

## **WATER RESOURCES POLICY IN BRAZIL**

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**ABSTRACT:** Almost two decades ago Brazil decided to reform the water resources sector in order to increase its efficiency, and therefore reducing costs and promoting development. With a strong cooperation of the water resources professionals, Brazilian government opened the discussion on what should be the country's water policy in 1984. The major change came in 1997, with the promulgation of the National Water Resources Management Act, establishing both the National Water Resources Policy and the National Water Resources Management System. This paper will describe the policy and the management system, as established in the 97 Act and now in process of implementation. It will also describe the many challenges the country is facing in order to push ahead such task. Brazil nowadays is an interesting water resources case study. In spite of the extension of its territory and the regional differences, the country is undergoing a major change in the way water is managed and perceived by different sectors of society.

### **INTRODUCTION**

Water is a resource of paramount importance and, as such, requires a careful management system. This situation is aggravated when there is rapid population growth with fast urbanization rates. Several uses are competitors for this beneficial resource: human supply, industry, agriculture, among others. Further more, water is essential to sustain development. Two decades ago, with Brazil already facing these conditions, decision on water issues had to be based on the Water Code promulgated in 1934. It was time for change.

The extension of the country, the regional differences, the difficult economic situation, all called for a comprehensive reform in the water resources sector, with the aim of increasing efficiency, reducing costs and promoting development. With a strong cooperation of the water resources professionals, Brazilian government opened the discussion on what should be the country's water policy in 1984. The major change came in 1997, with the promulgation of the National Water Resources Management Act, establishing both the National Water Resources Policy and the National Water Resources Management System.

This paper will describe the policy and the management system, as established in the 97 Act and now in process of implementation. It will also describe the many challenges the country is facing in order to push ahead such task. Brazil nowadays is an interesting water resources case study. In spite of the extension of its territory and the

regional differences, the country is undergoing a major change in the way water is managed and perceived by different sectors of society.

#### BRAZIL: LARGE EXTENSION, AMPLE DIVERSITY

Brazil is a federal republic of 8.5 million km<sup>2</sup> located in the southern hemisphere, between the Equator and the Tropic of Capricorn. The country is divided in 26 states and a Federal District, where the capital, Brasilia, is located. Brazil is known as a country plentiful of water, with the highest total renewable fresh water supply of the planet (Gleick, 1998). Our average availability 'per capita' is well above the 1700 m<sup>3</sup>/person.year, estimated to be the threshold below which the country will not provide itself with sufficient food production (Postel, 1997 *apud* Gleick, 1998)). However, our availability of 6950 km<sup>3</sup>/year in fresh water is to be viewed as merely an indicator of the average country's situation. In fact, 70% of such availability is in the Amazon Basin where only 7% of the population lives. The rest 93% of the country's population will depend on the remaining 30% of the water availability. The 'per capita' availability varies from 1460 m<sup>3</sup>/ person.year in the semi-arid Northeast to 634 887 m<sup>3</sup>/ person.year in the Amazon region.

Four major different areas are in contrast. The North, including the Amazon basin with abundant freshwater resources, is very sparsely populated and poor. The Northeast, semi-arid with a constant threat of severe droughts, struggles to sustain a population of 40 million people living in oppressive poor conditions. The West, with two dominating ecosystems, the savanna and the wetlands, is dominated by cattle raising activities and intensive agriculture development. The South is where the industrial and financial centers are located, with its water resources under a very unbalanced supply/demand relationship, due to excessive consumption and pollution of the large urban areas.

In each region, a different problem. Water is a fundamental resource and a critical issue in Brazil. An appropriate management system would have to encompass such multitude of different aspects, based on sound policies and invigorated institutional arrangements.

#### A FLEXIBLE WATER RESOURCES MANAGEMENT SYSTEM

The main objective of a management system is to allow an optimum water allocation in a way that essential uses are guaranteed, while economical activities have a reliable access to water in order to sustain growth. If water is an economic good and is to be viewed as such, a normative system has to discipline its uses, within an adequate institutional and legal framework. However, this framework should be tailored to the situations and constraints facing individual regions. The flexibility of the system was the first and foremost condition agreed since the beginning of this reform process almost twenty years ago. Otherwise, how would a major turn in water management, so much needed all over the country, be achieved?

The new system, in the view of the water managers and the water resources professionals was to accommodate the extensive regional diversities, the interdependency among the several uses and the protection of the environment. The only way to make such system feasible would be through emphasizing the need for efficiency, using economic incentives, and creating conditions for decentralization of the decision process.

## THE DEVELOPMENT OF THE BRAZILIAN WATER RESOURCES SYSTEM

The Brazilian Water Act of 1934 was promulgated at a time when Brazil was changing from an agricultural society to an urban-industrial one. The economic uses of the water had to be disciplined, mainly with the objective of providing a safe yield to allow exploitation of the huge hydroelectric potential of the country. In spite of being quite an innovative law at that time, with provisions for pollution control, the “polluter-pays” principle, among others, it was never completely enforced. It was used mainly to regulate hydropower uses.

During the 80's, both the water sector of the government and the water professionals felt that modern, specific legislation for the water management was needed. Brazil was reforming its constitution and that was the right time for changes.

When the Constitution was approved in 1988, Section 21 explicitly defined a National Water Resources Management System (Constitution of Brazil, Title III, Section 21 (XIX)). It was made clear that water was on Brazil's agenda for the future. In fact, it also defined water as a public good, administrated by Government (Constitution of Brazil, Title III, Section 20 (III)). The Constitution assigns the responsibility to administrate water use in rivers, rather than in river basins, either to the Federal Government or to the State Governments. A river is administrated by the State if it runs entirely within State borders and by the Federal Government otherwise. In other words, large rivers that flow through several states or are the border between states are administrated by the Federal Government, although its tributaries may be administrated by different State governments. Given this legal arrangement, water resources management at the river basin scale depends on a coordinated action between State and Federal Governments. This coordination is perhaps the most difficult challenge for the implementation of the Brazilian Water Resources Management System .

With the adoption of the new Constitution, there was a call for all legal and institutional arrangements related to water to be reassessed. Almost immediately, this National System began being planned. All over the country, significant changes were in progress. Several states also began developing their own systems to manage the rivers located within their boundaries.

The discussion process was opened to different sectors of society. Water professional organizations played a very important role in leading the discussion. The Brazilian Water Resources Association, for instance, produced formal statements, approved by its members, that helped to insert novel concepts into the discussion. In particular, the Association statement of 1989, included the following principles (Porto, 1998):

- (1) water quantity and water quality aspects cannot be dissociated;
- (2) the river basin is the territorial unity for management actions;
- (3) water is an economic good; pricing is one of the mechanisms to promote its rational use;
- (4) water use is to be disciplined through a permit system; no one is allowed to withdrawal water without its respective permit;
- (5) the decision making process is to be decentralized, with full participation of the local community.

The Dublin Declaration (ICWE, 1992) of 1992 reinforced the principles under which the Brazilian water resources management system was already being discussed. The State of São Paulo was the first to develop a management system along these lines and the State of São Paulo Water Act was issued in 1991.

The legal and policy review process at the national level involved a broad set of participants. Several workshops with politicians, water professionals, users, NGO's and local communities were held around the country between 1991 and 1996. All over, there was a strong support for the decentralization process and intensive community participation. One of the most polemical issues was promoting the rational use through pricing.

The result of such extensive debate and public consultation was a bill that reflected the views of the vast majority of stakeholders and interested parties, and represented an agreement between government, users and the community. The bill was submitted to the House of Representatives and the Senate, being finally approved in December, 1996. The President of Brazil signed the National Water Act (Law n. 9433) on 8 January 1997.

#### THE NATIONAL WATER ACT

The National Water Act of 1997 (Law 9.433) defines the National Water Resources Policy, with its objectives, principles and instruments, and also the National Water Resources Management System, establishing the institutional arrangement under which the country's water policy are to be implemented.

#### The Brazilian Water Resources Policy

The National Water Resources Policy was proposed to achieve the following objectives :

1. sustainability: to ensure that the present and future generations have an adequate availability of water with suitable quality;
2. integrated management: to ensure the integration among uses in order to guarantee continuing development;
3. safety: to prevent and protect against critical events, due either to natural causes or inappropriate uses.

To achieve such objectives, water management must be implemented according to the following principles:

1. water is a public good;
2. water is a finite resource and has an economic value;
3. the use of water required to meet people's basic needs shall have priority, specially in critical periods;
4. water management shall comprise and induce multiple uses;
5. the river basin is the appropriate unit for water management;
6. water management shall be decentralized, with the participation of Government, stakeholders and society.

These are the same principles viewed today as the modern concept of water management. They together encompass themes such as the protection of the

environment, economic development and improvement of social conditions, all to achieve the goal of sustainability

The general guidelines for implementing the water resources policy emphasize the need for integrated management, flexibility to accommodate regional differences, the coordination among different sectors, the importance of land use planning to the water management and the integration between inland and coastal water management.

The following specific “tools” are considered in the Act for implementing the policy:

1. water resources plans;
2. classification of water bodies in different classes of use, resulting water quality standards tailored to the target use of each water body;
3. permit system for withdrawal or use of water;
4. water pricing;
5. water resources information system.

Water Resources Plans are developed in order to guide future decision making and are to be developed for each river basin, State and the country. The aim is to try to harmonize and to establish guidelines and priorities to the water allocation and water pricing. Each plan has to be approved by the corresponding river basin committee.

The classification of water bodies in different classes of use is the basis for truly integrating the quantity and quality aspects of water management. Water quality standards in the water bodies are to be enforced based on the decided use of the water in the river basin. The classification is a planning device because one has to balance quality standards with the costs of waste treatment, either to keep the standards or to restore the quality of degraded rivers and lakes..

The permit system is being organized to set the rules for using rivers and lakes, either to divert water or to dilute pollutants. The permits are given for a fixed period of time, never longer than 35 years. All withdrawals and uses of rivers and lakes must have a permit, except those in insignificant amounts. Each river basin committee is responsible for defining what could be considered insignificant amount .. Permits are to be issued according to the priority of uses, as established in the water plan of the river basin. Permits may be modified, suspended or cancelled if not in use for three consecutive years or in case of occurrence of critical hydrological situations. The water pricing is the single most controversial instrument of the Law. The pricing system is also the most difficult step to implement in the new management system. It is the recognition of the economic value of water, as stated in the principles of the policy. The expression economic value refers only to the use of water as a natural resource, and not the related water services. In France, charging for water use is in place for more than three decades. The system appears to be an effective measure for promoting sustainability and efficient operation of the infrastructure (Barth et al., 1987). German tradition for sharing the investment and maintenance costs of common infrastructure at the river basin scale started before World War I. More recently the Mexican Water Law introduced charges for exploitation and use of surface and groundwater (Solanes and Gonzalez-Villarreal, 1999). In Brazil, several states are also introducing pricing of bulk water in their laws and regulations. The main objectives for charging water users are:

- To give an economic sign to each bulk water user that he/she may be constraining the use by others; although hardly ever done in any part of the

world, the water prices should capture as close as possible these externalities, in order to internalize them. In this way, balance between water demand and supply can be reached not only by augmenting supply, but also by decreasing demand;

- To provide the necessary funds for the adequate operation and maintenance of existing systems at the basin scale and to implement new projects; it may also contribute to environmental conservation and restoration.

Experience shows that the revenues collected from bulk water fees must be invested on the same basin where they are generated. This is the single most efficient way to increase the willingness to pay. Otherwise, the stakeholders perceive such payments as taxes. If this happens, it spurs a rejection to the system very difficult to be overcome.

Agriculture is the potentially the most affected sector by the pricing of bulk water, due to its intensive use. This difficulty is amplified by commercial barriers imposed by the USA and other developed countries on imports from Brazil, such as orange juice, and by the subsidies for agricultural activities in several of these countries, particularly France. All these decrease the Brazilian farmers to compete in the global market and therefore their ability to pay for bulk water, delaying the implementation of a system which would result on a more rational use of water.

The development of a new, modern and complete water resources information system is one of the basic needs for the implementation of the water resources management system. A complete and comprehensive data set on water availability, users, water quality monitoring, with the ample use of current technologies like geographical information systems, is certainly the way to produce an efficient decision support framework. Lack of information is one of the most critical points regarding the development and implementation of the new management system.

### The Brazilian Water Resources Management System

The central aspect of the new system is the decentralized mode of operation. Decisions should be taken at the lowest appropriate level with the effective participation of the stakeholders. Observing several river basin committees already established under the new system, the conclusion is that decisions such as water allocation tends to reach consensus rather than conflict. Participation of government, stakeholders and organized society raises the willingness to implement the decisions and even prevents misuse and degradation of the resource.

The National Water Resources Management System is implemented under the Ministry of the Environment. It comprises the following institutions:

1. National Water Resources Council
2. State Water Resources Councils
3. Agencies at the federal and State levels, in charge of managing the permit system, at the river scale;
4. River Basin Committees
5. River Basin Agencies, which will be the executive offices of river basin committees.

The National Water Resources Council (NWRC) is formed by (i) representatives of the Federal Government, from those Ministries with some level of jurisdiction over water and related issues; (ii) representatives designated by the State Water Resources

Councils; (iii) representatives of the stakeholders; and (iv) representatives of non-governmental organizations involved with water resources management or water use. Among the main responsibilities of the NWRC are: (a) to arbitrate, as a final administrative instance, conflicts between States; and (b) to approve guidelines regarding the permit system for withdrawals and water use, and also for the implementation of bulk water charges. The Executive Secretariat of the Council is under the responsibility of the Office of Water Resources, Ministry of Environment.

The composition and the responsibilities of each State Water Resources Councils is established by the corresponding State law but, in general terms, it is very similar to the NWRC. The State Council arbitrates conflicts between river basin committees and establishes guidelines for water resources programs at the State level.

Each river basin committee is formed by representatives of government (State and Federal, depending on the administrative jurisdiction for each river belonging to the basin), stakeholders and the civil society. They collectively decide how to: (i) allocate water; (ii) implement new development projects; (iii) arbitrate conflicts among stakeholders, and (iv) impose pollution control restrictions;

Each River Basin Agency should to perform all the executive work related to water management in the basin. A single river basin agency may serve as the executive office for one or more river basin committees. The funds for financing the operation of these river basin agencies should be provided through the collection of bulk water fees. The water agency is responsible for all the technical work required to locally manage the water resources. The supplying of expertise for data base management, for hydrologic studies to evaluate water availability, for ensuring adequate water withdrawal decisions, for assessing and evaluating new water resources projects, as well as providing technical support to the committee on any other technical issue, are all responsibility of the agency.

Recently it was approved by the House of Representatives a new Law creating the National Water Agency. When approved by the Senate, the National Water Agency will be the executor of the Water Resources Policy and will administrate the permit system under control of the Federal Government. The Office of Water Resources will be kept responsible for the elaboration of the country's water policy, as a prerogative of the Federal Government.

The National Water Agency was proposed in order to introduce more flexibility into the system. It will be easier to hire and fire staff, when compared to the rigid rules that stand for the entities of the direct administration of the Federal Government. However, top officers will be nominated for a fixed period of time and will not be dismissed due to political divergences with the ruling Government. The idea is to create an entity with sufficient stability and technical capability to implement the Water Resources Management System, which is a task that requires many years of continuing efforts before maturing.

#### GOING FROM THEORY INTO PRACTICE

In countries that do not adopt the Common Law, as Brazil, theory comes prior to practice. As it was said, the legal structure in Brazil starts with the Constitution of 1988, that calls for the establishment of the National Water Resources System, to be detailed in a Law. Before this Law was discussed in the National Congress, a Water Resources Law was approved by the São Paulo State Congress, in 1991. Many other states followed the lead and issued their respective laws, very much inspired on what was

done in São Paulo. The result is a homogeneous set of State laws. However, this homogeneity does not mean that the diverse water problems at the country scale can indeed all be solved by the same set of tools. It means simply that all the discussion has occurred around the same hypothetical situations. In these circumstances, the wisest procedure was to avoid endless theoretical discussions by adopting some code with a reasonable internal coherence, as it was the case of the Law of São Paulo. Certainly application of the State Laws to real case would result on improvements on the legal texts. In fact, this has already been observed. For example, the Water Resources Ceará State Law, approved in 1992, relied heavily on the action of the State Government, through the agencies of the direct administration. However, pretty soon it became obvious that the direct administration is too much constrained (directors can not hire, can not fire, and have no incentives for seeking efficiency) to be capable of implementing something new -water resources at the river basin scale- that requires long term maturation. For this reason, in 1993 the State of Ceará created a State Bulk Water Company –COGERH- to act as the river basin agency for all river basins in the State. The lesson is that the Ceará Water Law was barely one year old and real needs forced the creation of an entity not included in the Law.

Pricing bulk water use, or alternatively, pricing the water permit, may generate a substantial cash flow. In order to counter balance any tendency to centralize the decision making process, the Water Law calls for the formation of river basin committees. They should be formed only in basins with water allocation conflicts, actual or potential, and where the stakeholders would be sufficiently committed to take water affairs on their own hands. If these conditions are satisfied, then a river basin water agency should be created to function as executive branch of the river basin committee. These water agencies would be Brazilian equivalents of the river basin agencies in Germany or in France, or to the Water District in the USA. However, the river basin scale is proper in most cases, but not in all. Hydroelectric power plants in different river basins can be electrically interconnected. When a drought strikes a particular river basin, sometimes for several years on a row, the system may be sustained by the power plants located in different river basins, apart from each other by thousands of kilometers. In these circumstances, the electric power sector will tend to plan and operate the reservoirs from the interconnected system perspective, rather than from the river basin perspective.

The proper mix of representatives in the river basin committee can make a big difference. Limited experience has shown that if the NGO's outweigh the users representatives (water-supply/sanitation companies, industries, irrigation districts, power companies...), decisions of river basin committees tend to become unfeasible because those that decide do not have to pay for their decisions. On the other hand, if decisions are left only to users, there is a risk that the environment would not be properly preserved for present and future generations. Also, the composition of the Committee often asks call for a large number of members, in case one adopts the political standpoint of accepting “the one man, one vote” concept. In order to avoid the associated transaction costs, it has been considered a decision making process based on “weighted votes” for each category that should be represented in the river basin committees (similar to what happens in a assembly of shareholders of a private company). Decision inside each category would be left to be decided internally among members of the category.



One of the most awkward features of the Water Law is that it calls for another law (!) for the establishment of the criteria and juridical personality of the River Basin Agency. While this new law is not processed, there is a vacuum. Some efforts are being developed in order to assure, under the present legal dispositions, the existence of a “technical office”, that would temporarily perform the activities to be exerted in the future by the River Basin Agency. In Ceara, the State Bulk Water Company, COGERH, that plays the role of the water agency for all the river basins in the State, was created before the existence of any river committee. Only after COGERH could demonstrate positive results on managing the supply of bulk water, with the participation of the stakeholders, and after the water users were better organized at the reservoir scale, then COGERH proceeded to organize the river basin committees. This historical evolution is contrary to the concept embedded either in the National or in the State Water Laws, that are “fenced” by several defenses against the capturing of the river basin committee by its agency. Although this legitimate concern, incorporated into the Law is of significance, the Ceara example demonstrate how difficult it is to build a complete legal system at once. It would be preferable to build the legal system through an iterative process, relying on the evidences of actual experience.

Water use permits should apply either to quantitative uses of water, such as irrigation/ urban supply, or to qualitative uses, such as dilution of industrial/urban waste. However, in most cases quantitative and qualitative permits are issued by different government agencies, which are often rivals. Ideally, both kinds of permits should be issued by the same agency. Because of this, the same yardstick should be adopted in order to reduce quantitative and qualitative uses to common ground. The parcel of river flow that each water user makes unavailable for the downstream users may be this yardstick. In case of quantitative (consumption) use, the parcel is just the quantity of water withdrawn from the river. In case of qualitative use, the parcel is the quantity of water necessary to dissolve the pollutant to an accepted concentration level, in the river. It may decrease going downstream due to the oxidation of some pollutants.

Pricing bulk water should not be a source of revenue for governments, as there is a widespread disbelief in Brazil about government capability to carry on new policies, such as the rational use of water resources. Instead, the corresponding river basin committee should preferably use the revenue in the same river basin where it originated. Ideally, revenue should decrease with time because the money raised with the bulk water fee should finance improvements for the river basin as a whole. This is a strong argument against those sectors that believe that accepting lower environmental standards is the only hope for developing countries to compete within the global market.

River basin committees do not need to be established across the board. Committees should be formed only in basins, or sub-basins, which have some water conflict, actual or potential. Local problems may induce the formation of committees for some of the upstream sub-basins. In this case it is necessary to create a hierarchical relationship between basin and sub-basin committees, preferably ensuring the right of the committee of the larger basin to impose boundary conditions for the river flow, quantity and quality, leaving the sub-basin. This means that the sub-basin committees are free to decide matters internal to the sub-basin without external interference, provided that the boundary conditions are respected.

In the intermittent rivers of the semi-arid region of the Brazilian Northeast, continuous flow of water is assured for limited river reaches downstream from each dam.

In these circumstances, it is more relevant to establish users association for each reservoir, rather than river basin committees.

When it comes to flood control, community participation in the selection of solutions is highly useful. However, because flood protection is a community benefit, rather than an individual benefit, government financing is unavoidable.

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