

Federal Pact and Water Management

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Introduction

Water is a natural resource with multiple uses. Besides that, it is essential for human life and the functioning of ecosystems. These facts associated with the economic character of some of its uses (for example, production of hydroelectric energy, food production, navigation, tourism and leisure), and eventual conflicts between use sectors when there is scarcity, require that water be given special managerial treatment. From an administrative and institutional point of view, the hydrous resource sector already has the density to be considered in an individualized manner, such as the transportation, energy and environment sectors. Various countries have already deployed institutional and administrative arrangements that make possible adequate treatment of water management. Brazil is not an exception. On the contrary, Brazil has deployed one of the most modern hydrous resource management systems as can be appreciated in the course of this article.

The National System of Hydrous Resources Management (Singreh) is the result of a constitutional mechanism regulated by the 1997 Law n.9.433 which is known as the Waters Law. This system consolidated the management of hydrous resources and considered Brazil from a federal standpoint. In addition, the Waters Law brought new paradigms of decentralization, application of economic instruments for management, and public participation in the decision-making process.

This article presents the availability and demands of hydrous resources in Brazil throughout its different hydrographic regions. Brazil's richness in the water sector will be shown, as well as its regional diversity in quantitative terms. The legal and institutional arrangements developed for management within the last ten years are shown. Singreh is presented with its different performance levels in national and state hydrographic basins. Finally, a presentation is made of the basin of the Paraíba do Sul River, shared by the states of São Paulo, Minas Gerais and Rio de Janeiro, as well as the manner in which the management instruments defined in the Waters Law have been put into operation.

Hydro availability and demand

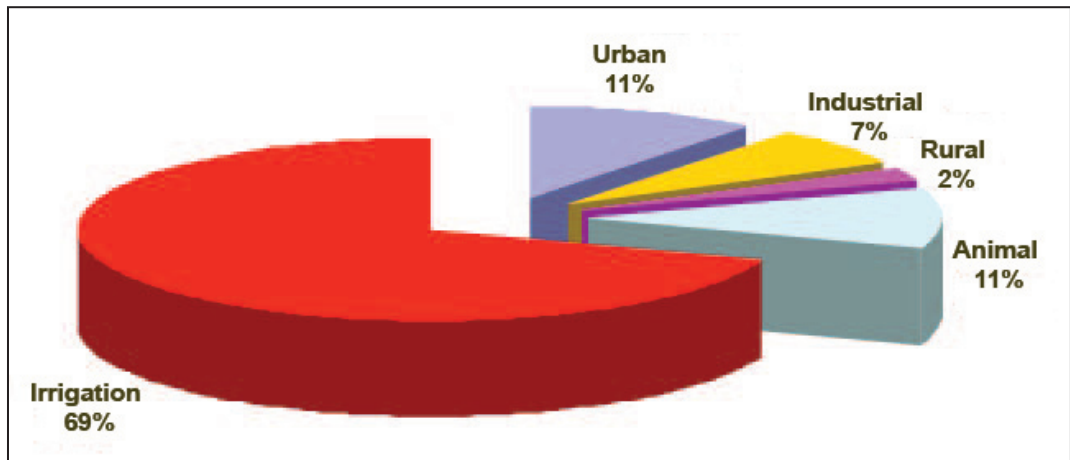
Brazil is a federal union constituted as a Union, 26 states, a Federal District and 5,561 municipalities (Figure 1). This is a very unusual configuration in the sense, for example, that numerous municipalities have administrative autonomy in relation to, water supply and sanitation services. In terms of hydrous resource management, autonomy is fortunately limited to the States and Union. According to the Federal Constitution approved in 1988 “lakes, rivers and any water flowing in federal territory or shared by one or more States, serving the border area with another country....”¹ are defined as Union goods. The remaining water courses and underground waters are the domain of the States. Thus, management of hydrous resources in Brazil presents challenges similar to the management of trans-frontier river basins shared by autonomous countries.



Figure 1 – Political division of Brazil.

Despite the issue of hydrous resources management being subject to the Union and the States, water supply and sanitation services are the responsibility of the municipalities. This user sector is of the highest relevance, besides being part of the millennial aims agreed to by the members of the United Nations in Johannesburg in the year 2000. Achieving good hydrous resource management therefore requires integration of all federal sectors.

Of greatest importance, the most intensive use of water in the water and sanitation supply sector in Brazil, as in the rest of the world, is irrigation for the production of foods. Nearly 70% of water consumption in Brazil goes to this end (Figure 2). Urban usage represents 11%; water for livestock, 11%; industrial use, 7%; and rural usage, 2%.



Source: ANA (2007)

Figure 2 – Water use in Brazil.

In Figure 3 the twelve hydrographic regions are shown (combining one or more hydrographic basins) that are used in Brazil for the purpose of combined analysis of its hydrous resources. The limits of these regions do not coincide with the geopolitical boundaries of Brazilian states. This fact has important implications in the management model for hydrous resources adopted in the country as will be seen further on. In this sense, it is worth noting that Brazil still needs to improve its territorial basis of planning units and hydrous resource management, as well as typologies of management, dynamics, and development that might eventually no longer coincide as a whole with these twelve hydrographic regions.

Table 1 indicates the average annual *per capita* output of these twelve hydrographic regions. The results show that Brazil is rich in hydrous availability. Considering the value of 179,433 m³/s of average output for the Brazilian as a whole, we note that the country contains 12% of the fresh water of the planet. Moreover, this availability varies in an accentuated form throughout the country. In addition there is also great seasonal variation in this availability. Even in hydrographic regions of great availability such as the Amazon (74% of the Brazilian total), we can observe important periods of dry spells. This was the case of important dry periods that occurred in the south of Amazonia in the years 1983 and 2001. However, this isolated data does not encompass the problem of water management in Brazil, since it does not take into account the demands for different uses.



Figure 3 – Hydrographic regions and the Brazilian States.

Table 1 – Average water output by inhabitant in Brazil

Hydrographic Region	Population (1,000 inhabitants)	Average Output	
		(m ³ /s)	(m ³ /hab/year)
Amazonia	7,806	131,947	533,062
Tocantins Araguaia	7,178	13,624	59,856
Western Northeast Atlantic	5,302	2,683	15,958
Parnaíba	3,729	763	6,453
Western Northeast Atlantic	21,465	779	1,144
São Francisco	12,796	2,850	7,024
Eastern Atlantic	13,996	1,492	3,362
Southeast Atlantic	25,245	3,179	3,971
South Atlantic	11,634	4,174	11,314
Uruguay	3,834	4,121	33,897
Paraná	54,670	11,453	6,607
Paraguay	1,887	2,368	39,575
Brazil	169,542	179,433	33,376

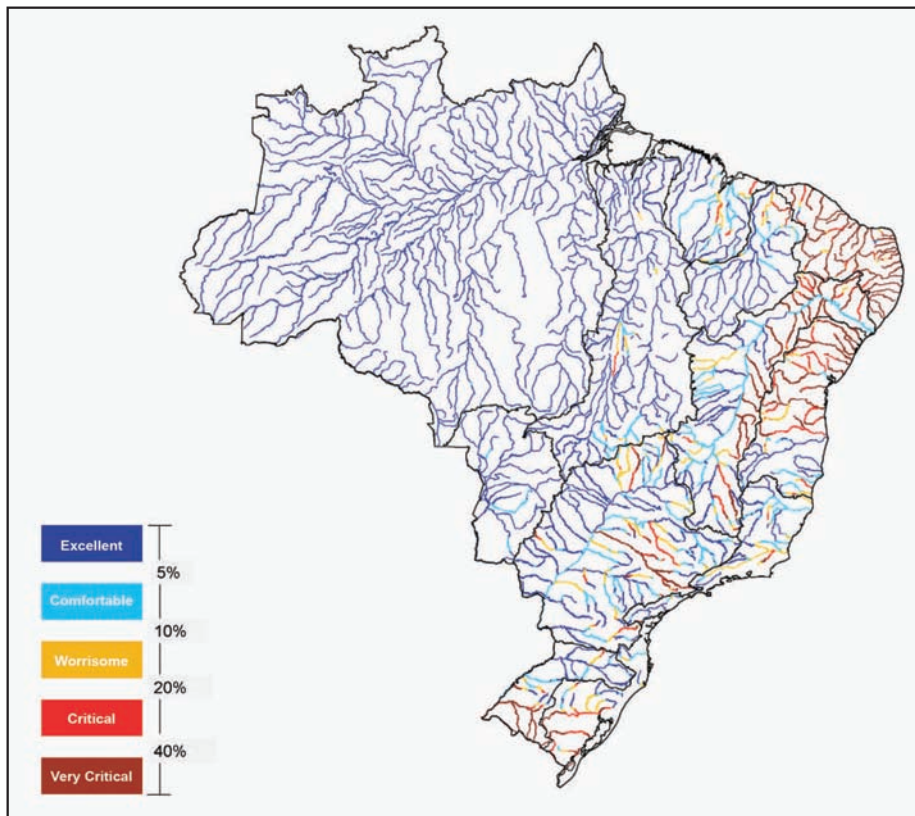
Source: ANA (2007)

Studies elaborated by ANA (2004) evaluated the demand/availability ratio of the water in these twelve hydrographic regions. Estimates for demand are based on the data available from licenses issued by the Union as well as by the States for the different uses of existing water in the hydrographic regions. Availability is the outflow regulated by the reservoir system in relation to the total amount, with a guarantee of 100%, added to the outflow with 95% remaining in the unregulated portion. In unregulated rivers, availability is the outflow with the permanence factor of 95%. In terms of characterizing the situation of the rivers in these hydrographic regions, a qualitative scale was used for this availability/demand ratio that varied from “comfortable” to “critical,” as shown in Figure 4. The situation is comfortable in the Amazon and Tocantins/Araguaia hydrographic regions, with the exception of some regions of the headwaters and the Jaburu and Formoso rivers, where irrigation activities have intensified in recent years. In the Western Northeast Atlantic region, the Mearim River finds itself in a critical situation. The Parnaíba River continues to easily meet the demands of the basin, with the exception of some tributaries. The Western Northeast Atlantic region is the most critical. Nearly all of the sub-basins of this region present a ratio between demand and availability above 40%. The hydrographic region of São Francisco also presents a condition at least of concern in the sub-basins of the Velhas and Paraopeba rivers, some tributaries of the Paracatu (Preto, São Pedro and Ribeirão Entre-ribeiros, the Alto Rio Grande rivers), the majority of the rivers located in the semi-arid region of the basin. Some of the basins of the Eastern Atlantic also represent difficulties in satisfying the demands: among others, Vaza-Barris, Itapicuru and Paraguaçu.

Additionally, they represent a picture of at least as much concern as the basins nearest to urban centers such as those of the Southeast Atlantic region (for example, the Paraíba do Sul, Pomba, Muriaé, Guandu rivers and the rivers that feed into the Bay of Guanabara), South Atlantic (Guaíba, Jacuí and Camaquã, among others) and from Paraná (São Bartolomeu, Meia Ponte rivers, some branches of the Rio Grande – Sapucaí, Turvo, Pardo and Mogi-Guaçu rivers –, Piracicaba and Tietê, for example).

Finally, some basins located in the vicinity of Uruguay find themselves in a situation that requires intensive management and intervention, especially due to the conflicts of use with irrigation (Camaquã, Ibicuí, Santa Maria and Quaraí rivers, among others).

Regions in the country may be noted where, even in spite of naturally elevated availability of water, intensive and unplanned occupation of the territory has generated conflicts over the use of water, especially in terms of questions associated with quality required for specific uses. This is true for the hydrographic regions of Paraná and Uruguai, of the upper courses of the Tocantins and São Francisco rivers, besides a good part of the Southeast Atlantic and South hydrographic regions, where conflicts over water usage essentially involve problems of either pollution or excessive consumption of water for irrigation.

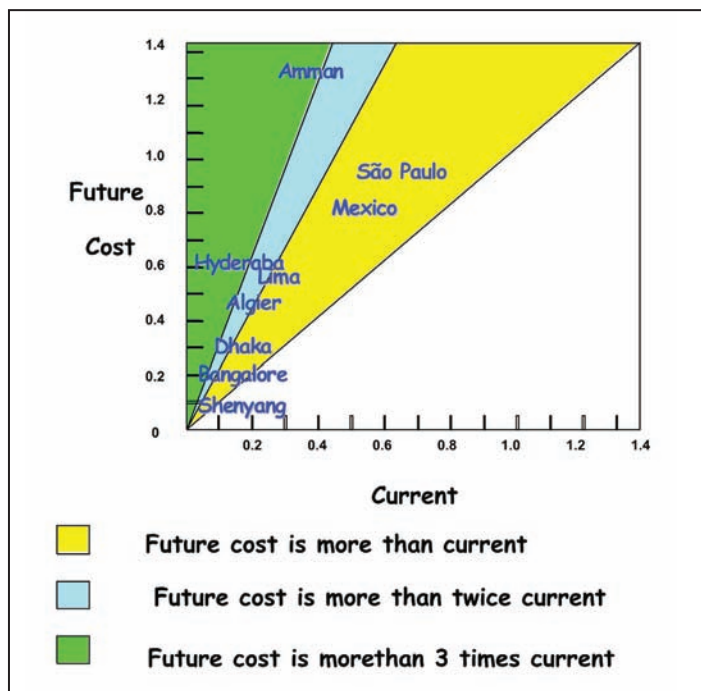


Source: ANA (2007)

Figure 4 – Ratio between hydro availability and demand of the principal water courses.

As shown, note that, in spite of Brazil leading in fresh water availability in the world with 12% of the total, serious problems exist in the offering of water for different uses. These problems result from elevated quantitative demands in relation to the availability and the compromising of the waters by pollution. The practical result is that the marginal cost of serving urban demands for water in metropolitan regions in the entire world has notably increased. (Figure 5). One of the reasons for this increase in marginal cost is the need for a water source from hydrographic basins adjacent to the region. Water for the population of the two most important Brazilian Metropolitan Regions, São Paulo and Rio de Janeiro, is transported from adjacent basins. In the first case, 50% of the urban water supply comes from the Piracicaba River basin. On average 33 m³/s are transported that cease being available for the Metropolitan Regions of Campinas and Piracicaba. In the second case, the waters of the Paraíba do Sul River are transported to Light System for hydroelectric power generation, and in the process are emptied into the Guandu River. In this transposition, 65% of the waters of the Paraíba do Sul (160 m³/s) no longer flow in return to the downstream region of Santa Cecília, which includes the cities of Barra do Piráí and Campos dos Goitacazes, among others.

The challenge of management of Brazilian waters, however, is connected as much to the management of demand as to the increase and guarantee of the offering of water in hydrographic regions with low availability and improvement of the quality of the water with reduction of domestic and industrial pollution. The work conducted by the environmental sector with the system of command and control (fines) has resulted from the contention over industrial pollution. However, domestic pollution, in other words, that which is produced by sanitation companies, is still far from being resolved. Only 15% of domestic sewage is treated before being disposed of into urban Brazilian rivers. Moreover, pollution of diffuse origin, urban and rural, represents an additional question that must still be dealt with after the timely solution of the already described problem of pollution.



Source: Adapted from the World Bank (2006).

Figure 5 – Marginal cost of domestic supply in metropolitan regions.

National System of Hydrous Resource Management

The National Policy of Hydrous Resources (PNRH), established by Law n.9.433/97 (Waters Law) has as its principal objective assurance of the necessary availability of water to the present and future generations, with standards of quality adequate to respective uses, at the same time that it seeks the prevention and defense against critical hydrological events and the sustainable development, by means of rational usage and integration of hydrous resources.

The principles on which the national hydrous resources management policy are based can be summed up in the following manner:

- recognition of water as a public asset with economic value;
- guarantee of multiple uses of the waters
- priority of use of hydrous resources for human consumption and animal maintenance in conditions of scarcity
- adoption of hydrographic basin as a territorial unit of planning and management of waters: decentralized management;
- participation of different levels of public power, of users and of civil society in the decision-making process: participative management.

The Policy of Hydrous resources is oriented to the following general directives of action:

- systematic management of hydrous resources without dissociation from aspects of quantity and quality;
- adaptation of management of hydrous resources to physical and biotic diversity, demographics, economics, cultures and societies of the diverse regions of the country;
- articulation of the management of hydrous resources with environmental management;
- articulation of the planning of hydrous resources with user sectors and with regional, state and national planning;
- integration of the management of hydrous resources with the management of soil usage;
- integration of the management of hydrographic basins with estuary systems and coastal zones.

In order to improve this condition of water availability in quantitative and qualitative terms and in the sense of implementing its instruments and directives of action, the PNRH instituted the National System of Hydrous Resource Management (Singreh). This system, defined in the Federal Constitution of 1988, and regulated by the Waters Law is an innovation in relation to the environmental system in the sense that it used economic mechanisms for the management of the water. By means of it the country was introduced to the concept of polluter-payer and user-payer. Water came to have economic value and its use was subject to charge. This system (Figure 6) took into account the federal character of the country and the possibility of involvement of society in the process of making decisions. It created the figure of the Committee of Hydrographic Basin, incorporating representatives of the government, users and non-governmental organizations. The Committee is responsible for the approval of the basin plan and for the determining the value to be charged for water use. In Table 2 the attributes of each of the members of this management system are described.

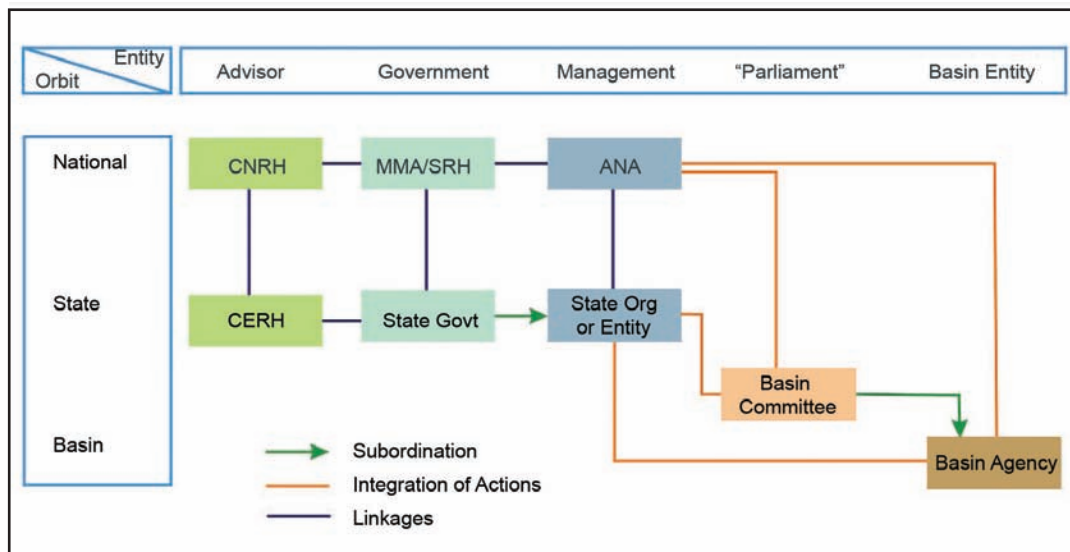


Figure 6 – The National System of Hydrous Resource Management (Singreh).

The management instruments recognized by the Waters Law and available to Singreh are: hydrographic basin plan, delineation of the bodies of water, licensing, charge for use of hydrous resources and information system.

The hydrographic basin plan requires data from the system of information about availability of water in quantity and quality, besides the demands for multiple uses aggregated to the hydrographic basin. The plans of the basin are directing plans that aim to ground and orient the implementation of hydrous resources policy at the level of hydrographic basins, defining the priority uses and the investment program for the development, sustainable usage, recovery and conservation of hydrous resources of the basin.

The framework aims at determining long term levels of quality in various intervals of the hydrographic mesh owing to the uses and the programs and goals for the fulfillment of these objectives. The definitions are seen directly affecting the license that will be given for the output reductions, which in turn controls established levels of quality.

Table 2 – National System of Hydrous Resource Management (Singreh)

Entity	Attribution
National Council Hydrous Resources (CNRH)	Highest level of Singreh responsible for dissolving use conflicts at the last resort and subsidizing the formulation of the National Policy of Hydrous Resources.
Secretary of Hydrous Resources	Federal entity charged with formulating the National Policy of Hydrous Resources and acting as executive secretary of CNRH

National Waters Agency (ANA)	Regulator of the use of hydrous resources in rivers in Union domain and coordinator for the implementation of Singreh in the entire national territory, the ANA has as its mission implementing and coordinating the shared and integrated management of hydrous resources and regulating access to water, promoting sustainable use for the benefit of present and future generations.
State Hydrous Resources Council (CERH)	Highest state organ responsible for dissolving conflicts of use within the orbit of the State and subsidizing the formulation of the State Policy of Hydrous Resources.
State Manager of Hydrous Resources	Central Organ and coordinator of the State Hydrous Resource Management System, with powers similar to the ANA, highlighted by licensing and inspecting of the use of hydrous resources within the domain of the State.
Hydrographic Basin Committee (CBH)	Group constituted for public power, users and civil society, with powers to approve the basin plan and follow its execution and establish the mechanisms of charge and suggest to the CNRH the values to be charged.
Basin Agency	Executive Branch of the Committees of the Basin, responsible for maintaining the updating of the hydro balance availability, maintaining user registration, operating the charge and elaborating the basin plan.

Source: Adapted from Braga et al. (2006)

The license is an instrument with the objective of assuring quantitative and qualitative control of water usage. It is the right of access to the water, or qualification for its use. The license requires for its implementation data from the information system relative to hydrous availability in terms of quantity and quality, and from users upstream and downstream from the authorized section.

The charge is established for the set of users subject to the requirements of the license, for use of hydrous resources. Besides the objectives of rationalizing water use as an incentive to avoid polluting, this also is the instrument of management that allows for the contribution of resources in order to finance the program of basin investments.

The principal objective of the information system is to produce, systematize and make available data and information that characterizes hydro conditions of the basin in terms of quantity and quality of the water in its various uses. These last assume various possible forms of characterization by maps of use and occupation of the soil, slope, vegetative coverage and point loads, referring

to the receptivity and release at different points of the hydrographic network expressed in the user registration of the basin water.

Implementation of Singreh

In order to implement such a complex system, it was necessary to create an institution that could authoritatively act on a national level. Law n.9.984, from 17 July, 2000, established as a function of the ANA the implementation within its prerogatives, the National Policy of Hydrous Resources and the coordination of the National System of Hydrous Resource Management (Singreh), in particular the execution and operation of the technical and institutional instruments of hydrous resource management. Moreover, the ANA is charged with regulating the use of water in rivers under Union domain through of the bestowal of the right of use and its inspection.

The activities of ANA obey the foundations, objectives, directives and instruments of the National Policy of Hydrous Resources, in particular the adoption of the hydrographic basin as the territorial unit of planning and management of hydrous resources, and is developed in connection with the public and private organs and entities that are members of Singreh. The ANA also exercises a no less important role of inducing processes through the definition of strategies for the establishment of the integrative mechanisms and cooperation, independent of the domain of water bodies. Particularly, and in accordance with Law n.9.984, it is worth highlighting some of the prerogatives of the ANA:

- to supervise, control and evaluate the actions and activities derived from the dictates of federal legislation pertinent to hydrous resources;
- to discipline, in a normative manner, the implementation, operation, control and evaluation of the instruments of the National Policy of Hydrous Resources;
- to elaborate technical studies in order to subsidize the definition, for the National Council of Hydrous Resources, the values to be charged for use of hydrous resources under Union domain, based on the mechanisms and amounts suggested by the Committees of Hydrographic Basin:
- to stimulate and support the initiatives deriving from the creation of the Committees of the Hydrographic Basin;
- to implement, in conjunction with the Committees of the Hydrographic Basin, the charge for hydrous resource usage within Union domain;
- to collect, distribute and apply income derived from intermediation of charges for use of hydrous resources in the domain of the Union.;
- planning and promoting actions intended to prevent or minimize the effects of dry spells and inundations in conjunction with the central organ of the National System of Civil Defense, in support for States and municipalities;

- promoting the elaboration of studies for subsidizing the application of financial resources of the Union in works and services of regulating water courses, of allocation and distribution of water, and of the control of hydro pollution, consonant with established hydrous resource plans;
- define and inspect the operational conditions of reservoirs by public and private agents, aiming to guarantee the multiple uses of hydrous resources, according to the hydrous resource plans of the respective hydrographic basins;
- promote the coordination of the activities developed within the scope of the national hydro meteorological network, in conjunction with public or private organ and entity members, or that are users;
- organizing, implementing and generating the National System of Information about Hydrous Resources;
- stimulating research and qualifying human resources for the management of hydrous resources;
- providing support to the States in the creation of managing organs of hydrous resources;
- proposing to the National Council of Hydrous Resources the establishment of incentives, including financial, for the qualitative and quantitative conservation of hydrous resources.

From the point of view of its organic structure, the ANA is governed by a board of directors composed of five members, appointed by the president of the Republic, and confirmed by the Federal Senate, with non-overlapping terms of four years, allowing only one consecutive reappointment. In order to provide technical support for the decisions of its directors, the ANA has thematic supervisors.

The challenge of hydrographic basin management

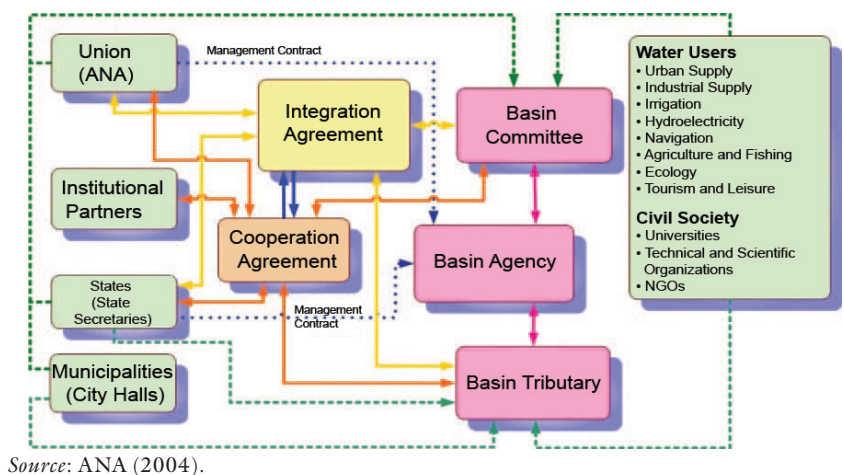
The great challenge that is put to the implementation of Singreh in a federative country like Brazil is the existence, in the same hydrographic basin, of rivers administered by States and by the Union. The autonomy of States creates situations, such as the basin of the Paraíba do Sul River, where the Committee for Integration of the Basin of the Paraíba do Sul River (Ceivap) decided to charge for the use of water, CNRH approved the value and the Union implemented the charge for rivers in its domain in the year 2003. The State of Rio de Janeiro, in turn, implemented the charge on rivers in its domain in 2004, and the State of São Paulo only in 2007, and the State of Minas Gerais still has not implemented a charge on the rivers in its domain of the Paraíba do Sul River basin. This asymmetry puts the system at risk.

Shared management of hydrous resources demands, necessarily, making compatible the diverse conflicts of interest. It requires, among other factors, the creation of institutional environments adequate for resolution, negotiation and

surmounting of problems and existing lacunae in the judicial-legal structure. These environments are formed by the interaction of multiple factors, among those which are decisive (Pereira, 2003):

- convergence of objectives;
- understanding of the involved questions and challenges by all of the actors;
- the creation of ties of trust by means of a process of ethical, transparent and democratic management, conducive to equitability, rationality and efficiency in the making of decisions; and
- the construction of a sense of identity of the basin, a sense of unity in harmonious action, of co-responsibility and co-dependency.

In the sense of seeking to establish minimal conditions of uniform criteria for licenses, inspection and charges in the realm of the hydrographic basin, the ANA created the figure of an integration agreement. This agreement established between the ANA and the States with the intervention of the Committees of the Basin is the commitment between the federal entities that they will work together in the implementation of management instruments defined in the Waters Law. However, the integration agreement is insufficient to guarantee the sustainability of this implementation. Some States lack the institutional apparatus compatible with the requirements of this new and complex management system. Thus the ANA also created the figure of a cooperation agreement for technical and financial State support in order to face the challenges of decentralized and participative management. In addition, it is necessary to establish a management contract between the federal or state organ, holder of the water domain, so that the financial resources collected by the Union or by the States can be forwarded to the Basin Agency. This multi-institutional arrangement is shown in Figure 7.

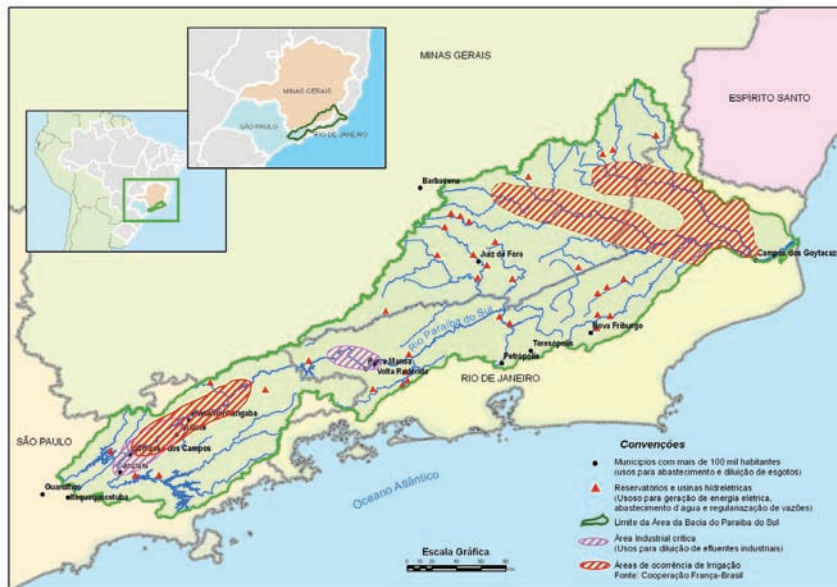


Source: ANA (2004).

Figure 7 – Organization of the Management of Hydrous resources in the hydrographic basin.

Case study: hydrographic basin of the Paraíba do Sul River

With a drainage area of around 55,400 km², the hydrographic basin of the Paraíba do Sul River extends to the Southeast Region, encompassing the Valley of Paraíba Paulista (13,500 km²), the Mata Mineira Zone (20,900 km²), and almost half of the State of Rio de Janeiro (21,000 km²) (Figure 8). In spite of the small territorial range – only 0.7% of Brazil and 6% of the Southeast Region - , the basin encompasses one of the most industrialized areas of the country, responsible for around 10% of the Brazilian GNP, and supplies potable water for approximately fourteen million people, including more than eight million inhabitants of the Metropolitan Region of Rio de Janeiro, situated outside the limits of the basin.



Source: Pereira (2003)

Figure 8 – Basin of the Paraíba do Sul River: location and principal uses.

The priority use of the great hydro potential of the basin is for public supply and other uses such as generation of electrical energy, industrial and irrigation. Fishing, leisure and tourism play little part, although great potential exists for their development, in contrast with river transport, which was never important nor had good conditions for navigation. The major basin user is Light System which, using a transposition system of water between basins, removes around two thirds of the average output of the Paraíba do Sul River, in its average stretch, and more of the totality of a tributary (Rio Piraí), for the generation of electrical energy in the Hydroelectric Complex of Lajes, at the Atlantic watershed of the Serra do Mar. This transposition created a significant hydro offering in the receiving basin of the Guandu River which became the principal source of water supply of the Metropolitan Region of Rio de Janeiro and of various industries and thermoelectric power plants situated there. The principal uses of the basin water are presented in Table 3.

Table 3 – Principal uses of the waters of the Paraíba do Sul River basin.

Uses	Collection (m3/s)		Consumption (m3/s)	
Public Supply	16.84		3.37	
Industrial	13.65		6.19	
Livestock	Irrigation	49.73	Irrigation	30.28
	Animal	3.45	Animal	1.73
Transposition to Light System	up to 180		up to 180	
TOTAL	83.667		41.57	
Including transposition	up to 263.67		up to 221.57	

Source: Coppe (2002)

The development of livestock and urban-industrial activities has caused a conjunction of environmental problems that have accumulated and grown year by year, expressing themselves in damage to the quality of hydrous resources. Already realized diagnostics in the basin provide evidence of critical problems in all environmental aspects that can be considered, from scarcity of forests (reduced to 11% of their original extent), contamination of the waters from dispersal of inadequately treated domestic and industrial sewage, going to exhaustion, impoverishment of the capacity for soil productivity, degraded by generalized basin erosion. The disorderly urban growth on steep slopes and margins of the rivers has created various risk situations of slides and flooding. The principal conflict related to the basin waters concerns the transposition of waters of the Paraíba do Sul River basin to Light System.

Organization of the basin: shared management

At first sight, the gravity of the present problems of the basin of the Paraíba do Sul River seem to contrast with its history of attempts to implement an integrated management dating back to the 1930s. In fact, various initiatives have had great importance in dealing with the principal problems of the basin and have left an important legacy in terms of knowledge of the characteristics and problems related to the waters and the predisposition of its principal actors in organizing for its defense. However, these initiatives were not sufficient to anticipate or confront the magnitude of the impact originating from the accelerated process of urbanization and industrialization, primarily between 1950 and 1980, from substantially more intense rhythms than the attempts at conservation, protection and recovery of the basin of the Paraíba do Sul River.

Starting in the middle of the 1990s, the basin of the Paraíba do Sul River has known an intense process of mobilization in relation to its waters, translated by the creation of various organisms of the basin in the sphere of the present dynamic of implementation of new management systems. It is dealing with a complex system, to a great extent due to the double dominion that imposes the cohabitation, in the basin, of four distinct management systems: national systems and of the States of São Paulo, Minas Gerais and Rio de Janeiro. The content of different laws resembles in their principles instruments of management and political-institutional arrangements but differences in the rhythm of implementation are significant. These dynamic differences are reflected in the internal institutional arrangement of the basin of the Paraíba do Sul River, as presented in Figure 9, which has today with various organisms of the basin, therefore giving rise to distinct organizational processes:

- in the State of São Paulo the first of the new organisms of the basin of the Paraíba do Sul River was created: the Committee of the Hydrographic Basin of the Paraíba do Sul River (CHS-PS) or “Paulista Committee,” which encompasses the totality of the São Paulo territory of the Basin;
- the Committee for the Integration of the Hydrographic Basin of the Paraíba do Sul River (Ceivap) was born from the interstate conjunction with the Union, prior to the approval of the Waters Law;
- the Committee of the Hydrographic Basin of the Piabanha, Paquequer and Preto Rivers, in Rio de Janeiro territory, created in 2006;
- the Hydrographic Basin Committee of the Tributaries from the State of Minas Gerais of the Preto and Paraibuna Rivers (PS-1), created in 2006;
- the Hydrographic Basin Committee of the Tributaries from the State of Minas Gerais of the Pomba and Muriaé Rivers(PS 2), created in 2006;
- the Hydrographic Basin Committee of the Grande/Dois Rios Rivers, in Rio de Janeiro territory created in 2008;
- the Hydrographic Basin Committee of the Médio Paraíba do Sul, in the State of Rio de Janeiro, created in 2008;
- in a separate process of regional organization, in order to deal with spontaneously supportive organizations independent of the laws of hydrous resources, various inter-municipal consortia and associations of users were created starting in 1997 in sub-basins or stretches of the basin. Oriented to the theme of water and the environment, these organisms of the basin have constituted important regional voices in the management process. They are: Inter-municipal Consortium for the Environmental Recovery of the Muriaé River Basin (1997), Inter-municipal Consortium for the Environmental

Recovery of the Pomba River Basin (1998), Association of Users of Waters of the Médio Paraíba do Sul (2001), Inter-municipal Consortium for the Environmental Recovery of the Bengalas, Negro, Grande and Dois Rios Rivers Basins (2001), Dual Interstate Consortium for the Recovery and Preservation of the Carangola River Basin (2001) and the Interstate Consortium for the Recovery and Preservation of the Paraibuna River Basin (2002).

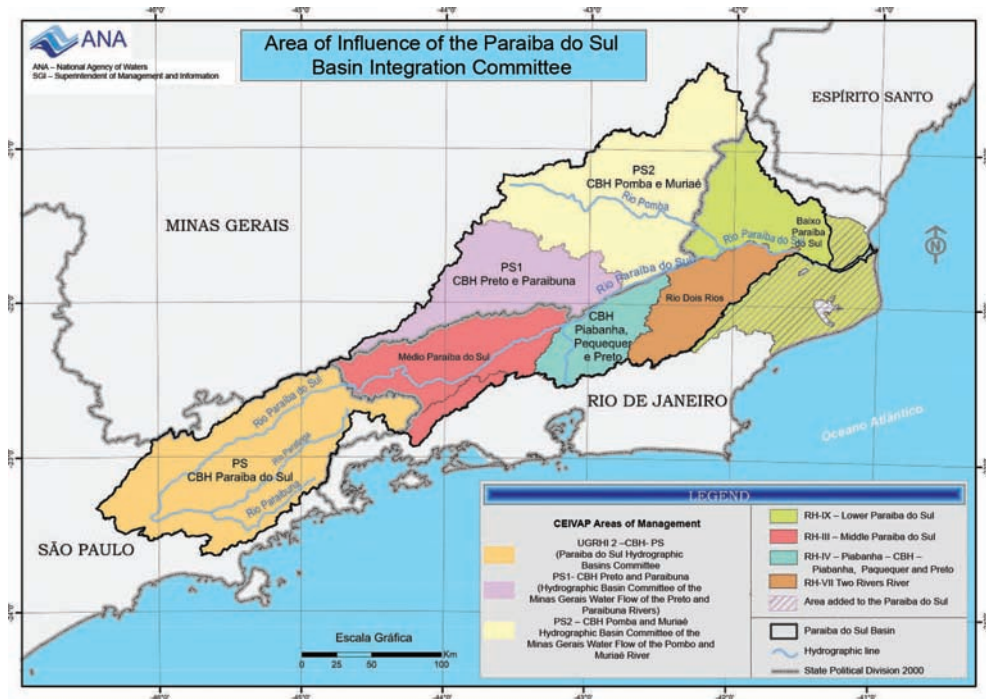


Figure 9 –Paraíba do Sul River Basin: Basin Committees

The institutional mosaic that is delineated demonstrates that the local actors are interested in the development of their hydrous resources and in their protection and recovery. According to their specific interests, and with greater or lesser intensity, all these organisms have created opportunities for information, preparation and discussion concerning the principles and instruments of hydrous resource management.

The multiplicity of fronts, however, equally imposes the necessity for harmonizing the combined actions with respect to the autonomy of each basin organization. It is dealing with one of the shared challenges presently faced by the Paraíba do Sul River Basin.

In this context, the role of Ceivap is highlighted. Besides constituting itself as a principal institutional instance of the Paraíba do Sul River basin concerning the planning and management of hydrous resources, Ceivap, restructured in 2007, has come to assume, within its expertise, the functions of the Integration Committee and, as will be seen.

Federal articulation: Ceivap, ANA and the States

In the face of the diversity of the rhythms and capacities of each management system involved with the Paraíba do Sul River Basin, the implementation of shared management took place in a gradual manner. Up to the end of 2000, the advances were made in the development of diagnostic and planning studies. Starting with that date, the process of implementing management instruments was strongly impelled by the decision of Ceivap to begin charging for the use of water under the domain of the Union, encompassing, above all: regulation of the uses of water (registration, reviewing and concession of licenses); universalizing a charge for diverse users; elaboration of the hydrous resources plan for the initial phase of charging; and the creation and installation of the Basin Agency (Pro-Management Association of the Waters of the Hydrographic Basin of the Paraíba do Sul River – Agevap).

All these activities have required systematic and harmonious performance by the different actors involved in the management of the Paraíba do Sul River basin, in other words, the construction of a management agreement, with respect to its respective attributions and competencies. As to Ceivap, its highly dynamic activity at the beginning of 2001 was its decision to operate short term management of the Basin, with its centerpiece the implementation of the charge for water usage. With this process, Ceivap was provided important decisions that make up part of the list of its attributes, among which are:

- to establish the methodology and criteria for charging for use of the hydrous resources and proposing the values to be charged by the qualified organs.;
- propose values for negligible uses involving collection, derivation and release of outflow with the effect of exemption from the obligation of license and charge;
- propose directives for the elaboration of the Hydrous Resource Plan for the initial phase of charging in the Paraíba do Sul River Basin, making it compatible with the plans of the sub-basins, approving and following its execution;
- to approve the proposal of the investment plan defined in the Hydrous Resource Plan for the application of financial resources derived from collection;
- to create the Water Agency of the Waters of Paraíba do Sul River Basin, together with the ANA.

Thus, the ANA, the States of Minas Gerais, Rio de Janeiro and São Paulo and Ceivap signed a five year duration Integration Agreement in March 2002 with the objective of integrated management of hydrous resources of the Paraíba do Sul River hydrographic basin, independent of its dominion, through technical and institutional integration for the implementation and functioning of the management instruments of hydrous resources, in a manner that will make

effective the hydrographic basin as a territorial unit of planning and management. In this instrument it sought harmony, between ANA, the States and Ceivap, the respective criteria and adopted procedures, above all in what is referred to as the hydrous resource plan, registration of uses and users, license for the right of use of hydrous resources, charge for water use, systematic inspection of uses of hydrous resources and quantitative and qualitative monitoring, and the development of preparatory activities for human resources.

Implementation of management instruments

The process of implementation of management instruments in the Paraíba do Sul River Basin was impelled significantly by the decision of Ceivap of initiating a charge for waters under the Union's domain. In fact, the functioning of the charge had as a prior condition the immediate and strictly inter-related implementation of other management instruments. – the basin plan and regulation of uses -, besides the creation and installation of the Waters of the Basin Agency (Deliberation Ceivap n.8, from 6 December 2001).

The strategy adopted for the implementation of these management instruments, in a short time, underwent a series of simplified proposals. Its conception evoked an arduous process of discussion and negotiation, constituting itself, in technical, political and institutional terms, in true challenges. The great merit of this process was the consensus established between the parts (public managers, users and civil society), in the innumerable discussions that occurred in Technical Groups and in the Ceivap plenary, grounded in studies and advices especially developed for this purpose.

The principal pieces comprising this strategy were the following:

- adoption of a simplified equation for charges involving collection, consumption and disposal of pollutants (DBO5), where volumes of untreated pollutants in undiluted volumes, making it possible to uncouple charges from the framing or setting of goals for unpolluting of the rivers in this initial phase;
- elaboration of the Hydro Basin Resources Plan, starting from existing studies and using two other management instruments, still to be cited: the information system, which has been developed over the years in various basin management projects and the framing of bodies of water by classes of use, originating from environmental legislation. Fundamentally the plan is composed of an Investment Program, which encompasses a conjunction of structural and non-structural interventions, as well as proposals for development of studies and technical tools of management;
- development and implementation, in an innovative manner, of a broad process of regulation of use, based on public meetings, publicized in the Diário Oficial da União, (Official Union Daily), and user self-enrollment. The principal objectives of the process were the licensing and the collecting. The obligatory-declaration enrollment by users served as a

requirement for licensing implementation of which has been conducted in all of its stages by a joint process between the Union and the States. Its form of advancement and all of its steps were discussed in the Technical Chambers and approved by Ceivap, with the participation of the federal government and the three State governments. The regulation was a joint decision among the four parties, implemented as a single process, and integrated throughout the basin. The process depended on a system that permitted self-enrollment of around 4,500 users, of whom 81% made their declarations directly via the internet. It was spread by a broad publicity campaign through the principal means of communication (radio, television, and local newspapers) with the aim of informing users;

- the effective beginning of a charge in March, 2003, followed enrollment emanating from the regulation process of all users subject to the license, independent of its announced concession.

Agency of the Paraíba do Sul River Basin

Ceivap, besides being structured as an articulating and integrating organism for discussions and definitions related to the implementation of the management of hydrous resources in the Paraíba do Sul River basin, became the first Basin Committee to approve mechanisms and suggest values for charging for the use of water. The implementation of charging, in March 2003, made the creation of the Paraíba do Sul River Basin Agency (Agevap) feasible. It lacked, however, the legal regulation that would permit its installation. It is worth emphasizing that, in 2003, as determined by Ceivap, the function of directly applying resources originating from charges in the basin, were delegated to ANA, which came to around US\$ 3,2 million,* in accordance with the Investments Program approved by Ceivap.

On February 11, 2004, the president of the Republic published Provisional Measure n.165 concerning the Management Contracts to be signed between ANA and the delegated entities of the functions of the Agency of Waters, in terms of art. 51 of Law n.9.433/97. On June 9, 2004, the MP n.165 was converted into Law n.10.881, which ruled on the Management Contracts to be signed between ANA and the delegated entities of the functions of the Agency of Waters relative to management of the hydrous resources under Union domain. Within this sequence the CNRH published Resolution n.38 on August 20, 2004 delegating responsibility for exercising the inherent functions of the Paraíba do Sul River Basin Agency to Agevap, thereby consolidating the legal base for signing the Management Contract.

It should be noted that Law n.10.881/04 satisfactorily and with great flexibility resolved the normative questions with reference to the constitution of the Water Agencies, guaranteeing to the delegated entities of the functions of the Water Agencies the resources derived from charges for hydrous resources use eliminating the possibility of its contingency.

In August of 2004 a meeting of the Administrative Council of Agevap took place where the Management Contract and the Work Program were approved. Moreover, in separate meetings, the General Assembly of Agevap as well as the Plenary Meeting of Ceivap sanctioned the celebration of the Management Contract. The approved text defined as an objective of the Management Contract the extent of the goals for the activities to be performed while exercising the functions of the Waters Agency function of Agevap as detailed in the Work Program of the Management Contract. In particular, the Work Program considered the specifics of the macro-processes (strategic objectives), and the goals and results to be reached by Agevap, measured by means of performance indicators.

The Management Contract guarantees the conveyance of the financial resources effectively collected in the Basin, according to a timetable of monthly disbursements, conforming to Law n.10.881/04 determining the norms to be followed by Agevap as published by ANA, for the selection and recruiting of personnel and for the purchases and contracting of works and services by Agevap.

Restructuring the Agevap-Ceivap System

Following a strategic planning process during the years 2007 and 2008, the Agevap-Ceivap System, due to its acquired experience, was reactivated along the following lines.

It was constituted as sixty proprietary members and sixty alternatives. The mission of the Committee for the Integration of the Paraíba do Sul River Hydrographic Basin (Ceivap) is to promote integrated management of the hydrous resources of the Paraíba do Sul River Hydrographic Basin, articulating public sector policies connecting and integrating the planning of actions related to the basin management system.

Moreover, Cevaip's purpose is to promote federal, interstate and inter-municipal articulation and provide support for creating and promoting regional integration of hydrous resources basin management, in particular River Basin Committees.

Henceforth, the recommendations of the proprietary and substitutes from the segments of civil society and the users will be made by their equivalent peer members of River Basin Committees when they exist, or by processes that they consider represent the state's management units of hydrous resources.

Within its competencies, by now dealing with an Integration Committee, therefore with a more strategic agenda for the basin, the definitions of the following questions are emphasized: regulatory mark of the basin; quantitative and qualitative allocation of the waters between the various consulting bodies for the management system of hydrous resources; usage that causes significant regional impact; transposition and derivations within and external to the basin; and general criteria for charging for use of the waters.

It is within Cevaip's jurisdiction to approve the Integrated Hydrous Resources Plan and establish levels of quality and availability of hydrous resources,

including those in the regions of the state divisions and to River Basin Committees activities in borderline areas, as well as to establish regional goals for sustainable use of hydrous resources.

In addition it was established that Ceivap would only consult with a permanent Technical House Consultant.

As to Agevap concerns the following aspects stand out:

- Agevap is a private autonomous non-profit civil association governed by the Brazilian Civil Code, by its Statute and by regulations to be adopted by its organs. Note that any reference to the Paraíba do Sul River Hydrographic Basin is excluded here so as to provide freedom of action to Agevap;
- As its basic goal Agevap provides technical and operational support to the management of hydrous resources, promoting the planning, execution and monitoring of its actions, programs and projects in accordance with the hydrous resource plans of the respective basins aims: technical, administrative and operational support to public or private organs and entities, related to the management of hydrous resources, looking toward integrated, decentralized and participative management; stimulating rational and multiple use of hydrous resources; technically supporting municipals and users in its area of activity in the preparation and implementation of actions defined in the hydrous resource plans of the respective hydrographic basins, including prevention of public calamities caused by critical hydrological events (floods and droughts) of natural origin following inadequate use of hydrous resources or aggravated by inadequate soil usage;
- Agevap has as associates companies of any nature the activities of which are verified as intervene on hydro availability or with recognized contributions for assisting the management of the hydrographic basins in which they act, and which formally request admission, and have an unlimited number of associates
- in order to avoid conflicts of interest, inadmissible as members are organs or public entities, from the Union or the States, which can create with Agevap agreements of any nature with the end of delegating or attributing to them functions of the water agency or the hydrographic basin;
- Agevap will have the following organic structure: collegial organs of the upper administration (General Assembly [AG], Administrative Council [CA] and Fiscal Counsel [CF]; Executive-Board [Executive-Director and Managing Directors designated by the Executive-Director]);
- the AG is composed of the associates at the discretion of their statutory rights and have, among others, the following duties: to elect and discharge members of the CA and the CF; sanction the decision to advise the CA as to dismissal of the Executive-Director; to approve alterations to Agevap Statute; to approve alterations to the Agevap headquarters; and to approve the dissolution of Agevap;

- CA is the upper deliberative organ of Agevap and will be composed of three individual members chosen by the AG, whether or not from among associates, for a term of four years, renewable once by the Agevap Executive-Board, will participate only in an advisory capacity;
- collaborates with the CA in deliberations about subjects that include: general policy lines, directives and strategies of Agevap; the budgetary proposal, investments in its own structure and the plan of action for the execution of Agevap activities; management and activities reports as well as respective quarterly reports; evaluation of the results of contracts, agreements or accords of any nature, as well as providing appropriate managerial analyses about its execution; following and evaluating the performance of Agevap with assistance from the CF; choosing the Executive-Director of Agevap, as well as its eventual replacement from among the members of the Upper Management of the Executive-Board, and setting his remuneration;
- CF is the inspection organ of Agevap, composed of three members, individuals elected by the AG whether they are associates or not, for a two year term, with one reelection;
- members of CA and CF cannot be professionally or financially tied, directly or indirectly: to the Basin Committee for which Agevap is exercising its functions as an agency of waters or the basin; to the public organs or entities, of the Union or the States, that can sign agreements of any nature with Agevap for the purpose of delegating or attributing functions of the water or basin agency; to the public or private organs or entities that have made agreements, contracts or accords with Agevap of any nature with reference to plans, programs or projects financed or promoted by Agevap, and in which that organ or entity participates in the condition of meeting conditions, contracted or beneficiary, direct or indirect, exclusive or not; or to CA from Agevap;
- among the principal responsibilities of CF are: permanent oversight of Agevap accounting and analysis of Annual Reports and financial and accounting performance reports, and on patrimonial operation accomplishments, issuing reports to the CA and for the AG;
- The Executive Board's duty is to manage and execute, with operational freedom observing the dispositions of the Social Statute of Agevap and the deliberations of CA, all the activities and services, recipients or administrative from Agevap;
- The Agevap Executive Board is composed of an Executive-Director, its highest director and directly and personally responsible for it in front of the many parts of its organic structure, and by Managing Directors, designated by the Executive-Director in the form of the bylaws and statutes;
- members of Agevap's Executive Board are forbidden to: have any other job ties or maintain relationship with a legal company of which they are

partners, shareholders or members which could be characterized as a potential conflict of interest; be professionally or financially tied directly or indirectly to the Basin Committee for which the Agevap exercises the functions of water or basin agency; to organs or public entities, from the Union or the States, which could sign agreements with Agevap of any nature with the purpose of delegating or attributing to it functions of the water or basin agency; to organs or entities, public or private, which have ongoing agreements with Agevap, contracted or agreed in any nature with reference to plans, programs or projects financed or promoted by Agevap, and in which that organ or entity participates in the condition of one of the agreement parties, contracted, or beneficiary, direct or indirect, exclusive or not, or to the CA or CF of Agevap.

Final considerations

Two Basin Committees are fully functional: Ceivap, involving the States of São Paulo, Minas Gerais and Rio de Janeiro, and the Hydrographic Basin Committees of the Rivers Piracicaba, Capivari and Jundiá – the PCJ Committees, involving the States of São Paulo and Minas Gerais. In these hydrographic basins an approved plan already exists, charges for use of the water and functioning Water Agencies. Particularly, the result of the charge executed by ANA and by the organ managing the hydrous resources of the São Paulo State Paraíba do Sul River Hydrographic Basin reaches an annual value of around US\$ 5 million* and from the Piracicaba, Capivari and Jundiá Rivers Basins an annual value of approximately US\$ 16,7 million.* These resources have above all been used for the construction of Sewage Treatment Stations (ETE) and thus have contributed to the improvement of the water of the basins.

The work of the National Waters Agency deserves to be pointed out regarding improvement of the quality of the water of Brazilian rivers. In 2001, ANA introduced the Hydrographic Basins Purification Program (Prodes). Also known as the Treated Sewage Purchase Program, this program subsidizes municipals with federal resources in construction of ETE in an innovative manner. Rather than delivering financial resources prior to the construction of the ETE, the municipal receives the financial resources only when the station has begun functioning correctly, in quarterly installments. The subsidy, aid corresponds to 50% of the estimated total cost by ANA. The guarantee of release of these values by ANA allows the municipal to raise loans combined with official financial agents. This program stimulates innovated technology and combats corruption. By 2004, 37 new ETE became viable with a global investment of US\$ 152 million*, thanks to the catalyzing effect of Prodes. In 2007, more than US\$ 22 million* was applied to the program.

It is expected that by intervening in the use of Prodes nature programs, Brazil can respond to the commitment assumed during the Millennium Summit

in Johannesburg in the year 2000. At that opportunity member countries of the United Nations signed a document committing to reduce by half the number of inhabitants without access to potable water and sanitation by the year 2015. The Brazilian situation is comfortable in relation to water supply. However, the collection and treatment sector of domestic pollutants lacks investments and programs suited to responding to the international commitment.

Finally it is important to emphasize that the global changes, in particular those relative to climate variability, are going to impose important challenges in the management of the resources of the world, in general, and in Brazil in particular. The prediction by the Intergovernmental Panel on Climate Change (IPCC) of more extensive droughts and floods will have direct consequences in the definition of the most resilient hydro infra-structure and standards of consumption that are more efficient and effective. Besides this, the sequence of hydrologic mobility resulting from climate change will impose new statistical models for the definition of this hydro infra-structure. This is a challenge that world hydrological science will have to respond too quickly, so that long term decisions can be made in the shortest possible time.

Notes

1. Art. 20, inc. III of the Federal Constitution of 1988.

* Exchange rate R\$ 1.79 on September 12, 2008.

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ABSTRACT – The consequence of a constitutional provision, the National Water Resources Management System (Singreh), regulated by Law n.9.433 of 1997 considers Brazil as a federative structure. In addition, the legislation imparts new decentralization paradigms and the use of economic tools for public management and participation in the decision-making process. The present essay, besides approaching issues of availability and demand of water resources in all 12 hydrographic regions of the country and the institutional design and functioning of Singreh in terms of legal and institutional arrangements, outlines the challenges of water management in each hydrographic basin in the context of the federation. It also deals with the implementation process of technical and institutional water resources tools in the Paraíba do Sul River Basin – the first basin to implement charges for water and operate a Water Agency in Brazil.

KEYWORDS: Federative pact, Water management, Management tools, Paraíba do Sul River Basin.

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