment and capacity building initiatives. The data collection efforts will focus on those critical environments and the data points in the regional seas that have the richest species diversity or marine biological diversity. The recent effort of UNEP, Global Environment Facility (GEF), and Kalmar University to provide a Global International Waters Assessment is a first step towards this goal (GIWA, 2006). The Global International Waters Assessment (GIWA) has provided a comprehensive and integrated assessment of the condition of international waters in different regions of the world and identified some of the main problems in the regional seas, including nutrient loading or eutrophication of aquatic systems attributed to agriculture runoff, urbanization, forestry, and industrial effluents (GEMS/UNEP, 2006).

GEMStat, the World Meteorological Organization, the International Association of Hydrologists, and Food and Agriculture Organization (FAO) could assist in the initial monitoring program. If locally staffed, these monitoring programs would be more sustainable, communication among monitors and local communities would increase, local communities would be empowered with information, traditional knowledge would augment the monitoring data, and local involvement would lead to an increase in conservation (Granek et al., 2005; Robinson 1997; Smith et al.).
HydroDiplomacy: Negotiating a Regional Ridge to Reef Approach

1999: Kaplan et al. (2004). UNESCO’s Integrated Coastal Area Management (ICAM) Programme already assists countries in their efforts to build marine scientific and technological expertise. Many NGOs are committed to local monitoring of marine resources (UNESCO, 2007). Monitoring that incorporates local participation is the recommended first step for a management approach to regional seas and their contributing waters. Science that is based on objective criteria could then stimulate a better understanding of the problems.

Case Study – Mesoamerican Barrier Reef Project

The countries of Belize, Mexico, Honduras and Guatemala have come together under the auspicious of the Mesoamerican Barrier Reef Systems Project to address the threats to the MBRS, the second largest reef system in the world. Available resources, across the four countries of Mexico, Belize, Guatemala and Honduras are greater than many of the other countries in the Wider Caribbean, and the cooperation among the four nations is significantly stronger than in many regions of the world. Consequently, the progress thus far has been impressive. Marine protected areas have been created around the MBRS and recently a four-country watershed assessment was completed to assess the land based threats to the water quality in the major river basins that flow into the Gulf and the waters surrounding the MBRS. The reef system itself brings in significant financial resources to the bordering countries, and is an impetus for cooperation.

The cooperative network of countries is largely supported by the international community, but is only in the initial phase of research and assessment on the land-based sources of marine pollution, water quality research, and on the threats to water quality. The region does not currently have sufficient data from the Gulf of Honduras to adequately quantify the sources of pollution in the Gulf. It also does not have enough information to establish effluent limits nor have the appropriate resources to help countries meet those limits. A major obstacle is resources to monitor and evaluate water quality at the mouths and along the major rivers. If further international support were made available it would support water quality assessments that could pinpoint some of the main sources threatening the reef system and surrounding water quality, these countries could set timelines, meet standards, and cooperate to reduce effluent.

IV.A.3. Protocols on Land Based Pollutants in all Regional Seas

Land Based Pollutants (LBP)s contribute greater pollution loads to the regional seas than any other source. Once in the marine environment, LBP stimulate algae growth, eutrophication, and fish kills. However, the legislation to protect human and environmental health from these contaminants is minimal. Seas with LBP protocols include the Wider Caribbean, the Mediterranean, the Red Sea, the Baltic, the Black and West Africa’s Atlantic coast, the South East Pacific, and Kuwait. The seas without land-based pollution protocols include: the Eastern African Region, East Asian Seas, East Central Pacific, Northwest Pacific, Southwest Atlantic, South Asian Seas, and the South Pacific. The seas and the livelihoods of millions of coastal inhabitants would benefit from further efforts to reduce LBPs.

In 1995, following a mandate in chapter 17 of Agenda 21, more than 100 states participated in drafting the Washington Declaration on Protection of the Marine Environment from Land-Based Activities (Hassan, 2004). The Declaration launched a new initiative under UNEP—the Global Program of Action for the Protection of the Marine Environment from Land-based Activities—behind new actions on Land Based Marine Pollutants (LBMP) since 1995 and has assisted in all of the regional developments since that time (GPA, 2005). Regional programs could be assisted further so that protection of the world’s oceans no longer resembles a half finished patchwork quilt.

IV.A.4 Expand Protocols on Land-Based Pollutants to the Rivers

Land Based Pollutants (LBP)s contribute greater pollution loads to the regional seas than any other. They are also contaminating freshwater and drinking water supplies, and degrading freshwater resources. Currently, of those regional seas with LBP protocols, only the Mediterranean, the Wider Caribbean (both not in force), and the Baltic extend the LBP protocols to the river basins and the numerous sources of pollution that stem from these areas. The rest only apply to a freshwater limit (GPA, 2005). Sewage, agricultural run-off, heavy metals, industrial waste, and other pollutants in rivers and their basins are the main sources of pollution, and are primarily delivered to marine environments by river basins. Some contaminants are easier to identify, locate, and limit than others. Wastewater treatment, for example, is easier to locate and limit than industrial pollutants. Furthermore, the major pollutants in the river basins that are the least controversial and that affect both environmental and human health are naturally the first to be addressed.

Those Regional Seas Programmes which have protocols and subsequent action plans to address LBPs and have preventative policies that mirror the physical problems of the connected water resources, from ridge to reef and from the source of the river to the sea, are much more successful. The program that is most the successful at reducing pollutants from land-based sources, the Black Sea, has a strong connection with its largest contributing source of pollutants, the Danube—a river basin that cuts across 18 different nations. The 18 member countries have formed an RBO called the International Commission for the Protection of the Danube (INCPDR). It is a model for other seas and river basins to follow, especially in the area of Land Based Pollutants.
Wetlands are one of the single best pollution prevention systems in river basins. Wetlands naturally occur and are their own purification treatment system. However, the critical value of wetlands is not widely known and, thus, about half of the world’s wetlands have been destroyed (Speth, 2004). Regional Seas Programmes that are better connected to the river basins that pollute them would facilitate better communication between marine and freshwater conservation programs throughout the catchment area.

IV.B. River Basin Organizations

Of the 263 transboundary rivers in the world, many have not jointly drawn up treaties or set up organizations to address demand, navigation, quality, flow, pricing or seasonal variability, posing a problem for the future when demands are greater and supplies more erratic. A number of recent reports recommend a watershed approach to ecosystem and water resources management because the management mechanism then mirrors the biological properties of the resource for the benefit of human well-being, the sustainability of water resources, and their services. The 2006 UN Human Development Report, Beyond Scarcity: Power, Poverty and the Global Water Crisis, recommends that river basin organizations be strengthened. The report and this paper recommend that RBOs provide networks among communities, regions, and even nations to better manage the common pool resources.

Currently, the functions, organizational successes, and goal attainments of the RBOs around the world are diverse. Some are very successful and have met the demands by integrating riparian concerns, creating management institutions, identifying goals, and improving water quality, supply, efficiency and/or sustainability of the resource and thus the livelihoods of the beneficiaries (Danube and Rhine). Others have arisen to draw out the contentious voices of discord and are credited with bringing together riparian countries in conflict, especially in water-scarce regions of the world (the Middle East, Jordan, Tigris-Euphrates) (Elhance, 1999). Some RBOs start with small-scale, clearly circumscribed operational projects and move gradually to more complex management structures. Examples include Israeli-Palestinian water issues and the Mekong in Southeast Asia (Benjamin, 2001). Others organize around community-based water infrastructure and development projects (U.S.-Mexico) (Lemos, et al., 2002). There are still other rivers that cover the earth’s surface and have no RBO to champion them. The Motagua River (Guatemala-Honduras), contaminated largely by agriculture runoff and untreated wastewater dumped directly into the river, flows into the Gulf of Mexico and degrades the second largest barrier reef off the coast. Other contaminated rivers are sources of drinking water. Still others flow to coastal ecosystems and cause eutrophication, pushing away fish and other sources of sustenance for coastal communities.

We know a great deal about water resources management at the basin level, at the municipal level, and at the household level to facilitate improved management. For example, results indicate that the larger a water basin is as a percentage of a country's size, the more likely that country is to form a treaty regarding its management. However, the more control any given country has over the water basin, the less likely it will be involved in a treaty (Espey et al., 2004). Stakeholder participation from the planning stages through the implementation of water resources policies and the management of infrastructure and monitoring of the resources is critical to successful basin level management and ownership (Saddoff et al., 2002; Williams, 2002; Jacobson et al. 1995; Millich, et al., 1999; Cassar, 2003). At the municipal level, good governance is important if resources are to be equitable, efficiently allocated, and effectively managed. We also know that when women are at the center of water and sanitation decisions, water and sanitation delivery is more effective: communities benefit, households benefit, children’s health and school attendance improves, women are empowered and the household is more productive (UNDP, 2006). Furthermore, getting water and sanitation services to the poor at the household level is an indispensable strategy for poverty reduction with the potential to drive economic growth (World Bank, 2003).

IV.B.1. A RBO Programme like the Regional Seas Programme

A River Basin Organization Programme like the Regional Seas Programme would assist the start-up of RBOs that do not yet exist and direct financial and technical assistance to critical river basins that significantly impact their regional sea.

Transboundary watersheds have, at most, 18 riparian nations (Danube), while most international freshwater treaties are bilateral (International Transboundary Freshwater Treaty Database, 2006). RBOs that already exist for river basins in developing countries will need financial support, while those RBOs that have not yet been formed could be assisted by international organizations and funds. Partnerships on these rivers between civil society, business, and government could serve to expand the commitment to the resource and form the basis from which to solve problems and identify threats to water quality.

There are also a growing number of environmental organizations to assist such a program. These organizations include the Global International Waters Assessment (GIWA) of the Global Environment Facility (GEF); UNEP’s Global Environmental Outlook (GEO); and the United Nations Economic Commissions for Europe, Latin American, Africa, and the Asia Pacific which have environmental programs in some regions. The River Basin Organization Programme should be housed with the Regional Seas Programme and then organized regionally, so that these offices could obtain assistance from the main office.

IV.B.2. RB's Protect Drinking Water Sources, Ecosystems and Forests

The services of a watershed include providing drinking water and food, regulating climate and water purification, and imparting cultural and religious mores (UNEP, 2006). If RBOs and communities themselves recognize the economic and human and environmental health benefits of resource conservation in managing the watershed, policies will be better supported and understood. Education about the life supporting services of a watershed will further stimulate a conservation approach, especially if the comparative advantages are realized and can materialize in benefits to each riparian nation.
**Case Study – The Catskill Watershed**

Before 1980, the Catskill Watershed provided some of the safest water to New York City and the surrounding area. But population grew and forests were cut down to make room for homes, farms, and resorts. Development, runoff from agricultural lands and impervious surfaces, and discharges from wastewater treatment plants began to threaten the natural filtering abilities of New York’s land-based ecosystems, wetlands, and waterways. NYC’s drinking water began to deteriorate. In 1997, a choice had to be made: invest $6.8 billion and $300 million annually for a water treatment plant, or restore the forested land and purification capacity of the watershed for $1 billion. The decision was easy. A joint decision was made between NYC, the EPA, and the Catskill watershed to restore the watershed. Now, the Catskill Corporation focuses on water quality protection, community preservation, and economic development in NYC’s watershed. Many watersheds will have similar choices to make, but the further the watershed is degraded, the greater the price tag for restoration.

(Wilson, 2002; Catskill Corporation, 2007)

Currently, water quality monitoring is addressed in only 54 percent of transboundary fresh water treaties (GEMSwater, 2006). This is a major obstacle that faces the regional seas where these river basins flow. For one thing, the successes of management and or restoration and protection efforts are impossible to measure. Water quality monitoring could assist in identifying the main sources of pollution in river basins and then allow the river basins themselves to organize around the problem areas. Anthropogenic problem identification could then assist the basin and subsequent communities to identify areas where forest preservation can assist in water quality control and where wetlands would be better protected.

**IV.B.3. Technical Assistance to River Basin Organizations**

A watershed assessment is one of the first and more pressing analyses to determine the ratio of water demand to supply, water availability per person, the fraction of water supply that originates outside the basin, and dependency on hydropower (Gleick, 1993). It is the first step toward identifying the main problems in the watershed and potential conflict.

Unsustainable withdrawals and unsustainable discharge of pollutants are two major problems that will face water resources management teams in the years to come. It will be important for RBOs to provide technical assistance along the river that addresses these and other problems identified in the assessment. Some of the major sources of land-based pollutants in fresh and marine waters include those from agriculture runoff and untreated human wastewater. Agriculture assistance and buffer zones along the banks of rivers prove to be highly effective in the decrease of agriculture runoff throughout the world, while low-cost treatment facilities such as condominial sewers in urban areas and stabilization ponds or constructed wetlands in rural areas have proven to be important low-cost investments. Investment in low-cost treatment facilities will be necessary if freshwater resources and the marine waters they impact are going to be sustainably managed.

A watershed approach to management of freshwater resources would help maintain adequate levels of water so that shortages do not harm future livelihoods. Such an approach would also prevent the development of impediments and security dilemmas associated with water scarcity.

**IV.B.4. Public Participation in River Basin Organizations**

Businesses, civil society, national and local governments, and NGOs could be incorporated into the RBOs at the local level to form municipal partnerships comprised of committees around the river basin itself. Participation at the lowest level will increase the likelihood of goal implementation, compliance, enforcement, and effectiveness (Najam, et al, 2006). Community participation is needed for three basic reasons: to implement management measures difficult to enforce without community support; to act as a mechanism in protecting watersheds through support of conservation bodies; and to monitor, restore, and rehabilitate water bodies through voluntary actions (Williams, 2002).

Actors within the confines of the watersheds may challenge environmental goals of RBOs; but, if their input is utilized from the beginning, the success of a RBO is much more likely. Some stakeholders will rally around efforts to build alliances that improve the quality of water resources and can assist in stimulating discussion and awareness about the health of the river basin. Agriculture, lumber, and certain manufacturing companies may be opposed to a RBO. However, if technical assistance can be provided to both industry and agriculture to improve water quality without decreasing economic revenues, the RBO will have formed a partnership necessary for successful water quality improvements. Parties that will benefit from a RBO and a connected Regional Seas Programme far outnumber those who may have to reorient how water is used and waste is discharged. Furthermore, as stated by the latest Human Development Report, governments can choose whether or not to cooperate in managing transboundary waters. Whatever the decision, rivers and their regional seas bind countries into environmental resource-sharing arrangements that shape livelihood opportunities (UNDP, 2006).

**IV.C. THE PARTNERSHIP: ICARM: River Basin Organizations and their Regional Seas**

The regional seas could serve as a home base for coordinated efforts. Each Regional Seas Programme would be a place for coordinated action, negotiation, and research at the local level. A Regional Seas Programme, each with its own secretariat (see Appendix I), would complement the RBO, each with its own secretariat. The RBO should support local governments, as represented in Appendix II. This would further enhance stakeholder and community involvement in the spatial medium of the watershed, and improve water quality monitoring. The RBO would fill the current gap that exists; most Regional Seas Programmes are not institutionally connected to their greatest source of pollution—their contributing waters, the rivers.

Many of the world’s largest and most polluted rivers have RBOs that could simply use greater funding and institutional support. If linked to the regional seas they pollute, RBOs could be strengthened, and research shared. The RBO and the Regional Sea Programme could work together simultaneously to curb pollution from LBPs. Furthermore, comparative advantages could be identified. While upstream nations are better situated to protect forests and provide hydropower, downstream nations are better situated for agriculture. Often, coastal communities,
with their beaches and reefs, provide the greatest tourist attractions. The benefits of each will have to be shared if water quantities are to be sustained and water quality maintained.

Significant research has recognized what makes a successful management partnership. Integrated Coastal Area and River Basins Management (ICARM) require the adoption of goals, objectives and policies, and the establishment of governance mechanisms which recognize the interrelationships between the two systems with a view to environmental protection and socio-economic development (UNEP/MAP/PAP, 1999). This integration of the two zones—the coastal areas and the river basins—occurs in only a few places in the world, but is the recommended strategy. It is based on a Coastal Zone Management (CZM) and River Basin Management (RBM) approach.

According to scholars in the field, prior to acceptance of a partnership between the Regional Seas Programme and the River Basin Organization, certain factors are critical to the success of the RBO and/or the Regional Seas Programme:

- mobilization of national governments;
- alleviation of equity or fairness concerns;
- employment of political symbols and prestige to encourage cooperation;
- assessment of the problem, range of possibilities, and solutions before deciding on the policies for implementation;
- involvement of all principle stakeholders;
- pursuit of functional strategies that de-link specific river management problems from any tense relations that may exist between riparian countries; and
- the use of policy instruments to internalize externalities (Marty, 2001; Wolf, 1997; Bernauer, 2002).

In some regions, much of this activity has occurred, while, in others, most factors have not been initiated. These recommendations recognize the importance of building off of and not replacing the organizations that already exist. Through the secretariats of each, a mutually beneficial partnership between the Regional Seas Programme and the River Basin Organization can occur.

If a Regional Seas Programme is weak or relatively inactive, incorporating RBOs will be a difficult task. There are some Regional Seas Programmes and RBO’s that are very active and highly visible, while others are not operating or are much less effective. Former Director of UNEP Division for Environmental Conventions stated in 1999, that some Regional Seas conventions, such as the Cartagena Convention for the Caribbean and the Barcelona Convention for the Mediterranean have always been active and visible. Others continue to struggle with funding problems and the difficulty of placing environmental issues at the top of their governments’ agenda (UNEP, Regional Seas, 1999). The recommendation is that the two organizations – the Regional Seas Programme and the RBO—move forward together. If, however, either is weak, the partnership will suffer. Therefore, both should be strengthened while building a partnership through key individuals to act in coordination on connected problems affecting water quality and, thus, human and environmental health.

In ICARM, the involvement of local and national governments and an integrated policy approach that involves all sectors (development, fisheries, tourism, environment, agriculture, mammal protection), all levels of government (national, state and local), all spatial zones (coast, land, rivers), all scientific research (social, engineering, natural), and all countries is recommended (Cicin-Sain et al, 1999). (Appendix II outlines the importance of local level committees. These committees can incorporate all sectors—industry, civil society, and agriculture.) Local communities, municipalities, can be interconnected through RBOs, and then the RBO to the Regional Seas Programme at UNEP, and the Regional Sea Programme at its physical office location.

The benefits of such a close partnership would be felt by coastal communities, marine ecosystems, fisheries and the livelihoods they sustain, and eventually by river basin communities with unsustainable water resource management or contaminated sources. Best stated in the 2006, Human Development Report, Beyond Scarcity, where cooperation fails to develop or breaks down, all countries stand to lose—and the poor stand to lose the most. Failures in cooperation can cause social and ecological disasters, as in Lake Chad and the Aral Sea.

These local and regional recommendations piggyback on Recommendation One of the Salzburg Initiative: countries with shared environmental interests should always be encouraged to caucus well ahead of formal treaty-making negotiations in order to explore common interests, share technical information, and analyze strategic alternatives together (Susskind, 1994).
IV.D. An International Waters Convention

Many benefits of local and regional initiatives have been outlined. To further benefit the local and regional water programmes, an International Waters Convention that addresses threats to water resources worldwide is highly recommended. Such a convention could outline the main problems, provide the visibility necessary for international support and coordination and form a secretariat that would be dedicated to: 1) defining the main problems for water resources, 2) coordinating scientific evidence and categorizing the chief problems facing seas and major river basins, 3) identifying the comparative advantages that might bring upstream nations to the table with downstream nations, and 4) assisting regional organizations in cooperative efforts, conflict mitigation, and negotiation.

The benefits from an international convention are critical to raising awareness about the issues impacting water resources worldwide, bringing together epistemic communities, coordinating cooperation among states so as to avoid suboptimal decisions, and bringing together states to set international norms concerning the governance of water resources.

Certain conditions that may be less controversial to start in such a convention include: the expansion of water quality monitoring, agreement to a decrease in Land-Based Pollutants (i.e. nitrogen), agreement to share lessons learned especially about regional conflict negotiation, and agreement to regionally allocate funding for transboundary RBs that contribute to the coastal water improvement.

IV.D.1 Identify Major Problems: Land-Based Pollutants, shortfalls and competing interests

IV.D.1a. Reduce Land Based Pollution

Land-based sources of pollution—the greatest contaminants to marine and freshwater resources—are under the sovereignty of individual states. The jurisdiction of the coastal zone falls under a single nation until the 30-meter depth contour (Beer, 1996). Once the pollutants have reached the ocean currents, they move along coastlines and across international borders. The persistent and cumulative nature of these pollutants allows them to have transboundary impacts, thus placing them in the arena of international law (Hunter et al., 2002). Although there is a global convention, namely the 1982 Law of the Sea Convention and several regional frameworks (Regional Seas Programmes), they do not, by in large, address LBP's from the contributing river basins. This is a major problem that will need to be addressed.

IV.D. 1b. Shortages

In some river basins the major problem is scarcity. Some countries, most in the Middle East, consume more than 100 percent of their total renewable water resources. They have even tapped into groundwater and depleted these water resources. In water-stressed basins, irrigation withdrawals supersede all others in more than 80 percent of river basins (UNESCO, 2003). Climate change will only further decrease water availability in some of the most populated regions of the world. Wealthier nations have benefited from investments in desalination, however, the technology is far from cost-effective for many low-income countries. Water scarcity in certain regions of the world is a major problem, especially for the poor. Scarcity impedes development by impacting human health, increasing the hours households must devote to carrying water, and decreasing the amount of water available for growing food.

IV.D. 1c. Competing Interests

Tensions often arise because of competing interests for available water resources and/or new management of already existing water resources that changes downstream appropriation. Competing interests or depleted available water resources can have significant impacts on poor households, especially poor rural agricultural households where a change in available water resources directly impacts household well-being. Addressing competing interests via regional agreements before they provoke conflict is critical.

IV.D.2. Coordinating Scientific Evidence

Shared data and joint monitoring are some of the initial steps needed for riparian nations to understand the problems in the river basins and the seas and can be the impetus for later cooperation, negotiation, and agreements. GEMS, the newest UN Global Monitoring System (GEMS) Water Programme, is a first step for freshwater monitoring. UNESCO's Integrated Coastal Area Management (ICAM) Programme is a first step in the monitoring of marine water resources (UNESCO, 2007). However, monitoring that incorporates local participation could be better supported in order to stimulate a better understanding of the problems and their corresponding source. This creates a pool of objective criteria from which to inform the negotiation process.

IV.D.3. Identify the Benefits; Identify the Comparative Advantages

Benefits from cooperation and negotiation can be realized on four fronts: benefits to the river, from the river, because of the river, and beyond the river (Kornives et al., 2005). The benefits to the river include: fisheries, water quality, and the ecosystem. Benefits from the river include: drinking water, irrigation, hydropower, fish, industry, and economic and social development. Benefits because of the river include: multilateral cooperation, trade, and navigation. Benefits beyond the river include: the subsequent cooperation that may be stimulated in other areas such as air quality or economic trade or the development of joint hydroelectric plants, joint investment in flood control related to the river, joint water planning, and water security.

These benefits can be secured through comparative advantage and cooperation. These can include financial resource flows from one country to the next, like trade in energy or agricultural resources, data sharing, and joint monitoring. Benefits, once identified, increase the options for mutual gain at the negotiation table.

IV.D.4 Cooperation, Mediation and Conflict Resolution

Regional seas and their watersheds will need greater assistance in their cooperative efforts and in conflict mitigation and negotiation. Initially, this can take the form of neutral mediators who...