

River Basin Organizations

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1. North America²

1.1. The United States

The United States operates under two major systems of water rights: riparian doctrine in the East and prior appropriation in the West. The quantifying of Native American tribal rights and their integration into these systems is becoming more important. The *acequia* system found in the Southwest is one of a few hybrids. It was inherited from the Spanish, who brought it from the Arab world.

The United States of America is a federal system. The states are sovereign entities and they have control over water resources. Like other large countries in the world, river basin operations and organizations revolve first around the alignment of powers among these sovereign entities, which rarely fit river boundaries. Second, they revolve around the exercise of bureaucratic power within the federal and state governments. Multiple agencies work with water usually within their own mandates and sector.

However, there are major federal interests affecting water distribution and use. In fact, one of the U.S.'s earliest court decisions was confining the power of the federal government to regulate commerce involving water navigation. Beyond interstate commerce, federal control over water has been established in a variety of areas, such as for emergencies, flood control, irrigation, public health, environmental issues, and fish and wildlife. Many of these interests have been institutionalized in numerous federal agencies, which present a formidable coordination task. Complex formulas for the mix of federal and state money in water resources development have evolved for different project purposes and water uses, such as flood control, navigation, recreation, water supply for irrigation, and hydroelectric power. Indeed, the debate around these formulae constitutes one of the principal bargaining arenas for water cooperation.

During the 1980s, the movement has been to reduce the federal role and to enhance the state and private sector roles in water resources development. There has been a reduction in water development and a greater emphasis on the management of existing facilities and projects. The federal regulatory role, especially for environmental purposes, has in many ways become the focal point for regional co-operative planning. However, many observers are now looking again at the need for coordinated water development (Sidebar 1). During the twentieth century, several types of arrangements were tried: interstate compact commissions; interstate councils; basin interagency committees (ad hoc); interagency-interstate commissions (Title II); federal interstate compact commissions; federal state agencies; single federal administrators; and watershed councils (see Table 5.1).

Two approaches dominated the early twentieth century: interstate compacts (which can be seen as a parallel to treaties among states) and adversarial court cases. These agreements suffered from the illusion that allocation could and should be permanent. However, as populations shifted, Native American tribal demands grew, and new uses (especially in-stream) appeared, allocations under compacts have proven too inflexible

¹ The materials for this appendix have been gathered from many sources which include gray literature inside several major water organizations as well as published materials. Training session on RBO's held around the world and several private communications with individuals have also been important to developing the following descriptions. In this regard communications with Eduardo Mestre, Peter Millington, Evan Chere and Bernard Barraque were most useful. However, the actual descriptions are the views of the authors. The list should provide a good entrée into further work for interested readers.

² See also, Delli Priscoli (2001,1976); Schad (1964); Wendall and Schwan (1975); U.S. Water Resources Council (1967); Kenny and Lord (1994)

for management. They are not conducive to taking advantage of the variability in the hydrologic system. Generally, the challenges to the compacts have been the impact of upstream developments (and future dreams for such development) on the apportionment to downstream states.

In the United States, numerous presidential commissions have tried unsuccessfully to establish national water policy. During the 1970s, an elaborate institutional and analytical procedure evolved, only to be abandoned as its implementation was beginning. To a great degree, this structure was based on river basins and was fueled by rational analytical notions. It encouraged high-level intersectoral planning and autonomous operating levels. A mini-analytical rapprochement among engineers, social

Sidebar 1

Review of U.S. Coordination Mechanisms (from Kenney and Lord, 1994)

One of the most common themes permeating the literature reviewing coordination mechanisms for U.S. interstate water resources is the track record of these institutional innovation is generally poor. This should not discourage further innovation, however. Addressing the factors that fragment regional water institution is an extremely difficult task and a task normally attempted with a new coordination mechanism only after more established approaches have failed. And in those basins where a coordination mechanism has not successfully resolved the major water resources problems, the mechanisms have generally not been a step backwards—but just a discouragingly small step forward. Thus, most mechanisms have proven to be unsuccessful only in the sense that they have failed to satisfy lofty expectations. If a more tempered enthusiasm for such efforts is utilized, then the track record of coordination mechanism is significantly improved, and proposal for further experimentation will be evaluated in a more forgiving and welcoming political atmosphere.

scientists, and ecologists was achieved in the form of two planning objectives and four accounts.

In the 1980s, the United States approach became more market oriented. National economic development was effectively established again as the prime objective, with environment quality as a constraint, usually articulated through regulatory policy. New private-public partnerships and cost-sharing formulas emerged. Attempts were made to use more realistic pricing—closer to marginal costs—for water through a variety of water market mechanisms. At the same time, recognition of the importance of environmental restoration and wetland management also grew. During the 1990s, the need for new modes of interstate cooperation increased, in both humid and arid areas. Reliance on court judgments proved too expensive, inflexible, time consuming and locked into precedent to realistically meet new needs. Indeed, even the U.S. Supreme Court noted the importance of planning for future water uses and information sharing as a prerequisite to adjudication. Various basins and regions, such as ACF and ACT areas of Georgia, Alabama, and Florida are turning to assisted negotiation techniques such as facilitation and mediation. In response to drought, riparian states on the Missouri River are seeking new forms of coordination and some are calling for a return to a river basin commission. Other areas, such as the Southwest and California are turning to water banking, marketing, and new forms of pricing.

1.1.1. Single federal administrator: (1) The Colorado and Department of the Interior (Colorado Law of the River)³

³ Johnson (1999); Delli Priscoli (2001, 2004); National Academy of Sciences (1968)

The Colorado serves about 20 million people in two countries (Figure 1). Its high variability, severe flooding and drought periods inhibited economic development in the early part of the twentieth century. From the 1920s to the 1960s considerable structural regulation was added to the river. Floods are mostly controlled and storage has prevented drought. However, the story of the Colorado is fraught with the political problems of trying to achieve river basin management (RBM) and create a river basin organization (RBO). Starting in the 1920s with a basic apportionment, subsequent federal and state statutes, interstate compacts, court decisions and decrees, international treaties, operating criteria and administrative decisions for the Colorado have together come to be called the “Law of the River.” The Law of the River remains the means for the administration of the river; there is no RBO for the whole river.

Like the Delaware River Basin, the seven states around the Colorado River Basin also attempted to use the interstate compacts process. From the 1920s to the early 1980s, the federal government acted as a catalyst to agreements around the Colorado. It made development funds conditional on apportionment agreements. Since the 1970s, a new era, which de-emphasizes structural solutions and emphasizes wise use and conservation, has emerged. The absence of an RBO has led to a new emphasis on interstate marketing. That too is fraught with problems, however. Upstream states are concerned that an agreement to use of their allocated water could eventually lead to the arguments that they do not need their allocation. Also the basin lacks an equivalent trusted information provider such as the Delaware River Basin Commission (DRBC) technical staff.

In 1922, after considerable acrimony between the upstream states and California, the Colorado River Compact was signed. The upstream states feared that California had an insatiable appetite for water. Herbert Hoover, who at the time was Secretary of Commerce, tried to mediate and build consensus on the entire river. The compromise, which was forged in lieu of full consensus, split the river and allocations into an upper (Colorado, Utah, Wyoming, New Mexico) and lower basin (Arizona, California, Nevada). The split allocated 9,255 MCM to each; at the time, the thinking was that average annual flow was over 22,000 MCM. Hydrologists have since discovered that the estimate was high: the average flow is closer to 18,500 MCM. Consequently, over the years the river has seen increased demands and less than average flows. Obviously, this has led to over allocation of the water, competition, and conflict. This is a classic illustration of the importance of data and trusted information providers.

Arizona refused to ratify the compromise because they disagreed with California over allocation. Thus, the U.S. Congress passed the Boulder Canyon Project Act in 1928. This ratified the Compact despite Arizona’s objections and placed the U.S. Secretary of the Interior in the position of implementing the water service to the entities in the lower basin. Since the parties did not agree, the Secretary, using contracting authority, implemented it. This essentially meant a federalizing of the lower basin. Congress through the Secretary of the Interior allocated 5,400 MCM to California and 3,455 to Arizona and 370 MCM to Nevada.

In 1929, California legislature passed the California Limitation Act making it unlawful for various California entities to use more than their share of Colorado River water. In 1931, the California entities entered into the Seven Party Agreement, which allocated the water amongst themselves. The entities could not agree on specific allocations, however, so they agreed on priority rights to users. Four agricultural entities got the first priority of water shares. The Agreement assigned water rights beyond the basic 5,400 MCM. The excess diversions have been allowed because the upstream states have not been fully developed to date; however, this is changing.



Figure 1: Map of the Colorado River Basin (TFDD, 2007).

The upper states were able to form an Upper Basin Commission in a 1948 compact. In 1956 Congress ratified this with the California Storage Act. This act authorized various storage facilities, among them the Glen Canyon Dam project, which essentially helped launch the modern era of environmental protest against dams.

In the 1940s and 1950s, California blocked Arizona's attempts at moving forward with the Central Arizona Project (CAP), a 365-mile long canal that would eventually stretch from Lake Havasu City to Tucson. In 1951 Arizona filed suit against California. The Supreme Court appointed a Special Master, which is a frequently used conflict management tool in water disputes in the western U.S. The Special Master collected data for over 10 years and the court found in favor of Arizona. The court thus strengthened the role of the Secretary of the Interior as water master on the lower part of the river. The court also allowed California to continue to use more than its mainstream entitlement because the upper States were not fully using theirs—but it also specified that this was not a long-term right.

Native American rights further complicate the situation. The 1964 court decree reserved rights for five Indian tribes located along the river of 1 MAF. These rights have come to be very important in the implementation and design of the CAP. In 1968, the Colorado River Basin Project Act was passed.

The Colorado is also an international river. In 1944, the U.S. and Mexico signed the Mexican Water Treaty. It calls for an annual delivery of 1,851 MCM to Mexico, with some additional water during years of surplus. In 1973, Mexico announced that it was suffering from increased salinity due to irrigation return flows and it filed diplomatic protests. This resulted in the 1973 Mexican Treaty and the 1974 Salinity Control Act, which defined water crossing the border in terms beyond quantity. It also authorized treatment at the border to assure the quality.

Today, increased demand and uses of water in rapidly growing areas and the Arizona CAP are putting pressure on the river. The Secretary of the Interior may have to enforce the basic limits as outlined in the Court decree of 1964. Upper basin development has not fully materialized. California has asked the Secretary of Interior for more detailed guidance on allocation rules of the surplus water.

The lessons of this history are important to river basin organizations. First the "Law of the River," like most legal systems, is inflexible. It does not easily accommodate changing needs stemming from demographic and other changes, as would a more flexible management system such as an RBO. Thus the failure to achieve an RBO has really increased the transaction costs of trying to do integrated management of the river. Still, the flood control and drought problems have been solved.

Second, data is critical, even in situations of plentiful data. Much of the problems can be traced to the use of figures that were too high because they were estimated at times of high flow. This is another lesson pointing to the importance of having some form of trusted technical expertise for the river.

Three, because clear water entitlements could not be reached among the California parties, there is difficulty in using marketable rights and trading. Four, the use of what is called the "surplus" is likely to cause more problems. States have feared, with some justification, that California would claim in effect a preemptive right to water. With the river over-allocated, the Secretary of the Interior will need to develop guidance on how to deal with the surplus (which may not really be a surplus). This means that once again the seven states will have to try and reach consensus. Thus, like other examples in the U.S., failure to reach consensus will not make problems go away. Court cases will not solve the problem of operating with flexible rules in an equitable ways. The same happened on the Delaware over 50 years until the parties finally did develop consensus on an RBO to provide a safe ground for negotiating needs for integrated management.

Six, special new rules for interstate water banking must be developed. Indeed a technical committee was formed to do so. It has resulted in federal regulations for transferring water from upper to lower basin states. Seven, due in major part to new environmental needs, Glen Canyon Dam has adopted an expensive adaptive management plan. This too is fraught with conflict and carries high transaction costs absent some

organizational forum to deal with these new ecological needs. In addition, there are now several endangered species in the lower basin. While the cooperation with Mexico has generally been good, salinity problems remain and the impact of all this activity on the Delta is becoming apparent. All of these points to the need for some form of formal cooperation.

1.1.2. Single federal administrator- variation: The Columbia River Treaty Organization⁴

The operations of the Columbia River (Figure 2) are a variation of the single federal agency, from the perspective of the U.S. Essentially the U.S. Army Corps of Engineers is the main U.S. manager of actions under the treaty. Like other cases around the world, the government reacted to precipitating events. In this case, it was floods, particularly the flood of 1948. Canada has 15% of the basin area, but 30% of the 134 million acre-feet (MAF) average annual flow. Half of the flow in the 1894 Columbia flood came from Canada. Flow at the border ranges from 14,000 to 555,000 cubic feet per second (cfs), which is a much wider variation than the Mississippi or St. Lawrence. The idea thus was to optimize U.S. operations to realize the benefits of the Canadian storage.

In 1944, the Government asked the International Joint Commission (IJC) to study the development of the Columbia. After many studies between 1945 and 1959, the IJC reported with alternative plans and principles for apportioning the downstream benefits. Negotiations began in 1960 and the treaty was signed in 1961. It was ratified in the U.S. Senate in March 1961. However, the Canadians were not prepared to go forward. The Government of British Columbia (B.C.) wanted to sell the downstream power benefits within the U.S. and the federal government was opposed.

In response, joint engineering studies were done to determine long-term estimates of power benefits. Negotiations between Canada, B.C., the U.S., and mid-Columbia utilities agreed on a sale price. Negotiations clarified the treaty and allowed the sale of the Canadian entitlement to downstream power benefits, and led to a protocol and Canadian ratification in 1964. The exchange of diplomatic notes implementing the treaty and entitlement sale was completed in September 1964.

The treaty and protocol defined dams, operations, and benefit computations for treaty storage. The Canada-B.C. agreement gave construction and operation obligations and benefits to B.C. and allowed sale of the Canadian entitlement to the U.S. The Canadian entitlement sold to Columbia Storage Power Exchange (CSPE) for \$254 million for a period of 30 years following the completion of each project. British Columbia used the funds to construct their dams. The allocation agreements allocated the Canadian Entitlement obligation among the downstream U.S. Columbia River project owners. The Pacific Northwest coordination agreement insured coordination operation of the U.S. project for optimum power to create entitlement. The powerhouse expansion on the mainstream Columbia River projects was justified by increased fall-winter flows from treaty storage operations. The PNW-PSSW ties were justified by PNW power surplus resulting from the U.S. entitlement and the purchase of the Canadian entitlement.

The treaty required Canada to construct and operate 15½ MAF of storage on the Columbia River and a tributary in Canada for optimum power generation and flood control downstream in the U.S. and Canada. The treaty allowed the U.S. and Canada to build Libby Dam, with 5 MAF storage, on the Kootenai River in Montana. The 90-mile long Lake Kootenai, the reservoir behind the dam, backs up 42 miles into Canada.

Besides Libby Dam, the treaty also included Mica, Arrow, and Duncan dams. Storage of 8.45 million-acre feet at Arrow, Duncan, and Mica were assured for flood control operation for 69 years. An additional 7 MAF of treaty storage and 5 MAF of non-treaty storage were available “on call” for large floods at a cost of \$1.875 million at each of the first four requests and lost operating cost. Cash payments of \$64.4 million were made

⁴ Delli Priscoli (2005); U.S. Army Corp of Engineers (2000)



Figure 2: Map of the Columbia River Basin.

to Canada by the U.S. Government at the completion of the treaty projects for half of the estimated worth of future flood damage prevented.

For hydropower, 15.5 MAF of Canadian storage is operated for optimum power generation downstream in the U.S. and Canada. Power benefits from the treaty storage include dependable capacity and average annual usable energy. Canada receives half of the increased power generated downstream in the U.S. due to the operation of Canadian treaty storage. Actual operation and magnitude of water year do not affect the downstream power benefits. Downstream power benefits resulting from Libby storage operation remain in the country where they are generated. The hydroelectric operation plans provide a monthly reservoir balance relationship for the whole of Canadian storage, allowing Canadians the flexibility to operate individual projects for maximum Canadian benefit.

The assured operation Plan (AOP) for Canadian treaty storage is developed for the sixth succeeding

operating year from a hydro-regulation study designed to achieve optimum power and flood control benefits in Canada and the U.S. The AOP defined operation criteria for Mica and the rule curves for Mica, Duncan, and Arrow that will be used in actual operation unless otherwise agreed by the entities. The assured operation plan determines the downstream benefits that will be sent to Canada. Once the benefits have been calculated they do not change, no matter how much actual energy is generated.

The treaty allows the entities to prepare the Detailed Operating Plan (DOP) for the upcoming year. The DOP may be fine-tuned from the AOP, which was developed six years earlier, to produce Canadian project operations that are more advantageous to both countries. The DOP includes the process for determining real-time project operation, which is not in the AOP. The DOP authorizes the operating committee to agree on mutually beneficial changes to the DOP for power generation and on power proposed. Figure 3 outlines the structure for coordination. The permanent Engineering Board is appointed by the U.S. and Canadian governments and assures that treaty provisions are carried out. The permanent Engineering Board meets at least once each year and prepares an annual report for the respective governments. The permanent Engineering Board Committee performs technical and administrative duties for the permanent Engineering Board.

The U.S. entity consists of the Division Commander of the U.S. Army Corps of Engineers for flood control, and the CEO of Bonneville Power Administration for power. The Canadian entity is the CEO of BC Hydro. The entities meet once a year. The treaty coordinators act as liaisons among the entities to the Columbia River Treaty Operating Committee. The entity Secretariat performs administrative duties for the entities. The operating committee performs all the technical work to implement the treaty. The operation committee develops annual operating plans, calculates annual downstream benefit payments, and assures delivery of the Canadian entitlement. The operation committee meets every other month. Working committees may meet more often than other month.

The U.S. entity makes a weekly treaty flow request for treaty storage based on the annual operating plan and additional operation agreements. Canada operates the three treaty projects as one pool, considering the total 15.5 MAF as one project. Individual project operations may differ from the annual plan, but the total, composite Canadian storage will match the plan.

The Columbia shows how hydropower and flood control can be integrated to create benefits, which then are used for negotiations rather than being mired in fighting over the allocation of flows.

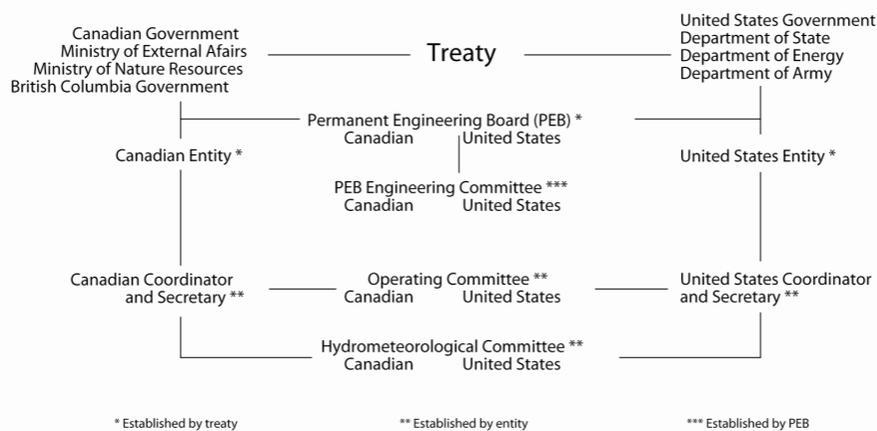


Figure 3: Columbia River Treaty Organization flow chart (Delli Priscoli, 2005).

1.1.3. Comprehensive regional authority: the TVA⁵

Upon signing the Tennessee Valley Authority (TVA) into law in 1933, President Franklin D. Roosevelt said it would bring the best of the private and public sectors together. The Tennessee Valley Authority is a product of the Depression Era and the movement called “valley authorities” in the United States. The authorization of TVA itself did not go through any of the traditional congressional natural resources committee to get to the floor of the U.S. Congress. It went through military related committees, as it was dealing with old munitions sites of Muscle Shoals, Alabama.

The TVA is one of the few comprehensive regional development organizations based on watershed and river basins. It has sufficient authority to integrate planning, development, and management in one agency, with the coordination focused around the Tennessee River. It has a high level of formal authority: in a sense it is one of the most integrated and powerful examples of what today we call integrated water resources management (IWRM). TVA has inspired some other regional authorities around the world, in Indonesia, Jordan, and other areas.

While federal and public, TVA is a regional agency and a federal corporation. This is important. The move to create seven more TVAs based on its success was defeated in the U.S. Congress in the late 1940s, primarily by the power of other federal bureaucracies and states, who saw their power, both in the cross sector and geographic sense, being lessened if more regional organizations were added. Private power companies also led the attacks on TVA.

At its height, the TVA used revenues derived from services such as hydropower to subsidize other services such as community development programs. TVA was, at its root, concerned with the total social and economic development of the people of the region. It sought to integrate water uses, from hydropower to flood control, to generate wealth in the region. It brought affordable and reliable basic services to the poor and rural people: electricity, stable water supply and protection from floods. As such, in one generation, it took one of the poorest and most poverty stricken parts of the U.S. into the twentieth century. In fact, the socioeconomic statistics of the region before the TVA are still very familiar to many poor parts of today’s world.

Today, the TVA has become focused primarily on power generation and receives little to no money from Congress. It has now also become one of the largest taxpayers in the southern United States. It does maintain an extensive watershed program and some first-class laboratories. During its days as a social development organization, major congressional debates took place over the bonding authority of the TVA. The extent of such authority gave the TVA financial autonomy and setting limits was one of the only ways to put control on the TVA itself. The Tennessee Valley Authority reflected the prevailing perspective of water engineering of the time and focused on structures, or what we call “supply side” today. As have others, TVA has changed these perspectives with changing notions of water value.

It is a mistake to call the TVA only a centralized national agency. It was as close as any organization has come in the U.S. to being a regional government. In fact, much of the anti-TVA rhetoric revolved around this very structure, which included a wide range of service departments far beyond what one normally would expect to see in a water agency. It was this comprehensiveness, pervasiveness, and real cross-sectoral organization that made it easy to paint as a huge government bureaucracy.

Using Millington’s criteria for success; TVA had high-level support at first; it was orientated to the community; there was clear accountability among the actors; and building a knowledge base and technical expertise was central to its operations.

⁵ There is much historical literature on TVA; Philip Selznick (1953); Hubbard (1961); Martin (1956); Delli Priscoli (2005); Leuchtenberg (1952); Pritchett (1943)

1.1.4. Watershed councils⁶

Since the demise of the Title II system in the U.S. in the 1980s, the major river basin management (RBM) innovation has been a renewed focus on watershed management. The U.S. Environmental Protection Agency (EPA), the Association of Metropolitan Sewerage Agencies, the American Planning Association, the U.S. Geological Survey, and Water Quality 2000, have all been advocating this approach. The focus has been on small watershed organizations built from the grassroots. The notion is that watershed councils should be *sui generis* and grassroots in origin, emerging to form shared visions on managing watersheds. Indeed, the watershed focus is far more manageable than the river basin.

The central concept has been on consensus. It has been built on the concept of “nested watersheds.” This approach is based on the idea that river basin institutions can be composed of interrelated but discrete arrangements organized around nested hydrologic units (i.e., from a large river basin to regional sub basins to local watershed). In this way, the concept is meant to employ both the top-down and bottom-up approaches. Indeed, the success of watershed management has come to be consensus, almost to the exclusion of technical analysis. In addition, it is becoming clear that consensus on numerous small watersheds does not necessarily add up to managing a river basin. However, hundreds of watershed councils have emerged in the U.S. They are testimony to a high degree of citizen activism and participation. One of the most visible of these, which has grown to actually bring established agencies into a new partnership structure, is the Chesapeake Bay.

The watershed processes, as might be expected, have been highly varied and have focused on water activities. They do address problems vs. jurisdictions. In many cases, they have achieved active participation of all local interests (private + non-public). They employ highly collaborative design processes. They are consensus driven. They try to use a more holistic and adaptive systems approach. Information exchange has increased and they have provided good forums for public education. They are non-threatening venues for dispute management and do force coordination among resources managers and the reduction of duplications. Figure 4 below summarizes some distinctions between the river basin and watershed focus.

| | Watersheds | RBOs |
|---------------------------|---|-------------------------------|
| Geographic Scope | RBOs are watersheds | Not all watersheds are RBOs |
| Level of authority | Less | More |
| Participants | Broader mix public and private | More focused on formal public |
| Legal basis | Informal | Formal |
| Issues/services addressed | Multi-issue more local | Multi-issue more regional |
| Catalyst events | Droughts and floods Fragmentation Demographic mismatching | |

Figure 4: Watershed vs. RBO “summarizes some distinctions between the river basin and watershed focus” (Delli Priscoli, 2004).

⁶ Natural Resources Law Center (1997)

1.1.5. Inter Agency-Interstate Commissions: Title II⁷

Under the Water Resources Planning Act of 1965, the so-called Title II commissions were established. Their purpose was to improve interagency coordination, federal-state coordination, and to complete what was called “comprehensive coordinated joint plans” for river basins. Figure 5 shows the organizational arrangements for the Titles IIs and how they fit into an overall national scheme.

This organizational structure was the result of a long process started in the 1950s and pushed forward by President John F. Kennedy. In many ways, it involved the best thinking available in the U.S. on how to achieve coordination and planning in the U.S. federal system.

The Title II RBOs had a formal legal status and permanent staffs, and treated the states more as equals than did earlier commissions. Each member of each commission had one vote. Either consensus or unanimity was used to reach decisions, but the actual process was unclear. Indeed the decisions of Title II were not really enforceable.

President Reagan terminated this whole structure in 1981. Since then there has effectively been no coordinating mechanism among the key U.S. water agencies. Insofar as such occurs, it tends to be achieved through the budget processes. Many water professionals have come to realize the need for such a coordinating institution. When it existed, the Water Resources Council under the Title II arrangements became mired in political battles. While the system was good at fostering communications, it was not effective at management conflicts.

In addition, the Title IIs came along when the policy world in the U.S. was changing. With the environmental movement, the focus became water quality. Under the 1972 Clean Water Act, a large program in water treatment emerged. The focus was on this grants program and on regulation for water quality, rather than on traditional planning. The result has been that the U.S. lost a structure for comprehensive planning along rivers. In addition, some commentators have said that the Title II structure was a structure developed for a time gone past. This is now debated because it is apparent that the structure offered numerous coordinating means that are much needed in the U.S. today.

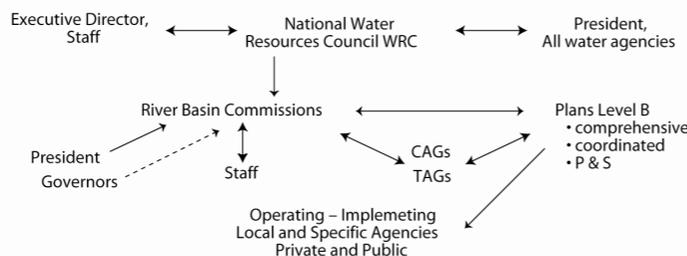


Figure 5: Interagency—Interstate Commission Title II (no longer exists) (Delli Priscoli 1976; 2004).

The system also devised an elaborate set of participation procedures and structures. It used citizen

⁷ There is a rich literature from the late 1950s to late 1970s, in the United States on the Water Resources Council and the National Water Commission of the United States and from academia on the following topics. This material is rarely cited in the current debates on water but it is highly relevant, some examples follow: Kalter (1971); United States Water Resources Council (1967); Eckstein (1958); Eckstein and Krutilla (1958); White (1969); Ingram (1971); United States National Water Commission (1974); Ostrom (1971); Arnold (1988)

advisory committees and technical advisory committees. As such, it went a long way to draw attention to the need for structured and real citizen participation. These committees however were subject to many debates. Their effectiveness was highly variable. They appeared at a time when the U.S. was just beginning to experiment with citizen participation in planning.

The distinction between the citizen and the technical committee was clear on paper. It really built on the idea of separating the technical and political or non-technical in water planning. Subsequent experience has shown that the best route to participation is in blending the technical and political as much as possible and not keeping them separated. In fact, empirical research on these committees showed that, demographically, the technical committees were often far more reflective of the general citizen population than the citizen advisory groups (Delli Priscoli, 1974). This was primarily because citizen groups came to mean environmental groups at that time. Subsequent experience in the U.S. has also shown that participation is and must be far more than just participation of environmental groups. It also must move beyond only advisory committees to public workshops and other such interactive means. However, all of this happened at a time when environmental values were just beginning to find a voice in traditional water resource planning.

In addition to the structure portrayed in Figure 5, this system of the WRC and the RBCs, under the 1965 act, produced principles and standards (P&S) for planning and a tiered, 3-level national system for water resources planning. The P&S is a remarkable document that tried to set up a system of planning that would be used by all agencies regardless of their mission. It originally did so by using four objectives and four accounts under those objectives: economic development, social well-being, regional development, and environmental quality. In this way, it put forward a uniform national accounting system for water resources planning and development. The P&S were modified to two objectives (economic development and environmental quality) and four accounts, and came to be called the Principle and Guidance (P&G). The P&G still exists and it is one of the best practical guides to doing what is now called "IWRM" for on-the-ground water managers worldwide (Sidebar 2). It has been used only by the traditional water agencies, however. Environmental regulators have not adopted the analytical procedures, such as benefit-cost analysis and trade-off analysis. Along with the lack of coordinating organizations for water agencies, this lack of analytical procedures for environmental regulation is also becoming recognized as a serious problem in the U.S. (Sidebar 3).

1.1.6. Delaware River Basin Commission (Federal Interstate Commission)⁸

In the early 1920s, drought in the Delaware Basin produced allocation conflicts. States initially tried to solve these through judicial remedies. However, judicial formulae were too inflexible and technically inadequate. States began to recognize that enhanced technical capacity, such as information generation and sharing and analysis, was necessary in the hydrological system, if they were to move to a positive-sum negotiating environment.

Droughts in the 1940s resulted in more judicial rulings, which established equity principles, but still were inadequate for management during droughts. This led to the formation of the Delaware River Basin Commission (DRBC) in the 1960s, which provided a decentralized institution within which to negotiate (Figure 6). It also enabled the states to draw upon its newly instituted technical staff. In subsequent droughts, the experience of negotiating within the DRBC framework and equity principles increased the legitimacy of this technical staff. As a result, the quality of contingency plans improved and a good faith agreement among states was signed in the early 1980s.

⁸ Martin (1960); Delaware River Basin Commission (2006); Delli Priscoli (2001, 2004, 2005)

Sidebar 2

Principles and Guidance (P & G): U.S. accounting system for public water investments

National Economic Development (NED)

Beneficial and adverse effects on the national economy in monetary terms

Environmental Quality (EQ)

Effects of plans on significant environmental resources and ecological, cultural, and aesthetic attributes

Regional Economic development (RED)

Distribution of regional economic activity from each plan in terms of regional income and employment

Other social effects (OSE)

Effects on urban and community impacts, life, health, safety factors

Displacement, long term productivity

Energy requirements and energy conservation

Sidebar 3

U.S. Water Resources Planning Framework

Level A - Region (many river basins)

Macroeconomics, goal setting, integrated economic resource use analysis, institutions, laws

Level B - River Basin

Macro I-O, econometric models, water use sectors, priorities, system management, policy analysis

Level C - Project Site

Microeconomics, economic efficiency, mitigation, design, O&M, cost-sharing, role. resp.

The Susquehanna River Basin Commission followed the model of the Delaware in the 1980s. It too was spawned by continual drought and the need for better management across purposes of water supply, flood control, and drought.

The Delaware (and later the Susquehanna) commissions had sufficient independent authority to act in a management capacity. This includes the ability to block proposed actions that are inconsistent with the regional plans developed by these commissions. In addition, they possess independent and technically competent staff; they have multi-purpose mandates and multi-value mandates; they have a large problem-shed geographic scope; and they rely on state political leaders (i.e., governors) rather than bureaucrats in guiding policy decisions. They also have achieved a relatively equal balancing of state autonomy with federal supremacy.

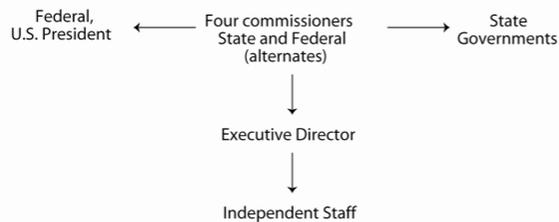


Figure 6: Federal Interstate Compact Commission—Delaware, Susquehanna. (Delli Priscoli, 1976; 2004).

1.1.7. Potomac River (Interstate Compact Commission)⁹

The Interstate Commission for the Potomac River Basin (ICPRB) was also formed, in large part, because of needs for drought contingency planning. For a long period, numerous dams have been proposed; however, only one major new dam has been built. The remainder of supply is provided through negotiated agreements among the states and the federal district (Figure 7). The ICPRB demonstrates the influence of data and technical analysis in facilitating cooperation. It has little formal power other than to gather data and convene discussions among basin states. Through the use of professional staff and interactive computer approaches such as STELLA¹⁰, ICPRB has built its technical credibility. Now it manages a real-time river monitoring process, which provides hourly flow projection data and a structure for the riparian states to discuss their responses to that data. Once a year it facilitates a series of drought contingency simulations for the river. In generating information and analyzing data in this way, it has become the key agent facilitating flexible agreements among the states. And it does this with little mandate other than to help gather and disseminate information.

Kenney and Lord (1994) note that no basin has realized the potential of “non-structural” innovations better than the Potomac. In this basin, the reservoir operations scheme developed and implemented by the ICPRB has increased the overall system yield by 50%, while satisfying instream flow and water quality objectives. In contrast, the “structural” solutions proposed earlier by the U.S. Army Corps of Engineers promised an increased yield of 43% through the construction of as many as 16 major projects, with the cost estimates ranging from \$200 million to \$1 billion. It has done this with one major and one minor new reservoir in place of the original 16 proposed projects.

⁹ Hoffman (2001); Steiner, Hagen and Ducnuigeen (2000); Interstate Commission on the Potomac River Basin (2005); Delli Priscoli (2001, 2004, 2005)

¹⁰ USACE (2006); United States Army Engineer Institute for Water Resources (2007).

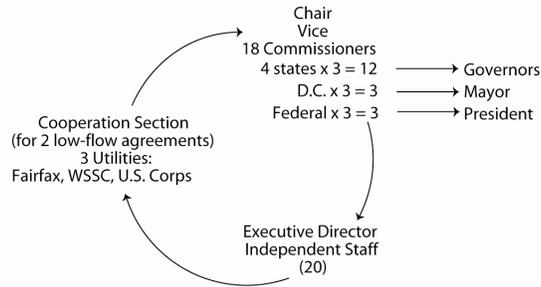


Figure 7: Interstate Compact Commission (Delli Priscoli 1976; 2004).

1.1.8. RBOs as Boundary Organizations¹¹

The two North American border commissions, the International Joint Commission (IJC) and the International Boundary Waters Commission (IBWC), emphasize their technical objectivity in their attempts to facilitate dispute resolution. Both deal with all waters that either form or cross boundaries between the United States and Canada. Both began with a narrow technical focus—IBWC more than IJC—but have been under steady pressure to expand their scope as values changed and needs grew. Much of this pressure now comes from transboundary groups advocating new environmental claims on the waters. These are clear cases that participation will go beyond the formal public agencies.

The IJC is more of an appellate, review and regulatory board because it is mandated to resolve differences. It also has more of a public access orientation than does the IBWC. The IJC is made up of commissioners from each country. The offices or secretariat for the commission exist in both Ottawa and Washington, D.C. Unlike with any other such treaty in the world, these commissioners have no orders from their countries. Instead they must take an oath to uphold the treaty. This enhances the independence of the IJC. It also enhances the IJC's capacity to deal with disputes.

The IJC can deal with any issue around water. Recently the organization has been involved in issues concerning major flooding along border rivers and with water levels of the Great Lakes. From its beginning in 1909, IJC has been mandated to deal with the public health and environmental aspects of boundary waters. Most recently, it has begun a process of initiating cross-boundary watershed committees or councils. If successful, these will be councils of Canadian provinces and U.S. states (thus, sub-national sovereign entities) concerned with certain rivers—which will also be unique in the world. Since issues must be forwarded to the IJC by both countries, a certain amount of preliminary negotiations has already occurred by the time IJC gets a case.

The IBWC is made up of two commissioners who must be licensed engineers. Each has an executive staff. IBWC has adopted a low-key mediating approach and nurtures a reputation for neutrality and expertise. It is now under pressure to become more activist, increase its attention to urban and environmental issues, and broaden public access to its deliberations.

¹¹ Delli Priscoli (2005); International Boundary and Water Commission (2006); International Joint Committee (2006); Utton (1992)

1.2. Some Canadian experiences¹²

The Canadian Prairie Water Board (PWB) is an example of institutional collaboration falling to the right of the center of the continuum. It monitors flows, provides oversight on water quality, advises on disputes, and uses fact-finding and technical committees. It is built on a master agreement among the Canadian Prairie provinces of Alberta, Saskatchewan, and Manitoba. Within the context of this master allocation agreement, provinces have reached bilateral agreements. Each jurisdiction manages its own water in inside that jurisdiction, and PWB monitors flow at the borders.

The PWB offers some important lessons: it operates by consensus; maintains strong, technically credible support; is flexible; and its rules can be redefined as it grows. Requirements are defined at the borders of jurisdictions. It starts with a master agreement on apportionment and then moves to bilateral agreements. Dispute resolution mechanisms are defined. It facilitates information exchange. Many of these lessons are echoed in other basin initiatives. Indeed, a similar process was undertaken on the Mackenzie River.

2. Europe¹³

There has been great diversity in water management institutions and river basin management in Europe. The diversity reflects the differences in hydrology and geography. The Netherlands, Great Britain, and Portugal have focused more on flood management than have others. France has built the most enduring modern RBO system based on an arbiter role between the polluter and users and on investment incentives. Germany has relatively little river basin planning except the long tradition in the Ruhr Basin, where large industrial demands caused early focus on water quality and multiple uses. Portugal and Spain have long tradition of RBOs, which traditionally focused on supply-side aspects of water management. The new EU directive on water requires river basin planning and organization.

The British moved from a public river basin planning model to far more privatization. While the river basins were smaller and were operated for fewer purposes, the system also has national regulatory oversight. Since the 1970s, the French have operated a river basin system that falls somewhere in-between the se approaches. The major basins have committees that include representation by industry, environment organizations, and the general public. These committees, which formally represent users and are financed through pollution charges, set priorities for users over a period of 20 to 25 years. As in the United States, the European Union has begun to move from single to multipurpose orientation of its river basin organization, such as the Danube and Rhine. New EU directives now require river basin organizations and planning.

2.1. France¹⁴

The French Water Agencies were initially begun as a funding mechanism and actually were called funding agencies in their initial stages. They are designed as financial intermediaries between polluters and users and water treatment operators. The basin agencies collect revenues from polluters and reallocate these by subsidizing investments in water quality improvement projects. While water management is financed

¹² From materials prepared for the U.S. Delegation to the Middle East Multilateral Peace Talks on Water, US Department of State.

¹³ From private discussions with Dr Bernard Baraque, Paris and Evon Chere, Paris; see also UNECE 1999 and 2000; Mostert, van Beek, Bouman, Hey, Savenije, Thissen (1999); Le Moline and Alearts, 2002

¹⁴ Delli Priscoli (2001); Kaczmark (2002)

independently from the general central government budget, the agencies can influence this management—and thus integration of flood management—through this reallocation function (Figure 8; Sidebar 4).

From the participatory viewpoint, the basin committees, or water parliaments are the most interesting. These consist of local government, users, and the state. Elected officials from local government and users make up two-thirds of the seats. Representatives for the regions and departments are elected by respective councils and from the communes from the French mayors' associations. Users choose members themselves and various ministries choose other members. All of this constitutes what has been called a “water parliament.” The committee is a consultative body. It advises on the levying of taxes and the allocation of revenues and it also approves the tax rates.

In addition, the committees are tasked with preparing the river basin master plans, called SDAGEs. In reality the bulk of this planning is done by the river basin agency. Apparently the users do not always see this activity as useful or have the means and time to pursue the effort. However, as difficult problems are emerging, such as low flow agreements for basins like the Adour-Garonne, the committees are beginning to see the important role for conflict resolution. These SDAGEs are supplemented by river basin management plans called SAGEs. Local water committees are specifically instituted for this function. They consist of local government members (50%), representatives of users, riparian owners, professional organizations and concerned associations (25%), and state representatives (25%). These plans continue the older practice of river contract planning. While the performance of the planning is mixed, there is an indication that the quality of the consensus directly affects the implementation of the plans.

This system is remarkable for its longevity, in how it tries to formalize representation and provide some clear authority lines, and perhaps most important, how it has attempted local and decentralized water management within the centralist state tradition in France. Indeed the direct participation of users in the bottom-up approach seems to contrast with the centralist government administration.

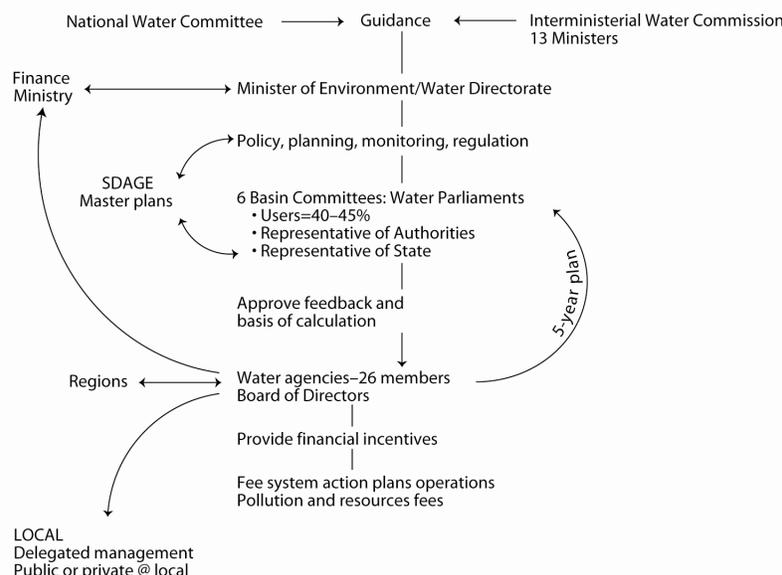


Figure 8: French system (Delli Priscoli, 2001, and extensive discussions with several principles of French agencies).

2.2. Germany¹⁵

As in most federal systems, the states have the primary responsibility for water in Germany. The only state with river basin institution units is in Northern Westphalia (NRW). These consist of water associations responsible for water quality and quantity in the Ruhr region. They began during the periods of rapid population and industrial growth at the turn of the century. Such growth threatened water supply and sewage systems in the regions. Thus water associations were established and membership of local authorities, industry, and supply and treatment companies was mandatory. Each association focused on different functions or task depending on the basin. However, the main concern was with pollution with some concern over water transfer. The associations were established by a special law and they are an expression of the tradition of water supply in Germany as self-government. And this is really its primary means for public participation

The water supply and waste treatment system is self-financing through a system of charges. There is little river basin planning outside this region and the NRW associations. Indeed water planning is just beginning to grow throughout Germany as a result of recent legislation.

2.3. The Netherlands¹⁶

Water is intimately linked to national self-perception in the Netherlands. Indeed the Dutch water boards are among the oldest operating democratic institutions in Europe. Because of its geography, the Dutch concern has traditionally been with flooding. This started with a focus on the sea; recently the focus has moved to the rivers, however, along with concerns over pollution. The water boards are not organized along river basins or watersheds. Integration among the highly fragmented Dutch system is achieved through a system for planning.

The water boards are functional public bodies for management and the provinces are bodies for administration. The board is made up of representatives of interested stakeholders, meaning landowners and inhabitants of the areas. The right to vote is derived for the duty to pay taxes to the board. There are managing boards, which reflect the similar composition of stakeholders. Since the Dutch system is so fragmented, consensus is primarily sought through the country-wide planning process. This is actually designed to obtain consensus within the administrative structure. That process includes a national policy document, operational plans for implementing it, and provincial strategic plans for non-state waters. Accountability is assumed to take place through normal elected process in provincial councils and parliament. Interested stakeholders, such as environmental groups, are also involved in the process of planning. Consensus processes focus on consensus within the administration and not on direct participation of the users. Agricultural interests have traditionally dominated the water boards. There is discussion on separating the policy and operation functions more clearly and better integrating environmental values into the overall process. This has in large part occurred as a result of flooding and a move to rethink the basic approach to flood management, including returning some land to the water.

¹⁵ Huisman *et al.* (1999)

¹⁶ Note articles on Dutch water history in Reuss (2002); TeBrake (2002); and Kaijser (2002).

Sidebar 4:
River Basins and Participation in Europe¹⁷

It isn't by chance that only the three historically centralized monarchies have their territory now fully covered by river basin authorities: *Confederaciones hidrograficas* in Spain, initiated in 1926 and generalized in the 1940s; 10 regional water authorities from 1974 to 1989 in England and Wales, which were seen as a centralizing move against the alleged inefficiency of local authorities, and are replaced now by even more centralized resource management policy, keeping river basins as a basic unit for water policies; and 6 French Agencies de L'eau which were initially seen as a central government tool to reinforce its domination over local authorities, and are now clearly understood as subsidiary institutions playing a role in post-decentralization governance.

In the subsidiarity countries having kept decentralization and communitarian management traditions, there are practically no river basin institutions as such: in the Netherlands, the waterboards in charge of drainage, flood protection, sewage treatment, and sometimes other tasks, do not follow catchments, largely because the country is flat and catchment limits are not obvious. But they are clearly subsidiary institutions, having a community type form of representation. In Germany, the *Ruhr Genossenschaften*, which pioneered modern river planning, are quite exceptional and linked to specific geographic and political history. In the rest of the country, river basin water sharing is made by ad-hoc working parties between concerned existing institutions, and there are no basin authorities. In Denmark, river basin institutions have been discussed and abandoned. In Sweden and in Finland there are water tribunals operating per groups of basins, but only to settle disputes which rose from hydroelectricity and subsequent river flow modification; water management remains carried out at the level of administrative regions. Integrated catchment planning is, however, studied and experimented with.

In the Mediterranean countries, one finds a general hesitation between growing demanialisation of all waters, and correlative development of central or regional government roles, and the river basin approach. In Italy, the administrative region was first preferred, but a subsequent traditional regional planning approach was poorly developed. In 1989 the Autorita di Bacino were created for the 9 or 10 largest rivers, to coordinate inter-regional planning. They are gaining momentum thanks to their cumulative expertise, but they remain weak until they obtain some direct financing mechanism. The 1944 law increased the public character of all categories of water. In Portugal, the strong legitimacy recovered by the 300 local authorities at the fall of the dictatorial regime placed the country in a central vs. local type of confrontation. This indirectly led to discard a project in the 1980s to create five river basin institutions, and also an equivalent number of regions. The country remains in a typical center periphery confrontation. There are however now five large inter-governmental boards for pollution control around the largest urban areas, and a new participative catchment planning approach breaking the country down into 15 river basin units. In Greece, there are water policy responsibilities at all traditional levels, plus river basin management (14 basins) where seemingly the hydroelectricity problem is dominant. In Spain also, the new constitution creating the autonomous regions quickly resulted in the Autonomias being the locus of a certain challenge of the traditionally hyper-centralized water planning in the Confederaciones. Besides, the 1985 law legitimized the role of the very ancient water user communities at more local levels, and proposed to develop a bottom up planning approach at their level. As a matter of fact, it is a community of users of a polluted and threatened aquifer, in Prat del Llobregat next to Barcelona, which gave a successful model to the water communities developed in the law.

A very complex situation is developing in most of the member States, because of experiments of public participation. In the U.K., for instance, even though water policy may now appear as the most highly centralized in Europe, and even the most inspired by the "Statist-liberal" paradigm (i.e., privatization and technocratic regulation), there remains river consultative councils which are widely consulted about catchment planning, even though in an informal and on statutory manner, typically in the British style of consensual policy. In Belgium water, the extensive federalization of the country, the Walloon region is developing a formal public participation process in river contracts. In the Netherlands, the Provinces are now placed at the heart of a complex procedure for integrated river basin planning. In France, the Agencies de L'eau were supplemented as soon as the end of 1970s by an apparently modest approach of river contracts, more informal than Belgium. There are now more than 160 river contracts going on, and then the Ministry of the Environment tried to make things more formal and more binding with the local catchment plans called the SAGE. While these are progressing very slowly, contractual and bottom-up river management is generalizing, including through the changing vision and methods of the approximately 60 river institutions earlier developed for mastering the river only with hydraulic projects.

¹⁷ (B. Barraque, in Gayer, *et al.*, 2000)

2.4. Portugal

Portugal established four river basin organizations early in the twentieth century. They were focused on hydropower and later on irrigation. Hydropower and irrigation were merged into the Ministry of Public Works. Thus Portugal looks like several other countries in that the river basin organizations were biased toward large infrastructure, supply-side investments and were creatures of the central government. This is similar to China and Nigeria and others. During the 1970s, environmental quality and large fish kills led to questioning this structure. Like in other areas, there was a growing call for more bottom-up approaches, where the local and regional institutions could take more responsibility.

In the 1980s reorganization, five river basin authorities were created. They included environmental aspects of water, licensing of all water uses, planning, and collection of funds based on the user-pays principle. On water supply and waste treatment, the idea was to establish water users' associations of local authorities and other users. These were to be a means for direct participation in planning and management. The plan never really got moving, however, as government changed. But new legislation created planning means for 15 river basins, which retained the user and polluter-pay principles. It also established river basin councils, which have the purpose, like the national water council, for developing river basin plans. These plans and planning process are now in process. While the planning is being done on a river basin basis, it is administered by national and regional authorities that do not correspond to hydrologic units. The participatory processes and involvement processes are not as clearly spelled out as previous plans. Since water management does not always have a high political profile, it is also hard to get direct participation in consultation processes.

2.5. Great Britain

There has been a long gradual evolution of the river basin organizations in Great Britain starting in the Middle Ages. In the modern era, with the land drainage act and the River Boards Act of 1948, organization by river basins emerged. In 1973, the Water Resources Act divided the country into 10 catchment-based water authorities. These were public bodies responsible for all water functions throughout the water cycle. Although successful in many aspects of integration, the RWA came under criticism because they were both the regulator and polluter. In the late 1980s, the utility functions of water were privatized, with the only asset sell-off seen to date in the water world. However, the National Rivers Authority (NRA) was created to regulate water management, thus carrying on the idea of catchment-based water management. The NRA calls itself guardian of the environment, or custodian of the common waters. It has a 15-member board and is organized around eight principle regions based on river basin catchments and subdivisions. It has three statutory committees in each region: a fisheries committee, advisory committee, and flood committee. These committees serve as a type of public participation—a combination of what has been seen elsewhere as technical and citizen advisory committees. They include major stakeholder and users such as farming, fisheries, conservation, recreation, navigation, water utilities, and industrial users. The NRA's primary focus is to protect and improve the environment and protect against flood.

The NRA tries to use the planning process to integrate its duties into comprehensive plans; however, it has little control over land use change on a catchment basis. It thus relies on partnership, compromise, and negotiations approaches with other relevant planning bodies. In the end, however, it cannot veto a development project. Public and stakeholder involvement lacks a statutory basis and the direct involvement of elected officials under this system. It looks a little like a corporate board. Public input is sought through the planning process and the preparation phase of the catchment plans. Extensive consultation has been held in the various regions as guidelines and standards were formed. In the end, the NRA is not bound by the

outcome of such processes, they are all advisory.

2.6. Spain¹⁸

River basin management has been present in Spain, in various forms, for over 100 years. Participation has both been encouraged and discouraged at various times. At the turn of the twentieth century, the hydrographic basin concept was used for the first national planning efforts. This was followed in the 1920s with the formation for hydrographic unions. These unions were primarily established for river basin planning. They include users and management along with administration. They disappeared in the 1930s due to lack of resources, but the river basin concept remained in the form of hydrographic confederations. Participation of the user continued with the representatives of users chosen by the users themselves.

During the late 1950s, water commissions were established. The commissions followed the same territorial and river basin jurisdictions as the earlier hydrographic basin concepts; however, they did not include user representation or any way for users to participate. The commissions became creatures of the national water administration under the general management of the hydraulic works department of the Ministry of Public Works.

During the 1980s, the reform government produced a new water act. The old commissions and confederations were united into new hydrographic confederations. These had management units called river basin authorities. River basin plans and a national river plan were called for. The new river basin authorities included a water commissioner, a technical directorate, and secretary general and planning office. They once again include representation of users. The steering committee of a river basin authority is composed of user representatives. In various exploitation boards, the users are a majority and have proportional representation on the regulation committees. Thus, the river basin authorities have been organized in accordance with new democratic principles, in accordance with the broader politics of the country.

The river basin authorities attempt to use the concept of “polluter pays.” Levies, fees for regulation, irrigation, discharging, and use of public land are all under their purview. Conflicts occur during drought within the context of a “first in use” rights system, established under the Roman law custom. This makes the regulatory committee of the river basin authority very important. New environmental conflicts have also risen, with new laws recognizing ecological claims along with the traditional approaches to water regulation.

The basin concept has been central throughout the previous century in Spain. Conflicts have been managed by collaboration among the users and administration and, for the most part, this has been achieved within the context of basin management units. This practice has remained remarkably constant, despite the changing governments over this time.

2.7. Russia¹⁹

The 1883 Water Law and the 1995 Water Code set the institutional framework for water resources management in Russia, which is built on the concept of State ownership of all water and management structures. It is also based on “user pays” and “polluter pays” principles. The Ministry of Natural Resources (MNR) is the key coordinating body for water at the federal level. Under the MNR there are 17 river basin agencies (RBA). Five of these are on the Volga River. With the RBAs, the MNR is responsible for the preparation of river basin plans. The RBAs are also responsible for the preparation of the basin-wide water

¹⁸ Hera *et al.* (2002)

¹⁹ Shevchenko *et al.* (2002)

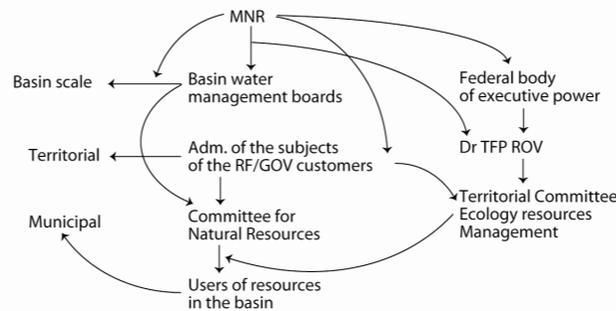


Figure 9: Organization of the ROV program (Dukhovny and Ruziev, 1999; Dukhovny and Sokolov, 2002).

management agreements on uses and protection of water. Legislatively, most of the pieces for IWRM management exist; however, the implementation is weak, especially concerning enforcing regulations management systems.

In 1998, the government established the Revival of the Volga (ROV) Program. Its aim was to improve the environment and enhance the quality of life in the basin. It is implemented by seven federal ministries, 39 constituents of the Russian Federation, and numerous other governmental and NGO organizations, all under the coordination of the MNR. The overall coordination is provided by the MNR. At the federal level, the MNR uses a steering committee made up of senior ministers of implementing agencies, state committees, and other institutions; at the regional level, the MNR works with each of the existing Territorial Associations for Economic Cooperation, located in the basin. These consist of the Governors of the oblasts and republics (Figure 9).

The ROV program follows four principles and has specific targets. It is supposed to coordinate the complex of institutions and provide for participation of the public. The major water-related functions of the MNR are inter-basin and inter-regional coordination and settlement of disputes; development of laws, regulations, and standards; support of related research and development programs; international cooperation and coordination with state committees; and environmental monitoring. The MNR is responsible for development of federal plans and plans for all the river basins. These plans then are followed by local water agencies, which develop guidelines for the smaller rivers and basins.

The basin-wide plans set up water intake limits, forms of payment for water consumption and use, waste water discharge standards, water quality control measures, and river rehabilitation and use-control programs. The water management agreements are considered and adopted by special commissions that include the Federal and regional authorities, water users, and public organizations. Nevertheless, there is a lack of state policy for sustainable water use, a weak capacity to enforce regulations, and a weak management system.

The ROV could impact this whole system, as the Volga River is critical to Russia. Since the 1930s, almost 90% of the river has been controlled through a series of mainstem reservoirs. There are 21 dams (beyond many small dams) for hydroelectric power and the entire length is navigable to the Black Sea. The basin includes 61 million people, almost 45% of the Russian industrial output and more than 50% of its agricultural output. While these developments have greatly benefited Russia, the environmental costs have been very high. Thus the ROV, in addition the costs for maintaining the sources of cheap electricity, were not calculated into energy prices. The vast profits were centralized and distributed by the government, with some allocated to reservoir maintenance. All of this changed with the reforms. The river also has very high variability.

The ROV program itself is meant to be an instrument for public participation. It provides for basin wide consulting institutions, monitoring agencies, expert committees, specialized information, and scientific

and technological centers. Most of the financing for the ROV comes from the regions (Figure B.9).

The ROV has identified 1,000 projects consistent with program objectives. The estimated costs are around 140 billion rubles. These projects clearly recognize that a major shift to more efficient uses, conservation, and demand management are needed. Cost-effective criteria are needed for selection of projects. As in other parts of the world, these call for new management. Like in many Asian examples, the need for RBOs has been recognized as an outcome of similar forces. Also, the attempt is being made to meet this demand through an essentially traditional top-down bureaucracy, and embedded with traditional engineering approaches. Participation is recognized, but its impact on key decision is uncertain. The power of the MNR is central, so decentralization may have real limits. Also, like other places, more people are aware of the problem; NGOS have been born and it is hard to ignore or not truly include them.

2.8. The Danube²⁰

While there is great diversity along the Danube, there is considerable shared culture, values, and principles along the river. The Danube has a long tradition of cooperation around navigation. This cooperation has provided a forum for expanding into new areas of need concerning integrated management and sustainable environment. Since the mid 1970s, several conventions and treaties have formed an overall environmental program and organizational structure along the river. Figure 10 summarizes these conventions.

The Danube illustrates how a river basin organization and its experience can provide a basis or safe ground for negotiations on broadening needs. It also has shown how the broader forces of regional integration (in this case, the EU) can encourage cooperation along the river through the promulgation of regulations.

The basin countries and transitions follow these shared principles: using best available technology; control of pollution at the source; the polluter pays; regional cooperation; shared information, and striving for more integration in water management.

3. Africa²¹

There is a history of river basin or international basin organizations in Africa during the twentieth century. Many of these have been discussed already in the context of general theory. They have often been plagued by donor dependence and in some case donor competitions, which has resulted in hydrologic models on the same basin that disagree and compete with each other. They have for the most part not been owned by the in-country stakeholders. Nevertheless, the importance of river basin organizations, both internationally and within countries, is growing. This is especially true in Southern Africa. The United Nations Food and Agriculture Organization (FAO) summarized RBO efforts in Africa under four policy approaches or coordinating mechanisms.

- Type 1 – No overall coordinating body for water with fragmentation among various ministries and under various acts and little chance for good IWRM. They saw Ghana and Sierra Leone as examples.
- Type 2 – An overall coordinating body established. Other specialist agencies are subordinated in

²⁰ Nachtnebel (1999, 2002)

²¹ Turton (2001); O.A.C. (1999); Carmo Vaz (1999); Delli Priscoli (2004); Shela (1999); Conley and van Niekerk (1999); Heyns (2005)

- one form or another to the Commission or Board. Ethiopia is an example.
- Type 3 – A coordinating role within a water ministry that has other responsibilities such as soils, forests, fish, etc. Uganda Zambia and Nigeria (which has 11 basin authorities) are examples.
- Type 4 – A ministry for water resource that controls all aspects of planning and management of water resources. Kenya is an example. Kenya in fact has three basin authorities.

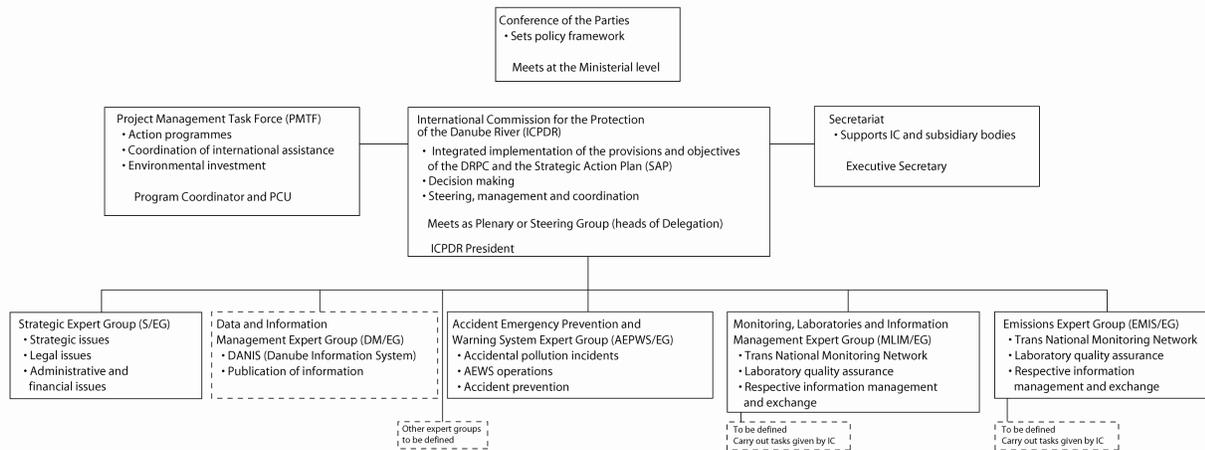


Figure 10: Structure of the International Commission for the Protection of the Danube River (Conference of the Parties) (Nachtnebel, 1999/2000; Natchkov, 2002).

3.1. Nigeria

Nigeria is a federation of states. The country is well drained by the Niger River system and its tributary the Benue. Organized water resources development for agriculture started in 1955. Up to that time, water resources development had been in the hands of small-scale and subsistence farmers. The first national development plan of Nigeria, issued in 1962, included agriculture and urban and rural water resources.

The drought of the Sahel in the 1970s, like in many other parts of the world, spawned the creation of River Basin Development Authorities (RBDA). This joined the Niger Delta Development authority, which had already been charged with the Niger Delta. The RBDA were soon increased to encompass the whole nation. Their purposes were to assure systematic use of ground- and surface water; multi-purpose development; supply irrigation water; flood control; erosion control; and general water resources management. As in other countries, they were also seen as tools to stem the tide of rural-urban migration. After the Federal Ministry of Water was set up in 1976, they called for 11 RBDA with the following functions:

- Undertake comprehensive development, with focus on ground- and surface water, irrigation, multi objectives, and flood control.
- Construct, operate, and maintain dams, dykes, and polders wells, irrigation and drainage systems, and other works
- Supply water from completed schemes for a fee to be determined by RBDA under approval of the ministry

- Construct, operate and maintain infrastructure services
- Develop, maintain and keep a water resources master plan.
- Undertake a scheme for erosion and flood control for watershed management
- Allocate water among users and sectors
- Operate water legislation and control measures in the basin.

In 1979, the RBDA functions were broadened to include fisheries, livestock, and a variety of other activities. In 1984, they were split into 18 RBDA, which covered each state of the Federation; in 1986, however, the RDBAs went back to 11 corresponding to river basins. Their functions were modified again and reduced. Their focus became more on development and less on direct production and engagement of extension services. In 1994 the RBDAs were renamed the River Basin and Rural Development Authorities (RBRDAs). Today there are 12, although there has been movement to reduce them to 6.

While the RBDAs constructed many dams, water use is still not well coordinated. Almost half of the 12 billion cubic meters of stored water are dormant. Of the planned 1 million hectares of irrigated land to be serviced by this infrastructure, only about 100,000 hectares are irrigated. The performance has been poor.

On the whole the RBDAs have not taken ecology and ecosystems into account. They have not dealt well with the conflicts emerging around land acquisition and development because there has been little involvement of the farmers in the process. Government policies have been inconsistent and there is a lack of data and knowledge. The policy on commercialization of the RBDA actually worsened the data collection situation. There has also been a high degree of politicization. Funding has been inadequate and the RBDAs have a low revenue-generating capacity.

Despite much effort and investments made by the federal government through the RBDAs, the achievements are modest compared to the objectives set at the beginning. The unsatisfied water demand has increased twice within a context of tension between users and a constant risk of conflict. The performance of the RBDAs has been mixed, since few of them were either financially or economically sound. In their tasks of monitoring and managing the water resources, all RBDAs have failed to do a satisfactory job. While their functions are rational, the financial constraints have reduced the programs of several RBDAs to a size that is inconsistent with their relatively large staff and related facilities.

The primary problems with the RBRDAs include: (i) RBDAs have no clear role and responsibility; (ii) lack of communication between RBDAs; (iii) top-down approach adopted in dealing with stakeholders; and (iv) lack of autonomy with regard to the federal and the state levels, as well as a lack of continuity in government policies.

Like many public enterprises, the RBDAs have not realized the high expectations to be a vital instrument for the attainment of self-sufficiency in production and harmonious water allocation. Some further reasons for their weakness include (i) the combination of regulatory and management functions; (ii) the frequent changes in policies and the interference in operating decisions; and (iii) poor resources allocation and management. In addition, stakeholders' non-participation and inappropriate planning have contributed to weaken the RBDAs, leading to increased conflicts among the water users.

To remedy these observed shortcomings, in 1988 the GON promulgated the Decree 25, which set up the reform package of the RBDAs within the privatization and commercialization program of the public enterprises. The broad objectives of the partial commercialization of the RBDAs were (i) to re-orientate the RBDAs towards strict commercial principles and practices; (ii) to reduce the constraints on decision-making procedures and administration; and (iii) to move from their dependence on the treasury for funding to a more independent capital structure that would enable them to approach the capital market to fund their operations, without government support. These global objectives have not been fully achieved because the RBDAs were unable to survive without the government subsidies.

Under the Decree 101, of 1993, the Federal Ministry of Water Resources (FMWR) embarked upon a water resources management strategy to address water problems including consideration of all the proposed water sector reforms. The prevalence of potential conflict situations, especially in water scarce basins such as the Komadugu-Yobe, has led to the formation of six steering committees, each addressing a watershed basin. The Act of 1995 established these steering committees based on the hydrological watershed. Their representatives include river basin commissioners, stakeholders, and relevant federal departments, as well as state representatives. The objective of the steering committees is to facilitate joint and participatory basin management, but they have not yet actually met.

The preparation of the national Water Resources Management Strategy is currently underway. It will address issues such as institutional reforms, legislative reforms, assets, and assets management. The result of this work will serve as the basis for national water resources management reform.

3.2. An Example: River Basin Management in the Komadugu-Yobe RBDA²²

The Komadugu-Yobe basin is located in the semi-arid northern part of Nigeria (figure 11). It covers about 188,000 km² with a population estimated at about 30 million inhabitants. The annual yield of the basin's water resources has been estimated at 13.7 10⁶ cubic meters. The surface water resources, consisting of 8.200 10⁶ cubic meters annual water yield availability, are more available in the upstream part of the basin. The downstream portion holds the main groundwater resources, estimated at 5.5 10⁶ cubic meters yield availability, mainly located in the Chad geological formation.

The middle part of the basin contains one of the country's most significant wetlands. The Hadeja wetlands are composed of swamp, grassland, and woodland created by the passage of the Hadeja and Jama'are Rivers. The area flooded annually by river discharge supports various socioeconomic activities and provides a favorable environment for migratory species.

The HJRBDA and CBDA RBDA's have overall responsibility for water resource management in the Komadugu-Yobe basin. The HJRBDA has responsibility for the operational management of the upstream basin in the states of Kano, Bauchi, and Jigawa. The CBDA is responsible for the lower part of the basin from the Nguru wetlands to the river mouth at Lake Chad, including the states of Borno and Yobe. The two RBDA's are defined by political boundaries rather than hydrological basin limits. In the upper basin, the HJRBDA has constructed 14 dams, including 3 major ones: the Tiga, Challawa, and Rwankanya dams. The total water storage of these three dams is estimated about 3.7 billion cubic meters. These assets were developed in order to promote irrigation schemes and provide water supply for rural and urban areas in the RBDA's domain of operation. The water allocation has been developed on an ad hoc basis, taking into account the needs of public irrigation, the water demand to supply the Kano district, and various downstream needs. The CBDA has to deal with the basin management from the Nguru wetlands to Lake Chad. This river basin management organization does not have dams and water availability and is mainly reliant on upstream water release.

²² Material based on private communications with O Dione at the World Bank

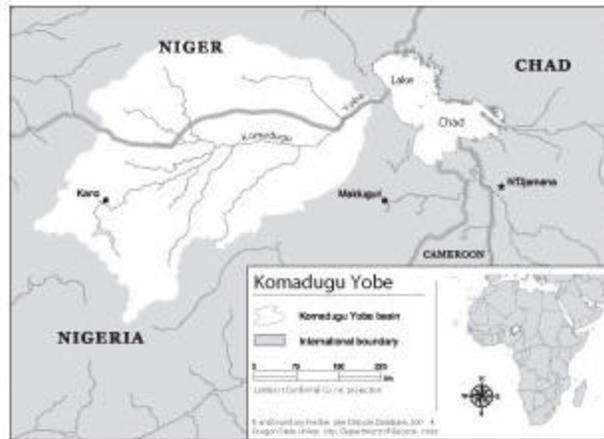


Figure 11: Map of the Komadugu Yobe Basin (TFDD, 2007).

The water-sharing agreement is not clearly defined. In addition to the two RBDAs, several institutions are involved in the basin's institutional management framework. These include the following: (i) the Federal Environment Protection Agency (FEPA); (ii) the governments of the five states that have domains in the basin; (iii) the local government authorities (LGA); (iv) the North East Arid Zone Development Program (NEAZDP); (v) and several water users associations such as the Hadeja Nguru Wetlands Conservation (HNWC), the stakeholders consultative forum, the Dagona Joint Area Development Association and the movement for the survival of the Yobe basin. Nevertheless, the separation of the basin management by two RBDAs has led to a misunderstanding between both RBDAs and various users from upstream to downstream.

Legal considerations in the basin rest mainly based on customary laws; however, these laws are inadequate to address interstate water arrangements and the growing management demands. The promulgation of the Water Law Act of 1993 empowers the Federal Ministry of Water Resources through Decree 101 to regulate the water management in the basin. Similarly, Decree 86 empowers FEPA to ensure that water resources management is not undertaken in a manner that results in negative impacts. To date none of these legal considerations is working efficiently within the basin.

The top-down approach adopted by the two RBDAs in planning and managing the basin has prevented the involvement of users in decision-making. The creation of the basin-level Steering Committee for the Komadugu was supposed to bridge the gap between the RBDAs and the stakeholders. There is a need to define and implement a clear framework, with clear roles and mandates for all actors within the basin, so as to implement a clear management process. For many years, IUCN has been involved in the conservation of the Nguru wetlands. A considerable effort has been made to organize communities and develop a comprehensive and integrated use of the wetlands; however, all these efforts have not led to sustainable successes. The water shortages faced by downstream users and the competing demands with other sectors, such as sugar cane irrigation schemes and water supply, have prevented the achievement of the program objectives set by IUCN at the beginning, with regards to water flow releases from upstream.

Recognition has been reached that sectoral approaches cannot meet the current basin problems. Solutions to the current unbalanced water situation must come through deep institutional reforms that include the involvement of both the RBDAs and stakeholders at all levels.

While Nigeria has put great emphasis on river basin management and its RBDAs it falls short on Millington's conditions for success. The high-level commitment varies and is actually confusing. There

remains a low knowledge base. There is little community participation. Lines of accountability are unclear. The RBDAs, as in many other parts of the world, appear to be handmaidens of the federal government. They have operated in a top-down fashion and have often been highly politicized. They have focused on supply-side solutions with the result that performance has been very poor. They have been unable to accommodate the changing values of water management into their organizations. At the same time there have been highly successful small-scale irrigation operations right next to the large-scale irrigation system failures.

4. Asia²³

In Asia, the Mekong commission, roughly at the same point on the continuum as the Indus Commission, has continued deliberations even during periods of conflict. Like many other river basin organizations, it started with a permanent advisory board of professional engineers. About 25% of its expenditures (USD: 44 million seed and USD: 800 million attracted investment) are for data gathering and feasibility studies. Among its achievements are 12 tributary projects providing 210 megawatts of power and supplementary irrigation for 200,000 hectares, flood protection, pump irrigation, agricultural research and extension, fisheries, and river navigation. However, as Kirmnani notes, the Commission suffers from weak sense of ownership among the parties of the region. It has been too dependent on external staff and support.

As Frederiksen and many others note, there is little question that the agreement made over 40 years ago on the Indus was critical to regional security and subsequent economic development for Pakistan and India in the region. After partition, Pakistan was left as a downstream state. What had been an intra-nation transboundary water issue became an international transboundary water issue, just as in the Aral Sea and Central Asia in the 1990s. Sharing waters of the Indus, Jhelum, Chenab, Ravi, Beas, and Sutlej in Punjab and Sind was a leading cause of tension between India and Pakistan. It is highly likely that it would have led to major conflict. The treaty and the process of negotiation averted conflict. The treaty has held even during periods of conflict between Pakistan and India. The lessons from this conflict are critical to transboundary conflict management today.

With the help of outside parties, India and Pakistan moved from positional posturing to more interest-based negotiations. Initially, Pakistan called for arbitration and India refused and called for a special court. Both are classic approaches for positional bargaining. Instead, at the initial suggestion of David Lilienthal of the TVA, a World Bank mediation process was initiated. The initial idea was that engineering studies could define optimal uses and stimulate shared operation of the rivers. After more stalemate, this succumbed to creative solutions for dividing the waters proposed by the bank at the request of the parties. While the optimal technical solution did not carry the day, talks were begun on the basis of shared epistemic technical and engineering values of integrated assessment. Creative options that expanded the pie were generated by the interplay of such expertise and discussion did begin on sharing benefits and not only allocating waters. The World Bank, as a third party, brought resources and the ability to generate resources to the table. They also brought expertise in development and water. Thus the negotiations moved from positional arbitration to mediated joint problem solving and back to a cross between mediation and arbitration. The well-known solution was to divide the eastern and western waters, provide for a transition period where link canals could be built, provide for India to fund some of the construction, and the generation of international capital to finance other parts of the project, including reservoir storage for Pakistan. In addition to the financial resources available, the World Bank efforts succeeded because it was possible to increase the amount of water available.

²³ Delli Priscoli (2001); Dukhovny and Ruziev (1999); Dukhovny and Sokolov (2002); Li (1999); Mekong River Commission (1999); Niem (2000); Radosevich (2002); Iyer (1999); Ramu and Herman (2002); Xia, Huang, Chen and Rong (2001)

4.1. Vietnam and Mekong

The new water resources law (1998) in Vietnam calls for a national water resources council (NWRC) and river basin organizations. The NWRC has been established. It is advisory and its job is to recommend strategies to the government. It is in the process of developing a national strategy and action plan. There is still debate on what form the river basin organizations should take and how much authority and power they should exercise. Whatever the form, there is need for better coordination across various interest in the Mekong Delta, more community awareness of problems and solutions, more stakeholder involvement, and better use of available technical expertise at the local levels.

To date, one such RBO has been formed, the Red River Basin Organization. This RBO and presumably others will be located under the Ministry of Agriculture rural development (MARD). The RBO is supposed to advise the MARD, assure adequate data collection, coordinate planning, and promote public participation in the planning process. The RBO consists of a commission and a support office. It includes representatives of 25 provinces and 7 central ministries. The chair is appointed by the MARD. It appears that it will be funded from hydropower revenues, fees, and taxes for other water services, along with funds from the central government. A standing committee of 15 members will carry on the major work. It will reach decision by two-thirds majority vote.

Stakeholder participation is mixed in Vietnam. On the one hand, the system of decentralization and local democracy is strong. On the other hand, political groups other than the communist party are inhibited, thus NGOs and broad civil society groups so important for participatory processes in RBOs do not really exist. Ministry officials have been used to the top-down central planning model.

At the international level there is a long history of basin cooperation under the Mekong River Committee (MC) and now (since 1995) the Mekong River Commission (MRC). This is a history that has spawned the well-known "Mekong spirit."

The Mekong Commission was established in 1957 with headquarters in Bangkok. The MC was under the umbrella of ESACP. Its role was to promote, coordinate, supervise, and control planning and investigation of water resources development projects in the lower Mekong Basin. Despite the 40-year history, through all conflict, much of the potential remains untapped. Indeed the Mekong was a main focus of the U.S. President Johnson's Water for Peace program in the early 1960s, diverted eventually by the war.

The MRC resulted from negotiations in the Paris Peace talks of 1991 and the willingness of Cambodia to rejoin the MC. A working group was formed to produce a draft agreement on cooperation for sustainable development of the Mekong River Basin. The agreement seeks to promote environmental conservation and sustainable development on a regional and cooperative basis, as well as on an equitable basis that considers the social economic factors of the people. It includes the four lower Mekong Basin States: Cambodia, Laos, Thailand, and Vietnam. It is a three-tiered organization: the Council, which is the ministerial level; the Joint Committee at the director general level and the Secretariat at the technical level. The Secretariat has over 120 people. Each country has its own national Mekong Committee. In Vietnam's case, this committee has been primarily a liaison for coordinating donor-funded activities related to the Delta. The MRC follows a program approach, meaning programs in five work areas.

The MRC sets a type of political space or safe area for meeting and talking. It specifies general principles, procedures for decisions, and other policies. As such it also can exercise a normative function on countries and be catalytic leader to those countries in areas such as participation and new flood-management tools. The MRC has shown an ability to address common interests and differences quickly. It has shown the values of using outside parties to help negotiate or mediate agreements. It also can help national governments progress in building national institutions. By advocating public awareness and participation in the MC, it

encourages each member country to also do so.

Overall, within Vietnam and MARD there is no clear mechanism to bring stakeholders and affected parties together on a regular basis. Thus there is little joint discussion of impacts and solutions and problems. Most of this has been done on a bi-party basis between the government and individual provinces. This also inhibits transparency, as clear definitions of who plays what role is lacking. While there has been an attempt at separating functions such as policy setting, management, and operations, it is still important to openly define the relationship between these functions. On the other hand, experience has shown that when farmers are given clear responsibilities for managing the parts of an irrigation system close to their areas of interests, they commit funds and effort to maintain and operate systems efficiently.

In effect, the current RBO model seems to be heavily influenced by the traditional top-down bureaucratic experiences using advisory committees with voting procedures and controlled participation in a hierarchical context. However, there is a considerable basis of local and decentralization experience to build on in Vietnam.

4.2. China

Flooding is a major concern on many of China's rivers. It is vital to the social and economic development in China. In the modern era, comprehensive planning, with flood control as a central focus, was begun in the 1950s. Until recently the major approaches have involved levees, reservoirs, flood storage, and retention. Protection along China's rivers varies from the 10-20-year flood to in excess of the 100-year flood along some parts of the Yellow River (Figure 12). Flood monitoring, warning, and forecasting systems have become quite sophisticated. In 1997, China passed a law regarding flood control. This law builds on previous laws requiring flood control to be part of river basin planning, which is ultimately accountable to the Central Ministry. The law recognized the need for measures beyond traditional structural solutions, such as population control, policy of economic development, safety in buildings, systems of post flood relief, and compensation and flood insurance programs. It also calls for stakeholder participation.

There are seven major river basin commissions (agencies of the Ministry of Water Resources, MWR), which perform the functions of water administration in the river basins. These functions are quite broad and range from planning to administration, coordination, conflict resolution, operations, and regulations. This institutional arrangement reflects traditional top-down and essentially administrative or technical bureaucratic approaches to flood control. The local water resources management is really the only element that gets grassroots interests of users into the planning process. These include the provincial, prefecture, country, and village levels. In addition, China puts emphasis on the actual teams and mobilization of people for flood fighting. This is an important element of participation in the picture of flood management. In the end, the level of flood protection is directly linked to the levels of and changes in socioeconomic development.



Figure 12: Map of the Yellow River Basin (TFDD, 2007).

Participation looms as a major issue for flood policy and the river basin commissions. New laws, with their calls for measures beyond traditional structural measures, as well as increased pressures on land from population and economic growth, will force calls for direct access to these processes. It is not clear how this will occur. The current structure does not appear to offer such access beyond the inter-agency and intergovernmental coordination routes. The RBCs are really offices of the MWR; they are commissions without members. There is discussion of legally authorizing them to include representatives of various sectors and users.

In the Tarim basin, the incompatibility of the production objectives and policies set by the central and regional government and those of prefectures around the watersheds of tributaries has become clear. It has inhibited the ability to recover dried-up flow areas of the lower reaches of the basin. Consequently, the reorganization legislation for the Tarim Basin Water Commission (TBWC) includes the five prefectures, along with traditional regional government authorities in decision makers. In addition, under a new basin project, it calls for more community involvement and water user participation. Thus, TBWC is beginning to forge direct linkages with water supply corporations and water user associations. It is seeking to engage such groups in workshops.

China illustrates the complex interaction of political culture, traditional technocratic power, and new pressures for empowerment, along with new demands on water. While most seem to realize that the river basin is the best way to organize all these divergent forces, it is not clear how willing the MWR and the river basin commissions will be to make what amounts to fundamental organizational change in their management culture to accommodate such.

4.3. The Yellow River example

The Yellow River Conservancy Commission (YRCC) is an agency of the Ministry of Water Resources. It is responsible for unified management of the basin and resources. This includes flood protection and most of the water uses, coordination, planning supervision, and services. It formulates basin-wide policies, strategic plans, and comprehensive plans. It supervises and coordinates tasks and tries to resolve conflict among

sectors and users. It is a comprehensive authority with a large and highly competent technical staff. Flood control is one of its most important tasks. Unlike most of China, where local governments perform most of the flood protection, the YRCC does so for the Yellow.

While the YRCC is comprehensive and integrative, it is built on the traditional hierarchical, technically driven, top-down model. To this degree it is supply orientated in its approaches. It does the planning, constructing, and operating along the river. These include plans for water and soil conservation, navigation, water utilization, protection, and flood prevention. It carries out a sophisticated process of scenario-based contingency planning using decision support systems. Advanced networks of technology, computer hardware, and cooperative efforts among various departments and levels of government support this. It also prepares and carries out an allocation plan. It is the agency for permitting water abstractions.

Like other states with central control experience, stakeholder participation seems to be done through the various coordinating mechanisms among the state and local and regional organizations. There does not appear to be developed civil society, as in other countries with one-party domination. In addition, there appears to be little formal stakeholder participation in the formulation of the plans, scenario exercise, decision support systems, and overall planning. The YRCC has achieved a high technical level and some excellent performance. However, it is not clear how and whether it can handle newer ecological demands and accommodate empowerment aspirations and a growing number of interested stakeholders. It is also not clear whether allocation processes and planning respond to higher-value uses versus established political/bureaucratic interests.

Indeed, in 1996, changes were instituted that may be a window into the future of RBO and management in China. The YRCC was authorized to take on overall management of the river. It was tasked to operate on the basis of demand management, and certain amounts of water were required to be reserved for environmental purposes. A consultative mechanism was established that included all users along the main stem. This consisted of regularly held meetings along the river on important issues in planning operations. The plans were also tasked to develop programs that included typical non-structural measures, such as resettlement, population control, agricultural production restructuring, land-use planning, and safety buildings.

4.4. Indonesia

Like other countries in Asia, Indonesia is starting to recognize the importance of river basins and to reorganize. However, it is also having trouble accommodating stakeholders outside the traditional state governmental and corporate entities. Indonesia has two RBOs: the Jatiluhur Water Authority and the Brantas Water Management Corporation. It is planning for six new corporations. At the provincial levels, recent legislation has called for Basin Water Operating Units (BWU) under provincial Water Resources Services, which will have regulatory and operational functions. It also calls for coordination institutions called Provincial Water Management Committees (PWMC) and Basin Management Committee (BMWC). The Jatiluhur and the Brantas are centrally owned and managed. The former began on the model of the TVA, but gradually it shifted into the Water Ministry.

Like elsewhere in Asia, these RBOs and the BMWCs really lack stakeholder participation. Stakeholder participation has generally been limited to participation through water user associations (WUAs) in irrigation. There is little direct involvement of stakeholders in planning, program development or implementation, or in the regulation of basin-wide water management. Like other areas in Asia, the idea has been to use line agencies, government corporation to provide inputs. Since the late 1990s, however, NGO activity has increased along with the broader range of interests needing to be considered on the system-wide basis. However, NGOs and civil society groups are still not well organized and lack financing means. There

is little such participation even in the legislative process. The town hall meetings that have been held tend to reflect the paternalistic and hierarchical attitudes of government. The BMWC and provincial committees lack formal stakeholder participation. The various boards also lack such participation. Thus the basin-wide work really reflects the voice of the Central Ministry. One result of all this is low general public awareness of water issues such as flooding. Indeed, the Jatiluhur depends on the provincial government for public awareness, while the Brantas has initiated a few awareness programs on its own.

5. Latin America²⁴

There has been dramatic water resources reform throughout Latin America. Mexico is among the most important. Brazil, Argentina, Peru, Colombia, and Venezuela have each looked to the Mexican model; however, the Brazilian and Colombian national laws give stronger emphasis to river basin councils.

In South America, a Coordinating Intergovernmental Committee (CIC) was established for the La Plata Basin, which helped prepare the treaty of La Plata Basin. This arrangement can be seen as near the center of the continuum. The CIC responds under a conference of Foreign Ministries. Numerous bi-national entities and technical commissions have been established for the survey, design, construction, and operation of various waterworks in the basin. In practice, the institutional machinery has not worked well (Sidebar 5).

5.1. Brazil

New water resources management in Brazil now emphasizes the river basin as the main management and planning unit. Water pricing of bulk water is being reformed. Basin committees with state and local water users and civil society groups are being formed. Basin agencies are often becoming the executive arm of the basin committees. Federal and state water resources councils are the regulators with government, municipalities, water users, and civil society representatives. In general, there is a strengthening of the water rights systems that goes along with all this.

As an example, in the Paraíba do Sul River Basin, the CEIVAP, which is an umbrella committee for the whole basin, has technical and financial functions. These include resolving water conflicts; approving basin water plans; setting guidelines for water allocation and water quality; setting water pricing criteria, charges, and investment needs to be approved by the National Water Resource Council; collecting water charges; verifying revenue collections; and helping integrate among all agencies and other entities involved in river basin management.

CEIVAP is a streamlined operation. It will not be the owner of infrastructure nor carry out construction or implementation of investments defined in the basin plans. It will not be responsible for operations and maintenance functions. In this transition period, the expected revenues will be about \$6 million per year: 3.6 from domestic users and 2.4 from industrial users. Nevertheless, projected revenues will probably only finance about 10% of the projected needs of around \$1 billion. It remains to be seen whether the new basin setup will help integrate water quality and quantity. The link between the water pricing and permit systems must be strengthened. In addition, agreement between the national government and the three states involved is needed to provide incentives.

²⁴ Mestre (2001, 2002); Delli Priscoli (2004); Economic Commission for Latin America and the Caribbean (1997); Johnson (2001)

Sidebar 5

Perspectives on RBOS and participation in Latin America (Mestre, 2001;2002)

Argentina has attempted to create several river basin organizations (RBOs), either triggered by national government (in lesser numbers) or by provincial efforts (most of them) Water institutions are weak—national and provincial—with few exceptions. Public participation was ample long ago in Provinces like Mendoza. However, gradually, centralism reduced some participatory niches, although important efforts have been made in the past few years to revert such tendencies.

Bolivia is steadily leading the way in public participation with a national law dedicated to this subject. Bolivians are now heavily participating at department and local levels. No relevant RBOs exist, but local authorities have provided space, time and resources for public participation to take place. However, action derived from public participation is still relatively scarce.

Brazil has fostered the creation of hundreds of river basin organizations of many sorts (second attempt in 30 years) with the support provided by the Water Law enacted in 1997. Public participation is increasing; independent water movements supported by NGOs are strengthening and today represent one of the best examples of public involvement in water management. The Central government is opposing to some of these movements and the newly created Agencia Nacional das Aguas will complicate the scenario for a while. The Brazil model was inspired by the Mexican and French models of basin organizations. However, Brazilian Consorcios are a new breed of watershed organization that fosters enthusiastic participation and support (including financial resources)

In Costa Rica, both Tárcoles and Tempisque Basins have been operated by pseudo NGOs with modest but interesting results (both in terms of water management improvement as well as for public participation positive experiences) Government has a light approach on these matters in general terms (the sole exceptions are both basins)

Via pertinent legal supports (i.e., a specific law with valuable concepts throughout), Colombia has created interesting mechanisms (Corporaciones Autónomas) with local entities playing important roles and challenging strong central entities. However, direct public participation is still scarce. Although the corporaciones are numerous and at least three of them are very powerful, the rest of the institutional arrangements are weak.

Chile, with a mature vision in terms of water management and its governing institutions, has made sporadic attempts to create ample public participation schemes with mixed results, heavily related to specific regions and existing socioeconomic issues. RBOs have not been successful in Chile for a number of reasons. Furthermore, the Water Law, with all its supporters and harsh critics, tends to difficult possible decentralized integrated water resources schemes.

Ecuador has weak national and regional institutions to foster public participation; the Consejo Nacional de Recursos Hídricos is still struggling to survive within a sectoral ministry: Agriculture. Decentralization is under way with mixed results. Opposition comes from present strongholds, such as the Corporación del Guayas. However, in specific cases, such as Cuenca, efforts are currently made to incorporate results from systematic public hearings on programs dealing with water treatment, allocation and protection. Some of the best practices are being supported or directed by entrepreneurs, in a philanthropic manner.

In Guatemala, little advance has been accomplished as all actions are held almost with no public knowledge (i.e., Lake Amatitlán and Guatemala City) Institutions are weak and water laws or acts are inexistent.

Paraguay has struggled to create RBOs and to foster public participation. Lack of Legal and Institutional frameworks, political willpower and financial resources has long impeded such actions to take place. Today, the Paraguayan water sector is heavily in demand of capital investment and a new deal in terms of government reforms of many sorts, especially in those tasks related to possible public involvement.

Uruguay has a two-fold approach: on one hand, local authorities and individuals in certain departments tend to participate in considerable numbers, but with very little achievements on the long run; and on the other hand, central government—that struggles against any sort of modernization approaches—has little belief that public participation may be a good idea to improve water management without involving large costs, both economic and political.

Like other parts of the world, states fear losing their power and control with basin entities. The interaction between the CEIVAP and other sub-basin entities also can engender the same fears. This is true with the federal government. There are new partnerships, so parties are adjusting to a new environment.

Similar actions and reactions are taking place in the Curu River basin. The voluntary reforms of the state of Ceara have strong World Bank support. The basin includes local organizations built around reservoirs, called social catchments, as well as basin committees. All of this provides a forum for permanent negotiation for the allocation of water.

These cases are beginning to show what others have learned about building river basin organizations. There is a need to strengthen the intermediate levels of decision-making and to encourage more stakeholder participation. However, in the Paraib do Sul, the basin is very large, making it hard for the general public to conceive of the whole. In the Curu, they are relying on strong links among the users of reservoirs and other water bodies. It is clear that the culture and the socioeconomic environment influence the structure of organizations. In other words, one model does not fit everywhere. For example in Curu, there is a more centralized system: basin committees thus do not control their own resources. It remains to be seen how the strong centralized tradition will fare—whether it will essentially defeat the regional idea of the river basin unit, as it has in other parts of the world.

In the PDS, there is more tradition of decentralization. They are using an approach similar to that in the Chapala Basin in Mexico: the paired basin committee and basin agency approach. Basin entities are expected to become self sufficient based on bulk charges. Thus the state and federal government are expected to exert a weaker influence on decision-making; whether this holds true remains to be seen, however. Also in the charges are the engines for reform. In the Curu, the stakeholders already have been working together and have been operating in an environment of almost continual rationing.

There has also been a long history of river basin management concerns of the Sao Francisco River, one of Brazil's most important rivers. Like with many rivers worldwide, navigation uses first prompted concern for the river as a whole. As in other areas, navigation was a means for bringing agricultural goods to market and for opening up new territories and settlements. Over time, irrigation and hydroelectric power uses grew. All of these produced the familiar patron of a structural focus, an economic development focus, and then growing sectoral rivalries.

The Sao Francisco has a major estuary and delta, which exhibit the problems of upstream development and altered flood flows (Figure 13). Over time, river regulation has favored hydroelectric power and flood control. Numerous government initiatives have emerged to deal with the river. A senate committee has been set to investigate the basin and set the stage for the creation of a river basin development corporation and an interstate liaison committee. The basin issues are familiar: little knowledge of environmental impacts, low traditional stakeholder participation, poorly regulated development with large single purpose projects, limited human and institutional capacity, lack of a holistic vision to drive management, problems with land regulation, fisheries, urbanization, and water quality.



Figure 13: Map of the São Francisco Basin (TFDD, 2007).

The principal federal agencies are the CODEVASF (Rio São Francisco Development Agency), CHEF (São Francisco Power Company), and SUDENE (an organization for planning and development in the Northeast). In the early 1980s, a special executive committee, Integrated Studies of the Basin (CEEIVASF), was created under the Commission for Integrated River Basin Studies in Brazil for planning studies on the river. This committee lacked independence, however, like many other such efforts in the world. There is also the Interstate Parliamentary Commission for the Development of the Rio São Francisco (CIPE). This group includes leaders of legislative assemblies of the five riparian states and the union of municipal authorities in the basin. In the late 1980s, there were important planning studies for development efforts in the whole region.

Against this backdrop of long concern, the states of the Northeast in cooperation with the National Water Secretariat formed a group from the water sector of each state in 1995. A special commission for the Development of the São Francisco Valley was also created in 1995 by the federal senate to promote discussion about river basin planning. The states themselves have varying degrees of expertise. In 1997, as already mentioned, the federal government passed a national water law and a system of public institutions or basin committees for issuing water rights and implementing a charging scheme.

All of this has moved the various entities closer to river basin management. CODEVASF has been increasing user participation through user-controlled water districts. However, CHESF continues to develop hydropower in a single-purpose mode and with little regard to comprehensive management. The agency has encouraged cross-sectional planning and has emphasized strengthening the basin committee as a way to do this. The idea is to find ways for entities to build relationship and work out joint gains, for example, through the creation of more basin committees and user associations. There is a major watershed program geared toward changing the paradigm for water planning.

The São Francisco, like the Colorado in the U.S., shows how difficult it is to engage a large basin in river basin management, even when there has been a strong focus on the river basin and numerous attempts and knowledge of the experiments around them. The political motivations of various entities do not always

agree. The supply management tradition and top-down tradition continue and are very hard to change.

5.2. Mexico

Socioeconomic development in Mexico has always been tightly linked to water. The 1917 constitution established that water is owned by the federal government and cannot be privately owned. The National Irrigation Commission was created in 1926. This was followed in 1945 with the creation of the Hydraulic Resources Secretariat (HRS), which was a federal ministry responsible for irrigation, river management, and control, along with municipal water and wastewater. From 1947 to 1960, HRS put several river basin executive commissions (RBECs) in place, primarily to promote hydraulic development. These were run by the federal government with little interaction with water users associations other state and local entities. They became powerful regional entities that altered state and regional politics; however, by 1977, they were dismantled. In 1976, a new federal ministry called the Agriculture and Hydraulic Secretariat (AHRs) emerged. In 1989, the National Water Commission (NWC) was the sole federal water authority. It was placed inside the AHRs and had broad responsibilities dealing with water rights, allocation, use, effluent charges, infrastructure, and operations.

In December 1992, the National Water Law (NWL) was enacted, which strengthened the NWC. Through NWL, the roles of regional actors were better defined and participation of state and local water users and general public was encouraged. However, environmental deterioration continued, as did the gap between supply and demand. NWC was transferred into the Environment, Natural Resources and Fishing Secretariat in 1994. Since that time, 24 river basin councils have been established, water planning readopted, and thousands of water rights issued. While efforts have been made to decentralize, especially in the Lerma Chapala Basin, they have not moved far (Figure 14). Water is still primarily a federal activity. The river basin councils are means to coordinate government institutions and to negotiate with users and social organizations.



Figure 14: Map of the Lerma Chapala Basin (TFDD, 2007).

Mexico currently has 25 river basin councils, 6 basin commissions, 2 basin committees, and 38 groundwater technical committees. Users are increasingly interested in learning more about management and taking on roles formerly played by government entities. The knowledge base, one of Millington's criteria for

success, is growing. The river basin councils are beginning to play a greater role in planning. They do respond to and provide a forum for stakeholder participation. They still need to gain in legitimacy and credibility, along with the NWC and regional councils. The RBCs complement rather than replace the governmental organizations, although they are likely to take over even more functions of the NWC in the future. They work through consensus; however, they do need a stronger legal personality. In short they still need further refinement in the definition of lines of accountability and authority.

The Lerma Chapala River Basin Council has been the forerunner in this trend; it illustrates much of this development and the tensions among federal and other interests when trying to establish river basin organizations (Figure 15).



Figure 15: State government-Lerma Chapala River Basin coordination (Mestre, 2001; 2002).

5.3. Lerma Chapala example

This is one of the richest areas in Latin America and the most important in Mexico. Twenty percent of all national commerce and services activities occur within the basin. The river basin needs coordination across all uses including flooding. Frequent conflicts over water quality occur. Growing crises in use, allocation, environmental deterioration and efficiencies spawned social reactions in the early 1990s.

In 1989, a consultative council was formed, which was precursor of the river basin council. It also created a technical working group made of public servants from across sectors. This group became an important engine for keeping the council going. The primary tasks of the council were negotiating resources, coordinating efforts, conciliating different positions, forging consensus, creating legal instruments, and generally facilitating planning and allocation policies. The council met yearly while the technical committee met regularly. The council made decision through consensus. In difficult cases where such could not be reached, it referred issues to selected high-level members of the technical working group. This mechanism became a critical means for resolving disputes. It is very much like the disputes review panels used in North America (Figure 16).

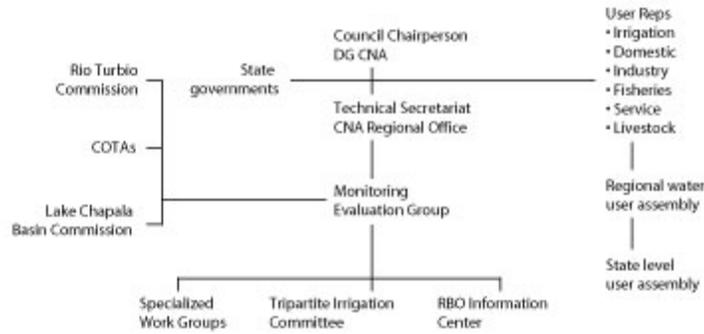


Figure 16: Lerma Chapala River Basin Council (Mestre, 2001; 2002).

Like other successful river basin ventures, the council was persistently if not in a low-key way opposed by federal interests. This is much like attempts to create river basin organizations in the U.S.: the states preferred bilateral agreements and the federal government saw its power as diminished.

The Lerma Chapala River Basin Council was born in 1993, after much negotiation, under the National Water Law, out of the national water council. The first council included more than ten key agency representatives, all five state governors, and six water users of different sectors. The water users could thus interact with the government across sectors and at the various levels. The users eventually came to be chosen by the general assembly; they would come from the state water user organizations within the Lerma Chapala. In effect, the LCRBC is akin to the idea of a water parliament found in the French system, but with less formal power to influence allocations. At its root, it seems to be an institutional approach to broaden stakeholder participation. LBRC is a mixed organization: it is not an authority, public or private. It is legally supported by the NWL. It is consultative; however, it can officially question, propose, and approve decisions. It does not have regulatory responsibility and is not a service provider. It seems to work well to raise issues early, to engender a sense of ownership and participation in decisions, and perhaps forestall or mitigate the intensity of conflicts (Figure 17).

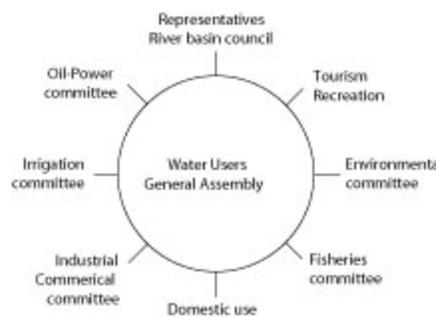


Figure 17: Lerma Chapala River Basin Council Water users assembly (Mestre, 2001; 2002).

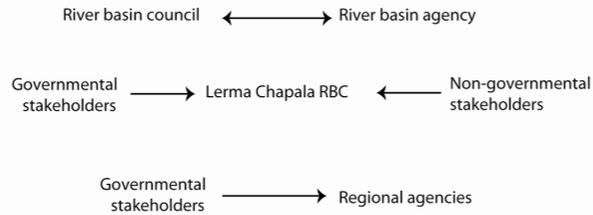


Figure 18: Approach to regional water management (Mestre, 2001; 2002).

The Lerma Santiago Pacifico Regional Agency (LSPRA) complements the LCRBC. This is a government organization subordinate to the NWC. It can suggest basin level tariffs, establish collections schemes for revenues, use financial resources, issue water rights licensing, pollution control, efficiency schemes, and conservation and intervene in disputes and provide water rights.

There is still lack of clarity between the roles of the LCBRC and the LSPRA, however. This makes the system susceptible to creeping centralization attempts by the federal government. This is especially true because of the dependence (to varying degrees) of both LCBRC and the LSPRA on the NWC. The NWC developed the river basin master plan drafts in a top-down manner. It was, however, eventually evaluated by the technical working group. Water licensing and rights management remains the exclusive province of the federal government. Many new titles have been issued and this is a major accomplishment. But this also brings some problems where illegal uses have now actually become legal. The Regional Agency of the Government has the key role in water licensing, and the LCBRC plays only a marginal role (Figure 18).

While progress has been made, water rights need to be revised. Much more water efficiency is needed; water markets need improvement, as do regulation means. Better water balances are needed. Sanctions must be improved and allocation is not really working properly. Success in these areas will, to a great deal, depend on how well the LCBRC and LSPRA do.

6. Australia²⁵

6.1. The Murray Darling

Murray Darling basin covers more the 1 million square kilometers: almost all of Southeast Australia and a great deal of the continent (Figure 19). The basin is larger than Spain and France combined. Attempts to coordinate along the river began as in many places with navigation. Navigation was crucial to opening the interior for development and settlement. By the turn of the century, it was clear that agreement was also needed on water supply because of increasing demands for irrigation. Agreements at the turn of century focused on building storage and structures, as the focus was on development. A Murray Darling Commission was instituted. Its mission was revised several times during the century, but for the most part remained focused on quantity. More recently, the environmental costs of successful development became apparent. These included collapsing river banks, salinity problems, declining fish, more effluent discharge into the rivers, deteriorating water quality, outbreaks of blue green algae, and reduced flow in the rivers. In the 1990s, there was the recognition that the states and the commission were not integrating the management of the water or basin resources in ways that were sustainable. There was a need for stable

²⁵ Millington (2002); D. Blackmore (2002); private conversations with Australian water officials, 2004 and 2005; Murray Darling Basin Commission, www.mdbc.gov.au.



Figure 20: Murray-Darling Basin Ministerial Council structure (Millington, 2002; Blackmore, 2002; Murray-Darling Basin Commission; and several private conversations with principles of Murray-Darling)

The community actions programs include the identification and definition of local problems, the investigation of options, and the drafting of plans with implementation strategies. The adopted plans require landholders, industry and government to agree on some long and medium term commitment. The plan will include initial bench marking, performance targets, cost-sharing arrangements, and a monitoring system (Figure 22).

Perhaps the most important bottom line to the Murray Darling experience is the broad and deep recognition across society of the national, regional, and local economic importance of proper river basin planning. A clear understanding up and down is necessary to avoid bad decisions and to capture potential benefits. It is also essential for building stable water rights and entitlement systems, which are necessary for legitimate and accepted allocation decisions and policies. As an example of monitoring the council commissioned a water audit report on water use. This resulted in a cap on increased diversions while detailed discussions take place on appropriate policy for off-stream diversions and management regimes. None of this could occur without the MDBC structures, which brings a wide variety of stakeholders into the debate in ways that allow them to feel responsible and that they are participating. For this, the local implementers must be involved, together with the policy makers, so the knowledge base must include local as well as national and technical knowledge.

The MDBC organization has the key attributes for good basin organization: high-level ministerial commitment, meaningful community input, high knowledge levels, and clear accountability among participating members.



Figure 21: Murray-Darling: principal government agencies (Millington, 2002; Blackmore, 2002; Murray-Darling Basin Commission; and several private conversations with principals of Murray-Darling).

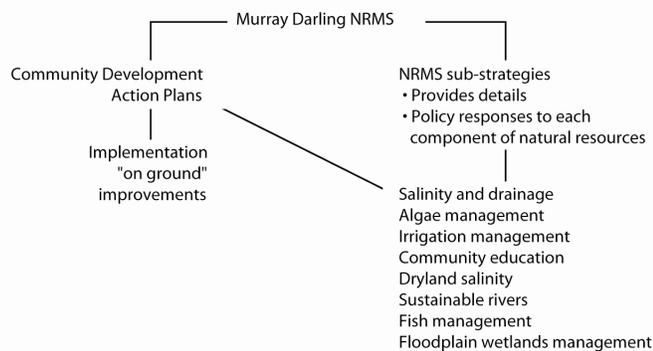


Figure 22: Murray-Darling natural resources management strategy (NRMS) (Millington, 2002; Blackmore, 2002; Murray-Darling Basin Commission; and several private conversations with principals of Murray-Darling).

6.2. The Heart of the Murray Darling Organizations: Participatory Processes

The CAC was constituted because many in the national government were concerned that unless this concept was expressly stated, the state governments, over time, might reject the idea of such a high level “voice” affecting them. State governments with either a strong development or environmental attitude have not necessarily liked such a strong high-level CAC.

Usually the CAC gets a three-year term, but re-appointment can occur and often does. The Ministerial Council appoints the Chair after consensus agreement. This is not an easy choice; choices have ranged from former bureaucrats to regional and farmer representatives. The second Chair was a farmer/regional government representative, who lifted the profile of CAC, focused its debates, and generally got the basin community to see how the CAC could be useful as a means to get ideas directly to the political leadership. There are 26 members, 21 of whom are state representatives chosen on a catchment or regional basis. They are spread between each state in about the same proportion as the main sub-basins in each state, plus representatives from four “special interest” organizations and an Aboriginal representative. The latter five are nominated by the groups themselves. The states choose the catchment and regional representatives. In practice, these representatives usually come from the CCCs in each state. For example in New South Wales, there are seven major sub-basins, each with a catchment management committee (or CMC, but generically a CCC) and a representative of each of these goes onto the CAC—mostly with no interference from the state

minister. This means that there is a good connection from the CMC, or CCC, upward to the CAC and a good connection of issues and transference downward of experiences in one part of the sub-basin to another. (In each sub-basin the CMC is made up of a wide cross-section of the community and there are good links downward to the many land care, river care, stream watch and other such groups that are achieving real change on the ground.

The CAC deals first with issues that are referred to it by the MC or the Commissioner, and concerns of the basin community that needs to be referred to MC or the Commission. These must be major issues. Discerning issue salience is a key role for the CAC Chair and it is crucial to keeping the CAC relevant to the basin and the MDC objectives. In effect, this means that the CAC can actually be assessing community opinion before the MC determines policy options, rather than exploring reactions to new policies.

There is no fixed approach to the CAS operations. Generally it does some strategic planning when a three-year term starts. It usually holds a series of workshops or [briefings at key locations throughout the basin on a particular issues, but this depends on the understanding in the basin and on the responses of the 21 major CCC groups in the basin represented on the CAC. The CAC has a budget from the MC that allows it to commission limited studies and obtain expert briefings. The CAC usually reports to each MC meeting, of which there are generally two per year.

Some of the Murray Darling terminology can be confusing. The CCC is really a generic term. Some states use total catchment management committees (TCM), others use integrated catchment management, and still others use catchment management committees. At lower levels, there are the land care and river care and other such local action committees.

In sum, the participatory Murray Darling process seeks to combine a bottom-up knowledge with top-down action. The participatory processes through the CAC and the CCCs have teeth and directly affect the ministerial council. The focus is really the 21 sub-basin CCCs. Each of these is supposed to create a good natural resource strategic plan for its area, which goes upward into the CAC deliberations and downward to smaller groups within each sub-basin. The idea is for these plans to take the basin-wide and particular state policy frameworks and put them into strategies and local actions. These actions then link downward to the various action groups within a sub-basin such as land care, river care, and stream watch within the school structure. This linkage aims to ensure that these smaller community groups, where the real action occurs at property or sub-catchment level, do put their efforts into a common strategic direction that benefits the region as a whole.

The MDBC and state bureaucracies must develop the “technical” story on emerging resource problems and help these groups to develop responses. Each key agency has representatives on the 21 senior CCCs; the chairs of these 21 CCCs are thus key people. They can make or break to enthusiasm and output at this level.

It does appear that the MDBC is developing resource knowledge and injecting this into the community, even if there is residual reluctance in some states for getting out and selling ideas. There is also a need to look more carefully at the economic impact of reforms being instituted. As could be expected, the quality of the CCC chairs varies. The strategic support also varies. Most farmers still need some convincing to participate. This makes the role and enthusiasm of the state agency CEOs and the CCC chairs so important.

Note

The materials for this appendix have been gathered from many sources which include gray literature inside several major water organizations, as well as published materials. Training session on RBOs held around the world and several private communications with individuals have also been important to developing the following descriptions. In this regard communications with Eduardo Mestre, Peter Millington, Evan Chere,

and Bernard Barraque were most useful. However, the actual descriptions are the views of the authors. The list should provide a good entrée into further work for interested readers.

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