

# **The Development of Decentralized Participatory Water Resource Allocation in the Northeast of Brazil: Institutions and Actors**

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## **Abstract**

Water resources are central to political, social and economic power in the State of Ceará, Brazil. The trend in decentralization of water resources and the growth of participatory water management is closely linked with international water management policy development and dependent upon the institutional structure of the region. Particularly in regions such as Ceará, where there is history of “water crisis”, there is also political legitimacy and importance placed on the role, function, and structure of policy, use and institutions in the region. This paper aims to survey many of the institutions involved in and policies contributing the current water management regime in the State. The state of Ceará is considered by many to have implemented and initiated some of the most radical water reforms in the country and the institutions and policy development leading up to these policies are fundamental to understanding the future potential and ‘gaps’ in the goal of sustainable water resource management for some of South America’s poorest populations.

## **Background**

Freshwater is increasingly the world’s most limiting resource; Accessible freshwater accounts for only 0.4% of the world’s total water resources and is unevenly distributed across ecosystems, national borders and cultural divides. Nevertheless, water is key to all aspects of life and paramount to sustainable development initiatives throughout the world. The variability, allocation and quality of freshwater resources are fundamental to food security, sanitation, economic growth, disaster mitigation, human survival, and ecosystem health.

According to the 1997 Brazilian Ministry of the Environmental data, it was estimated that freshwater availability in Brazil is approximately 12% of the world’s total. The availability of 6950 km<sup>3</sup>/year of freshwater within national borders is not indicative of the reality of most populous regions of Brazil. Indeed, 93% of the country’s population depends on approximately 30% of total available supply. As is true in many regions throughout the world, the per capita availability of freshwater resources varies greatly: from 634, 887 m<sup>3</sup>/p/y in the Amazon Region, to 1,460 m<sup>3</sup>/p/y in the semi-arid Northeast (Kelman and Porto). Likewise, it is the uneven distribution of these resources that leads to great water pressures in many regions of the country.

Understanding the water sector in a region is very complex in that it involves not only the endogenous factors directly related to water resources including availability,

water infrastructure, uses, and water policy, but also exogenous factors such as economic development, boundary and right issues, poverty alleviation, and social values. All of these variables are interdependent and are necessary for a true evaluation and understanding of “water-related” issues in a region. Furthermore, due to the scale of most water management initiatives, once policies and/or infrastructure are begun, it is often incredibly costly to take on measures that are conflicting. The net benefits for institutional change in a “crisis-ridden water sector” are often quite high due to the assumed impact and emphasis on affected water resources (Saleth et al). Particularly in regions where there is history of “water crisis”, there is also political legitimacy and importance placed on the role, function, and structure of policy, use and institutions in the region. This phenomenon has been observed with the amount of money, resources, and attention that has been paid to the Northeast region of Brazil in the last few decades. The positioning of water management institutions within a society is also directly dependent on the ‘nature’ of water resources in the region, as well as many other fluctuating variables.

In the following sections, I will look specifically into case studies from the Northeast of Brazil to discuss the decentralization of water resource management in the region, and the accompanying development of participatory water allocation committees, as well as other institutions. The concepts and implications of “decentralization” and “participatory” are repeatedly discussed throughout this paper. Therefore, it is important to have a working definition of these interpretable concepts. In her 2001 analysis of the "Variables and challenges of the decision making process for Hydrographic Basin Committees in Brazil", Magalhaes defines the two concepts as follows:

### **Decentralization of Water resources**

Decentralized management is incorporates the ‘subsidiary principle’, whose decision processes flow across spatial scales and the transfer of control and/or responsibility from federal management issues to the levels most local relatively next to the citizen (cities, hydrological basins, etc.).

### **Participatory water management**

Participatory water management is conceived as the management not solely of the State, but one that incorporates the participation of different sectors of the society, including the water users and representatives of civil society.

**(Magalhaes: 7)**

Analysis will begin with and introduction of the current water allocation regime and demographics of the study region. Following, I will outline select recent developments in international water resource management policy, including the Dublin Principles and Agenda 26 from the WSSD, Johannesburg. These policy goals, implementation strategies, and tools will comparatively put into context national Brazilian developments in Water Resources Policy in recent years. Discussion will then include the exploration of the institutions themselves involved in the creation and implementation of water resource management policies in Brazil and the Northeast, as well as some of the policy tools and implementation strategies used for these regions. As was heretofore mentioned, the paper will try to create a ‘history’ of sorts of participatory water management institutions in the country in

order to better understand the components of these systems, the tools needed to analyze them and the potential development of future institutions, institutional organizations, and other related policy tools for the equitable and sustainable management of water resources in one of the most densely populated semi-arid regions in the world. In the following section, I will discuss the background of the regional focus of this paper: the semi-arid Northeast of Brazil and the State of Ceará.

### **Regional Focus: The Northeast**

The emphasis of this paper is to survey policy development and relevant institutional roles, which have contributed to the current water resource management regime in the Northeast, with particular emphasis on the State of Ceará. However, it is important to understand the regional setting before looking into the specifics of water sector policy and institutions. In this section, I will outline some of the key issues concerning water resource management in the Northeast Region of Brazil and some specifics concerning the State of Ceará. This region serves as a useful case study of both policy development and resource allocation of water resources in the face of uncertainty and mounting resource-related pressures. Additionally, the Northeast of Brazil both notorious for prolonged periods of drought and for the broad range of water management techniques that have been applied there on all scales.

The semi-arid region of the Northeast contains 13% of the total national area, 35% of the population and a disproportionate 4% of the country's freshwater resources. Furthermore, over 50% of Brazil's poor live in the Northeast and two-thirds of the country's rural poor, with a predominant number being agriculturalists that directly depend upon the very limited supply of water for their livelihoods. Water, as a limiting resource in the Northeast, has led to a long history of poverty, famine, increasing levels of inequality, conflict and broad arrays of local, regional and federal water management techniques. The Northeast of Brazil has historically also been seen as a classic example of an informal economy. It has been stricken by drought and subsequent famines, with little governmental role until the 1960s:

*Poverty became synonymous with the lack of water and clear title to the land. A small number of big fazendas, the ensuring centers of oligarchical power, monopolized the perennial water sources and were usually well protected from drought, but the rest of the population in the semi-arido was pitifully dependent upon the erratic rainfall. Every year the sertanejo made a desperate wager with a devil we know as El Niño (Davis, 386).*

The climatic variability in the region of the Northeast subsequently created a semi-nomadic culture of farmers due to the variations in land fertility and rainfall. Throughout the 18<sup>th</sup> and 19<sup>th</sup> centuries, immigrant labor and new settlers originally brought labor-intensive style of farming from Europe and other non-tropical regions that didn't correspond with the ecology, dryness, and infertility of the soils of the Sertão. During the 19<sup>th</sup> century, the Northeast region was plagued with extreme drought and subsequent consequences; the drought-famine of 1825 killed 30,000 people in the state of Ceará alone. This was followed by El Niño droughts 1888-1902 and sustained levels of very high pressures on water resources:

*In the wake of successive El Ninos, national commissions and visiting foreign irrigation experts drew up sweeping, never-implemented plans for stabilizing agriculture and human settlement in the backlands. The few hydraulic projects that were actually built, beginning with the Acude Quixada reservoir in Ceara in 1899, “stored water which benefited large landowners and protected their cattle by providing pasture and watering facilities but....left most of the low-income agricultural population untouched.” Only 500 hectares of the sertão had actually been irrigated by 1941, and twenty-seven years later, when a military dictatorship, worried about possible Guevarist focus in the Nordeste, hired Israeli consultants to conduct the first comprehensive irrigation survey, conditions of life for millions of drought-stricken and immiserated sertanejos were little different from the days when Conselheiro and Cicero first preached Apocalypse on the backroads of Ceará. (Davis: 392).*

The population in the Northeast of Brazil has more than tripled since the 1950s, and the rapid levels of both urbanization and industrialization in the region, without the appropriate time for adequate infrastructure development, has led to increased levels of demand and critical levels of pressure for water. In the Brazilian Constitution, there is a distinction between Federal and State waters, which has led to many state-based water laws and management initiatives, which may or may not in the long run coordinate with Federal-scale water laws and management initiatives. The urgency of water scarcity and extensive droughts in the Northeast, has historically and continues to be a major obstacle in the economic and social development of the region. The push for increased decentralization in recent years has also led to increasing amount of state-level water management initiatives.

Recent Bank economic and sector work (e.g., *Water Resources Management: A World Bank Policy Paper*, 1993, and *Brazil Management of Water Resources*, LA1 Economic Notes #4, World Bank, September 1995) have identified two fundamental deficiencies in water resources management which apply to the Brazilian Northeast:

- 1) **Management of water demand is inefficient.** According to the Bank, public agencies in the region have little reliance in their management capacities and collaboration amongst sectors has been lacking. Furthermore, water management has historically been highly centralized (only applicable to water users who have water infrastructure access, which is very low percentage of the region’s population) and, coupled with this, there has been little user-policymaker interaction. The World Bank also assumes that the historical perception of water a public, free good has greatly impeded to development of “adequate water-use rights systems” and they support the shift of perceptions to that of an economic good with the potential for allocation to the private sector (*Water Resources Management*, 1993), implying the need for the “privatization of water resources;
- 2) **Management of water supply is weak.** Storage capacity in the Northeast is insufficient and/or poorly operated and managed to carry the region through frequent dry cycles and has deteriorated due primarily to the lack of adequate maintenance.

As of 2000, Brazilian census data showed that approximately 10% of urban and 80% of rural population still have no access to piped water supply. IBGE social indicators for 200 showed that under on third of the poorest 40% of population have access to water services and sanitation, where 80% of the richest “decile” have those services. Furthermore, the North and Northeast have the largest discrepancies in the access (percentage of population with) to water and sanitation services. According to the World Bank, the reasons behind the lack of systems is the inefficiency of water systems that are handled by the municipalities themselves, the corruption within the systems, and the lack of municipality involvement in rural sectors (WB 2003, **PID8172: 2**).

Perhaps as a response to donor pressure, there has been a trend in the past 30 years towards the “decentralization” of water resource management throughout Brazil, which will be discussed in depth in subsequent sections. Within the state of Ceará, this has meant a dramatic increase and focus on hydrological infrastructure development, including reservoir and canal systems, statewide and regional approaches to “participatory” water management, including the creation of Water Allocation Committees on the river-basin level, which are responsible for bi-annually determining the release of waters from regional reservoirs for the rural population and associated sectors, and numerous water pricing initiatives. The State of Ceará has pioneered a diversity of water resource management strategies and tools, action which is rooted in many causes, including those highlighted by Musa et al, such as:

- 1. Water in this state is very scarce since there are no perennial rivers in the region; therefore, water management is of paramount importance to overcoming the annual dry season and drought periods;*
- 2. Because of this severe water scarcity, Ceara does not have the means to generate hydroelectric power. Consequently, the state does not receive a share of the legal financial payments that are accrued from the energy sector and which provide a "free" fund to water resources management in the regions where hydroelectric plants are located;*
- 3. To cope with this absolute and seasonal scarcity, about 7,500 reservoirs were built in the state. Yet these reservoirs have not been successful in providing a reliable water supply, and dramatic shortages continue to occur during severe drought seasons, as occurred in 1998. Federal government investments had almost disappeared in the public deficit crisis of the 1980s, so the state had to fund this massive investment;*
- 4. Ceara has been promoting an aggressive program of industrialization and coastal tourism, taking advantage of its low salary economy and land prices. Clearly, a reliable water supply is a key factor to the success of this program; and*
- 5. There is no major federal river in Ceara. Consequently, the state government is free to implement its own policies, without waiting for federal regulation.*

*(Musa et al: 21).*

For the reasons listed above, water resources play a particularly central role to many aspects of life in the Northeast of Brazil. Furthermore, although there are both advantages and disadvantages to the numerous approaches to water management

in a region, it is not the goal of this paper to analyze “successes” and “failures” water management schemes in the region. Nevertheless, it is important to keep in mind the exogenous contributing factors to the development of a particular water management regime. In this section, I have given a broad overview of some of the strategies currently being implemented in the region and some of these correlated contributing factors. This regional setting serves as a contextualization of water policy development on multiple scales in Brazil, as is discussed in following sections. In the following section, the role of international water management policies in Brazil, as well as key policy strategies and goals, are discussed.

## IWRM and BRAZIL

With growing populations, climate change, and economic development throughout the world, demand for freshwater resources is increasing. Accordingly, the increased gap between water supply and demand has led to the intensification of cross-sectoral, inter-regional, and international water-related conflicts. The 1992 Dublin Declaration is key to the current international trend in the decentralization of water resource management, as well as, the implementation of a diversity of participatory water management schemes. These trends can be seen throughout the developing world, in particular, where funding for water and sanitation programs are often linked to international donor agencies. Interestingly, Kelman and Porto point out that the 1989 Brazilian Water Resources Association Statement included principles that were later incorporated into the 1992 Dublin Principles, as is seen below:

**Table 1. Brazilian Water Resources Association and the 1992 Dublin Principles**

**The Brazilian Water Resources Association statement of 1989, included the following principles:**

- 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;*
- 4) *The decision making process is to be decentralized, with full participation of the local community;*
- 5) *Pricing is one of the mechanisms to promote its rational use;*
- 6) *Water use is to be disciplined through a permit system;*
- 7) *No one is allowed to withdrawal water without its respective permit;*

**(Kelman and Porto)**

**As is outlined in the 1992 Dublin Principles, water management initiatives should acknowledge:**

- 1) *Freshwater is a finite and vulnerable resource, essential to sustain life, development and the environment;*
- 2) *Women play a central part in the provision, management, and safeguarding of water;*
- 3) *Water has an economic value in all its competing uses, and should be recognized as an economic good;*
- 4) *Water development and management should be based on a participatory approach involving users, planners and policy-makers at all levels.*

**(Dublin Principles, 1992)**

Water resources are increasingly under pressure from population growth, economic

activity and intensifying competition for water among user groups. The Dublin Principles are one among many responses to the need for a set of international guidelines for water policy development and implementation and the incorporation of water resource issues into sustainable development. Similarly, the 2002 Johannesburg World Summit on Sustainable Development (WSSD), through Article 26 of its' Plan of Implementation, officially recognized the role of Integrated Water Resource Management (IWRM) as a tool in international development.

Integrated Water Resource Management (IWRM) is a tool addressing the challenges to and roles of water resources in development. Integrated Water Resource Management (IWRM) as defined by the Global Water Partnership:

*Promotes the coordinated development and management of water, land, and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems (from [www.gwpforum.org](http://www.gwpforum.org)).*

Article 26 of the WSSD Plan of Implementation coordinates the efforts of several international conferences from the past ten years focusing on IWRM:

#### **Table2. Article 26, IWRM and Brazilian National Water Resources Policy**

**IWRM and Article 26 priorities include:**

- 1) Policies prioritize water resources including reciprocal relations between macro-economic policies, water development, management and use;
- 2) There is an integration of cross-sectoral policy development;
- 3) Stakeholders are part of the decision-making process, with particular focus on the inclusion of women and the poor;
- 4) Local water-related decisions are congruent with broader regional, national, and international policies and implementation
- 5) Water strategies are incorporated into broader social, economic and environmental goals, regulations and strategies

**Brazilian National Water Resources Policy incorporates the following principles:**

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

**(Kelman and Porto).**

As is seen in the above examples, decentralization and participatory institutional structures are both central to international and Brazilian national goals for water resource management. Accordingly, the Brazilian Constitution contributes to the

“decentralization of water resources” by legally distinguishing between Federal and State waters and promoting state-based water laws and management initiatives. Other key similarities include the definition of water as an economic good, the inclusion of multi-leveled institutions in water management issues, and a focus on marginalized sectors of society.

In this section, I have pointed out two major international water resource policies that relate directly to policy development in Brazil: the Dublin Principles and Article 26 of the WSSD Plan, as well as the IWRM Policy Tool. It is important to understand the linkages between the international policy arena and that of the policy evolution within a developing country such as Brazil; the two are closely interlinked. Although this paper will not explore in depth the causality behind this, funding issues and international perception are key. In the following section, I will continue to reference international policy contributions to Brazilian and Northeast regional policy, while focusing on the actual policy development of participatory water allocation processes throughout Brazil and within the State of Ceará.

### **Brazilian Water Policy Timeline**

The Brazilian Constitution of 1988, Section 21, created the National Water Resources Management System, which emphasized water as an agenda item for the national government and legally defined water resources as a public good. It is also included in the Constitution that water resources are to be administered by the Government, with intrastate rivers being the responsibility of state governments and interstate rivers the responsibility of the national government or the collaboration of multiple state governments, all of which directly relate to international water management policy issues as discussed previously. This, however, was not the beginning of water resource policy in Brazil. <sup>1</sup>As can be seen in the chart below, there were many water-management policies enacted in Brazil before this, which helped to develop and structure water resources in the country.

#### **Table 3. Chronology of Water Resources Management in Brazil**

- 1934 - The Water Code;*
- 1977 - United Nations Conference on Water, Mar del Plata;*
- 1978 - Special Committee for the Integrated Studies of Water Basins created;*
- 1991 - Law 7663/91 of the State of São Paulo, laying out State Water Resource Policy and instituting the management system;*
- 1997 - Law 9,433 lays out National Water Resources Policy;*
- 2000 - Law 9,984 creates the National Water Agency;*
- 2001 - Decree published on 05/06/2001 creates the São Francisco River Basin Committee;*
- 2002 - Decree published on 25/01/2002 creates the Doce River Basin Committee;*
- 2002 - Decree published on 25/01/2002 creates the Piracicaba, Capivara and Jundiá Rivers' Basin Committee;*
- 2002 - Decree published on 16/07/2002 creates the Paranaíba River Basin*

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<sup>1</sup> For the purposes of the paper, water resource management policy chronology was restricted to that of the 20<sup>th</sup> and 21<sup>st</sup> centuries.

*Committee.*  
**(ANA 2002: 8)**

As is seen in the above table, 1997 Federal Law 9433 established the Brazilian National Water Resources Policy, nationally instituting international water management objectives resulting from the Dublin and Rio Conferences (1992). Law 9433 also prioritized integrated, decentralized, participatory, and environmentally sustainable water resources management. The enactment of Law 9433 shifted the focus of water management facilities from the federal and state levels to river basin-based organizations (committees and consortia). According to Law 9433, these organizations are responsible for the coordination and regulation of multi-use, multi-stakeholder management of water resources and for the development of river basin-level user fee systems. However, the implementation of resultant water reform programs throughout the country vary greatly on the state and river basin level.

In 2000, Federal Law 9984 created the National Water Agency (ANA), an institution, which is both administratively and financially autonomous, yet housed under the Ministry of the Environment. ANA is responsible for the implementation of the National Water Resources Policy and the National Water Resource Management System (from the 1988 Constitution and regulated by Law 9.433) (Kelman and Porto).

The National Policy for Water and Sanitation's goal is to provide universal access to water supply services by 2010 through methodology focusing on modernization, reestablishment of investment (new sources for financing) and "compensatory activities" or incentives, which are aimed as a response to the services needs (demands) of the low-income citizenry. Furthermore, in 2001 the Brazilian Federal Government proposed national guidelines for the water sector that aim to create effective means for universal service provision by:

- 1) Delineating the time structure and need for the states and municipality to manage services;
- 2) Delegating and regulating public and private service operators; and
- 3) Focusing the resources on providing for those who are not currently include in the system.

Although the 1997 Federal Water Law states that all water is public property, in many regions this is not enforced and local understandings of water rights continue to dominate. Throughout the Northeast, public dams have been privately appropriated as well as private dams constructed without state or federal permission (Marino et al). Accordingly, in 1992 Ceará passed its first Water Resources Law, however the main water resource managing body in the past has been allocated to the National Department of Works against Droughts (DNOCS). Accordingly, the World Bank has emphasized the importance of the collaboration of the many levels of water management, while praising the progress of particular states in the Northeast:

*The States of Ceará and Bahia, where the Bank is preparing State Water Resources Management Projects recognize the importance of complementarity between the proposed Federal Project and their own State projects. In addition to Ceará and Bahia, the States of Rio Grande do Norte, Minas Gerais and Pernambuco have achieved*

*significant progress towards the establishment of their water resources management systems and have already indicated their interest in obtaining Bank support for future State Water Resources Management Projects (World Bank, 1996).*

The goal of the Sustainable Integrated Water Supply and Sanitation in Small Municipality program funded by the World Bank in 2003, was to target poor municipalities (<20,000) for improved access to water and sanitation. The approach of this particular program was to create 'local integrated sanitation plans' incorporating institutional, technical, etc components for greater access to water-related services. In addition to this, there is a large emphasis on the integration of 'best-practice' approaches in these regions. Many of the World Bank initiatives have worked to dually help increase poverty reduction and water allocation in a region, emphasizing the causal relationship between the two factors. Interestingly enough, many of the projects are not necessarily linked with environmental reforms and appear to focus more on anthropogenic uses/pressures associated with water resources in the region. In the case of the World Bank Small Municipalities project of 2003, there is an emphasis on environmental assessment, however, no emphasis to natural habitat. From the numerous studies read, it can be generally assumed that the predominant analysis and action in regards to water resources in the Northeast region focuses on quality and quantity of water for human consumption and other anthropogenic uses. Although this is, arguably, a potentially detrimental approach to water resource management (in that the resource is a part of a greater ecosystem and is dependent upon the health and viability of the system) that human-related water issues have been focused upon in this region due to the scarcity and pressures associated with water resources there.

In this section, I have provided an overview of incremental water resources management policy development in Brazil, with examples from the Northeast.<sup>2</sup> As is seen in table 3, changes within Brazilian water management policies have been quite recent (with most occurring after 1997 Law 9433) and have only had a few years for implementation and monitoring. Furthermore, through the examples given, we saw how despite the apparent policy, institutional capacity for monitoring and enforcing regulations is often minimal, if present. There are many other issues surrounding the relationship between the formation of water management policy and the actual implementation of it. This is particularly true in the Northeast, where water scarcity is a predominant issue and allocation via regulated infrastructure is available only to the minority of citizens. In the following section, I will survey some of the implementation strategies used in water resources management.

## **Implementation Strategies**

Although there are many implementation strategies used at all scales of the water resource management system, there are also commonalities throughout; The guidelines for the implementation of water resource policy emphasizes integrated management, flexibility in policy to allow for regional specificity, cross-sectoral coordination, land-use planning, and spatial integration of related concepts/applications (Kelman and Porto). It is interesting to see how much these strategies are reflective of the underlying principles of international policies discussed in previous sections. Furthermore, it is important to

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<sup>2</sup> See Appendix 2 for the summary of Ceará water management policy/legislation.

keep in mind the link between funding availability and restrictions, in relation to implementation strategies and water resource management. According to ANA, relevant implement strategies include:

- 1) **Water resource plans** are developed to guide future decisions and are to be developed for each river basin and state as well as the country. The objective is to coordinate efforts and establish guidelines and priorities for water allocation and water pricing, with approval resting in the hands of the applicable river basin committee. Water Resources Plans are master plans that organize the implementation of National Water Resources Policy and other related water resource management issues and are designed to be temporally and spatially compatible with applicable plans, etc;
- 2) **Classification of water bodies for different use, resulting in water quality standards tailored to the target use of each water body** are meant to integrate the quantity and quality of water management. Water quality standards are dependent on use strategies of the specific river basin. The classification is a planning device that is intended to balance water quality standards and waste treatment costs and either to keep the standards or to restore the quality of degraded rivers and lakes. Classification of bodies of water focuses on:
  - i) *Assuring water quality compatible with the most demanding use;*
  - ii) *Reducing the cost of fighting water pollution by means of ongoing preventative measures.*
- 3) A **permit system for withdrawal or use of water** decides the rules for using rivers and lakes, in reference to allocation/diversion and pollution dilution. Permits are time sensitive, with a maximum longevity of 35 years and are mandatory for all withdrawals and uses of rivers and lakes-- *except those in insignificant amounts, which are determined by each river basin committee. 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 canceled if water is not used for three consecutive years, or if critical hydrologic situations exist;*
- 4) **Water pricing** includes economic instruments such as water charges and effluents dilution charges. Federal Law 9433 declares water a good with an economic value; Basin Committees are responsible for designing payment mechanisms and defining the prices to be charged in accordance with authorized uses;
- 5) Several states are introducing **pricing of bulk water** in their laws and regulations. According to ANA, the main reasons for charging water users are twofold:
  - i) *To send them an economic message that they may be constraining the water use of others;*
  - ii) *To provide the necessary funds for adequate operation and maintenance of existing systems at the basin scale and to implement new projects. Funding may also contribute to environmental conservation and restoration (Kelman and Porto)*
- 6) **Water resources information system** entails the collection of water resources data into a central system for outreach, education and other needs for communications among and between relevant sectors;
- 7) The strategy of the National Water Agency, ANA, uses **MANAGEMENT PACTS**

for institutional organization of water resource managers –NATIONAL WATER AGENCY – STATES – BASIN COMMITTEES--and implement IWRM strategies.

- 8) **Grants for water resource rights** promote qualitative and quantitative controls over water use and the right to have effective access to water. *All grants are subject to the usage priorities laid out in the Water Resource Plans and should respect the class in which the water body has been placed and the maintenance of adequate water transportation conditions when it is the case.* The granting of water resource rights also requires the preservation of multiple-use strategies.

(ANA 2002, Kelman and Porto, PROÁGUA 99)

As is seen in the above examples, there is a wide diversity of implementation strategies that are focused to differing action scales throughout the water resource system. In some regions, all of the above strategies may be used in local water resource management strategies, while other regions may implement alternative methods. Additionally, the presence of sound policy and implementation strategies still does not ensure the realization of goals and requirements of said policies. This is true for both internally-driven projects and externally-driven projects such as those funded by the World Bank.

The World Bank's strategy for assistance in Brazil, prioritizes efficiency in resource allocation and of the public sector, incentive creation for the private sector, improved environmental management and the targeting of services to the poor (*World Bank, PID81111, 1997*). According to a report detailing the rural/small community water resource provisions throughout Brazil, the World Bank attempts to implement project designs that focus on alternative service delivery models, gradual investment, sound financial policies for subsidies and applicable tariffs, and the subsidizing of access components to water resources in lieu of a focus on consumption subsidies. Overall, they claim to attempt at adopting increasingly integrated approaches to water supply management throughout Brazil (WB, 2003, **PID8172** p 6), where states and water users maintain a greater participation level in the management of water resources. Accordingly, they infer that the rural population of the semi-arid zone of the Northeast will benefit the most from infrastructure development and improved supply, while urban populations in the region will benefit increasingly from the boost in economic activity in surrounding rural regions (due to the improved infrastructure) as well as the increased availability of water supplies (World Bank, PID81111, 1996).

Although the above example emphasizes the prioritization of participatory water resource management in Brazil, the actual local implementation and subsequent interpretation, as well as, the overall reception of strategies (whether they are internally-driven or externally) is variable. There are many exogenous factors that contribute to the development and implementation of strategies including social and cultural values, local institutions and capacity, participants' willingness to participate, etc. This paper, however, is not going to explore these complex issues and their effect on the implementation of heretofore mentioned water management strategies.

In the following section, I will overview the main categories of and key institutions involved in the management and policy creation of water resource management strategies. The institutions outlined are those that most relevant to decentralization and

participatory water resource management policies, implementation, and monitoring. Priority is placed on describing the institutions present in Ceará to give a more detailed description of institutional presence/capacity in that region.

### **Survey of Brazilian Water-related Institutional Structures**

There are numerous institutions in the Northeast of Brazil, which both play a key role in and have potential for organizational motivation in the implementation of water resource management in the region and throughout Brazil. Below, starting at the Federal level, some of the key institutions are listed along with their main responsibilities in regards to water management.

**National Water Resources Council** was created in June of 1998. This is the highest body in the National Water Resources System and is charged with the following responsibilities:

- 1) *Promotion of the coordination of water resource planning with national, regional, state and user planning;*
- 2) *Deliberate on projects for the use of water resources;*
- 3) *Follow-up the implementation of the national water resources plan;*
- 4) *Lay down general criteria for the granting of water resource rights and usage charges.*

**The State Council** *arbitrates conflicts between river basin committees and establishes guidelines for water resources programs at the state level.*

**River basin agencies** are responsible for the executive work surrounding basin-wide water resource management. An agency is the executive office for one or more river basin committee. According to ANA, the funds for the agency should be provided by revenue from bulk water fees in the basin. All technical responsibilities lie within the agency's responsibility, including:

- 1) *Supplying expertise for database management;*
- 2) *Conducting hydrologic studies to evaluate water availability;*
- 3) *Ensuring adequate water withdrawal decisions;*
- 4) *Assessing and evaluating new water resources projects; as well as*
- 5) *Providing technical support to the committee on any other technical issue;*

**Municipal Development Consultation Bodies** (*Conselhos de Desenvolvimento Municipal*) are composed of community members (80% of total membership) and representatives of civil society and municipal authorities (20% of membership). According to the World Bank, their role is to help define the water service priorities for a given community and to help to initiate community adherence to related projects assigned by the state and other entities. Furthermore, the Bank emphasizes the role of these 'councils' in the formal agreements, which will commit communities to following the conditions of the programs. In other words, the 'councils' serve as a body for the mobilization and agreement of communities and stakeholders to follow the rules set by the Bank and affiliated projects in regards to water management.

**Community Associations:** Community associations are legally constituted by the members of a particular community and are responsible for the structural and

developmental stages of the water services at the *local level* in addition to the management of these said services.

**Users Associations:** The Bank calls for the creation of user associations in more populous regions where the management of water resources is managed by either public or private service providers. These groups are supposed to serve as the educators and translators between the two factions in respect to water provision, understanding the communities' rights and responsibilities, etc.

**Local Executing Agencies (UEs):** These community bodies are located (where 'community councils' or other community associations already exist and have social legitimacy) by the local communities themselves and are to focus their emphasis on social mobilization in affected regions. They are meant to participate directly in planning meetings and assist in the decision making process throughout the development and strengthening of the formal community associations or user associations.

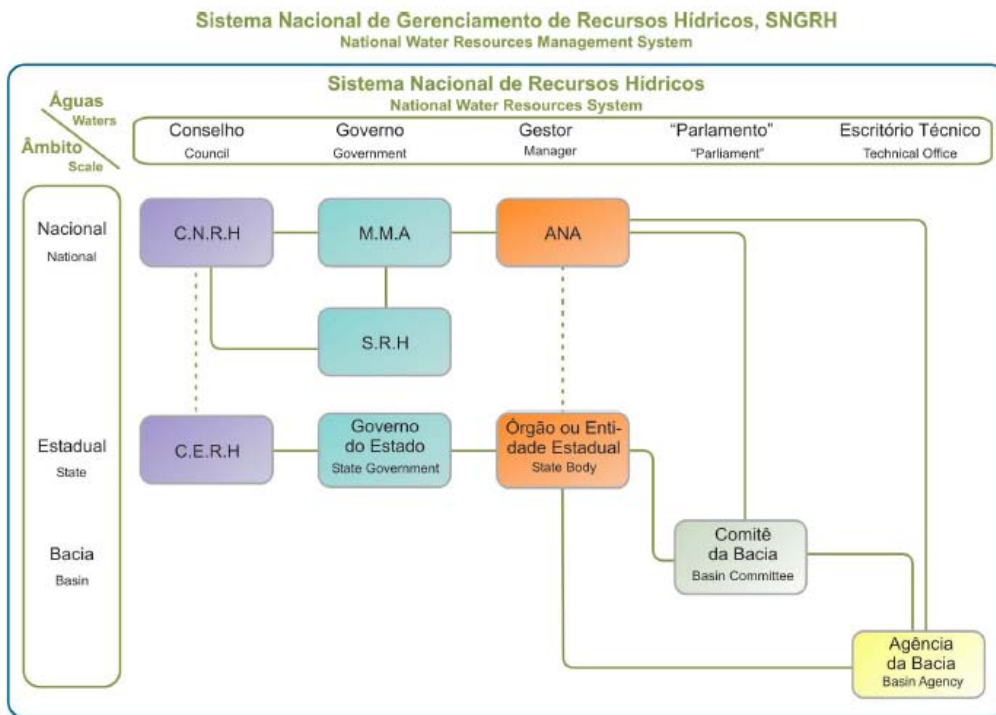
**River basin committees and other regional associations/committees:** Regional water basin committees are meant to work with other regional associations or municipal association to provide potential water management projects with applicable local solutions to management issues and the integration of the system across municipalities. They are made up of representatives of the federal, state and municipal governments; civil society and user groups. According to ANA, the role of Basin Committees is to:

- *Stimulate the discussion of questions related to water resources and coordinate the involvement of other entities;*
- *Arbitrate, at initial administrative level, conflicts related to water resources approve the Water Resources Plan for the water basin;*
- *Design the charging mechanism for the use of water resources and suggest unit charges (ANA 2002:10).*

(World Bank, 2003; Kelman and Porto; ANA)

The list above includes *some* of the *formal* institutions related to the management of water resources. As is evident in their descriptions, many of them have similar, if not overlapping, responsibilities or foci. Additionally, the definition of the roles and/or categorization of these institutions may vary per user groups and/or region. In addition to these institutions there are numerous *informal* institutions of which I will not go into in this paper. Chart 1 below attempts to diagram the relationship between the institutions described above in the context of the National Water Resources System.

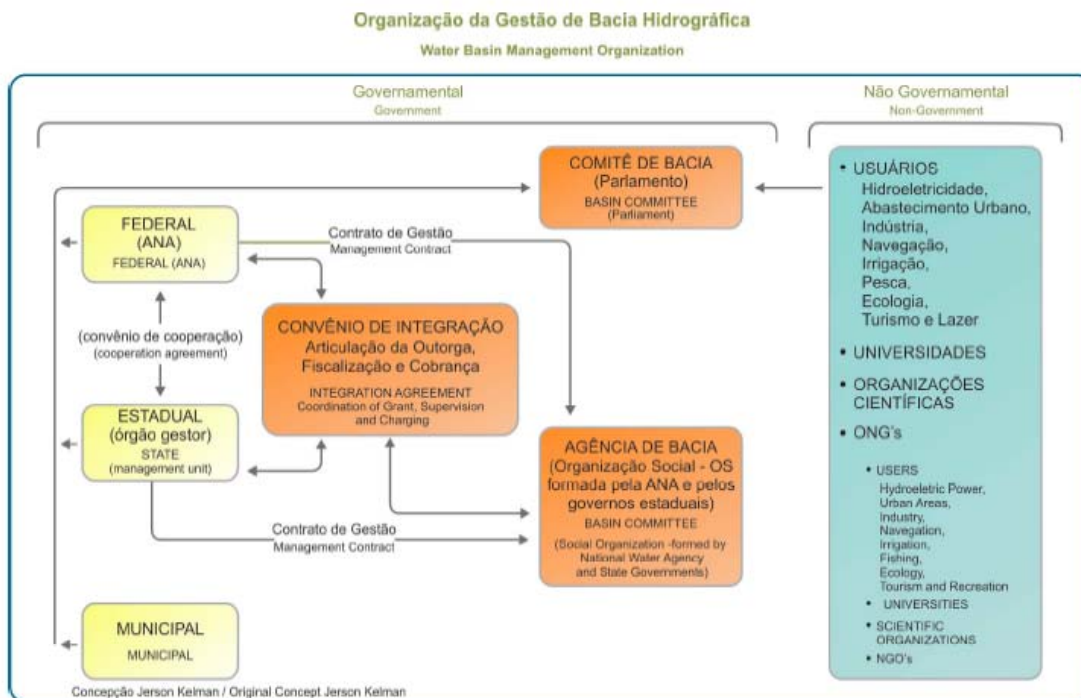
**Chart 1. The National Water Resources System**



(ANA 2002)

The organization and role of Basin Committees within water management policy is very complex. As was mentioned in the introduction, the concepts of 'decentralization' and 'participation' are open to broad and variable interpretation. The Basin Committees themselves are inferior in responsibility and authority to civil water agencies and associations and maintain fluctuating influence over decision-making and water management strategies, dependent on social, political and environmental factors (Magalhaes Jr. Jan./June 2001).

**Chart 2. Water Basin Management Organization**



(ANA, 2002: 13)

Below are descriptions of some of the key agencies involved in water resource management and the implementation of decentralized and participatory water management regimes:

**Brazilian National Water Agency (ANA)** is an executive branch from the Ministry of the Environment, which was created in 2000 through the National Policy on Water Resources (1997). ANA is the institutional arrangement response to the increasing demands over scarce water resources by conflicting uses, such as agriculture, industry, urban and recreational uses.

**The National Water Resources Council (CNRH)** is the Federal institution to promote the co-ordination of water resources planning, monitor the execution of the National Water Resources Policy and establishes criteria for granting of water usage rights and pricing mechanisms.

**Water Resource Management Company of Ceará (COGERH)** was created in 1993 (Law 12.217) by the State Water Resource Ministry to manage and organize the water resources of the state in a decentralized, integrated and participatory manner, while adhering to federal laws and policies.

**Meteorological and Water Resources Foundation of Ceará (FUNCEME)** was created by the State of Ceará to do research on and disseminate information concerning the planning, implementation, and development of private, public, and other sources of information concerning climate, hydrology and the environment of the State.

All of the above bodies play potentially instrumental roles in the development and integration of state and federal-level water management into the local community and local development. In the following section, I will present some of the key issues surrounding participatory water allocation policy and implementation in the State of Ceará.

### **Participatory Water Allocation in Ceará**

The State of Ceará, located in a semi-arid region of the country, is in the Northeast of Brazil. The State-wide water resources management policy was developed in the early 90's.<sup>3</sup> In this case the shortage of water was the catalyst that brought about legal and institutional measures (ANA 2002).

In 1992, the State of Ceará Water Resources Law was approved and included predominantly control and involvement on the state level. However, the state found that they did not have the capacity to implement, monitor and enforce the creation of water resource management on the river basin scale, such as was mandated by Federal Water Resource Management policies. Subsequently, the State of Ceará created the State Bulk Water Company, COGERH, as the river basin agency for the state. According to Jerse Kelman, the director of the Brazilian National Water Agency, ANA, *“The lesson is that the Ceará Water Law was barely a year old before reality forced the creation of an entity not included in the law (Kelman:11).”* Additionally, COGERH was created before the existence of any river committee:

*Only after COGERH demonstrated positive results in managing the supply of bulk water (with the participation of the stakeholders) and after water users were better organized at the reservoir scale, did COGERH proceed to organize the river basin committees. This historical evolution is contrary to the concept embedded in either the national or state water laws that offer protections against the capturing of a river basin committee by its agency. Although this is a legitimate concern, the Ceará example demonstrates how difficult it is to build a complete legal system all at once. It would be preferable to build the legal system through an iterative process, which relies on actual experience (Kelman:12).*

In 1997, the Jaguaribe River Basin Water Allocation Committee was formed. As of 2003, the Committee was composed of 107 member from the four sub-basins of the River (Baixo Jaguaribe, Alto Jaguaribe, Banabuiu, Medioc Jaguaribe), to bi-annually (January and June) determine the allocation of rural water resources in the River Basin. The Water Allocation Committee is structured as follows:

- *30% of members are representatives of civil society i.e. diverse rural workers unions and associations of inhabitants; among these, the most highly represented group is the rural workers unions (2/5 of total);*
- *28% public and private water users, e.g. companies providing water for human use, associations of producers from both public and private irrigation areas, and other associations;*

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<sup>3</sup> See Appendix 2 for a detailed chronology.

- 25% representatives of municipal governments, i.e., *prefeituras* (municipal executives). Secretariats of municipal government, and *camaras municipais* (municipal legislative);
- 17% representatives of the various state and federal government agencies, i.e. people from DNOCS, COGERH, EMATERCE, SEAGRI, and CHESF.

It is important to note that although the state has instituted a participatory management and allocation structure for rural sectoral water usage, the allocation of water to the Fortaleza Metropolitan Region continues to be controlled solely by COGERH (Companhia de Gestão de Recursos Hídricos do Ceará), the State's agency for water resources management. According to the 1999 ProÁgua Report, the two main problems of water access in the semi-arid regions of Brazil are the conflicting philosophies of use projects with traditional philosophies towards water and the question of planning for the use and consumption of water.

In this section, I reviewed some of the numerous institutions and institutional structures surrounding the decentralization and participatory management of water resources in Brazil, with particular emphasis on the State of Ceará. As was seen in the descriptions, there are a wide array of institutional responsibility, power, and capacity—depending on the specific institution, the location, and many other exogenous factors concerning the water resources of the specified region. As was seen in the case of Ceará, there are many capacity-related difficulties surrounding the organization of issues and policy concerning water resource management, much of which does not result from or comply with *formal* government policies.

In the last section, I will review the previous sections and try to compile the main issues asserted concerning decentralization and participation in water resource management of the Northeast, as well as the institutions and policies that are key in the development of these 'policies'. Lastly, I will place these observations within the context of proceeding with the development, implementation, monitoring and analysis of these same participatory water management institutions.

## **Conclusions**

There are both advantages and disadvantages to the numerous potential approaches to water management in a region. Use efficiency, supply and allocation are key to the 'environment' surrounding water resource management policy and the limitations of the water supply itself. Accordingly, policy and management techniques should address water management issues respect to both "supply" and "demand" or pressures. The Brazilian, northeastern State of Ceará, is a primary example of a region where both supply AND demand face of extreme pressures. As heretofore mentioned, these pressures stem from the frequency and severity of drought, coupled with the continually increasing population, in the region.

The decentralization and participative structure is meant to include all actors present or interested in the use of resources of the watershed (water basin) and the National Program for the Sustainable Development of Water Resources in the Semi-Arid Regions of Brasil (PROAGUA/Semi-arido) addresses institutional, financial, administrative, operational, and structural aspects of water resources (Covering the

states of the Northeast Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe e Bahia...also working the Minas Gerais—totaling an estimated 26 million people). However, the implementation of locally-based water management initiatives in the State of Ceará are preliminary in nature. Furthermore, there are major issues surrounding the equity in allocation of water resources, as is emphasized in Federal Law 9433/97. With experiences in Participatory Water Allocation Committees going back to 1997, the planning, structure and efficacy of the Committees are still unknown. Accordingly, there are many resources going into the development, implementation, and analysis of these initiatives within Federal, State and Local institutions, among others. Further emphasis should be placed on the development of baseline measures for determining the desired results and subsequent efficacy of the initiatives. In addition to this, more resources should be allocated to the adequate dissemination of relevant water-related information and programs. This would include educational outreach concerning water conservation, strategies for better understanding the desired outcomes of participating stakeholders, and to diversify both local and external support of the water management initiatives in the region. According to ANA, the main challenges laid out in the national Water Resources Policy are:

- 1) Cooperative management.
  - 2) The water basin as a management unit, within the context of national and state-wide administrative divisions.
  - 3) Compatibility of federal and state legislations and resolution of legal omissions.
  - 4) Creating a basin identity.
  - 5) Regional Diversity.
- (ANA 2002)

Additionally, some question the relevance of river basin committees in some regions, despite the 'participatory' structure:

*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 to ensure 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 would be free to decide matters internal to the sub-basin without external interference, provided that the boundary conditions are respected (Kelman and Porto: 13).*

Due to the scale of most water management initiatives, once policies and/or infrastructure are begun, it is incredibly costly to take on measures that are conflicting. Water institutions are directly dependent upon the nature of the resource in the region; Thusly, the structure and linkages of the water institutions in the Northeast of Brazil should accordingly reflect a history of limited water resources in the region. The institutional structure in the region directly affects the regions ability to enact political pressure for change in the region as well. The net benefits for institutional change in a "crisis-ridden water sector" such as Ceará are quite high due to the assumed impact and emphasis on affected water resources.

Water is not only a limiting resource in the semi-arid state of Ceará, it is also a means of power and economic gain. The Jaguaribe River Basin is the region of Ceará with the greatest amounts of total water withdrawal. Therefore, the water allocation and resource management decisions made in this area are crucial to the State and the majority of its' population, which is focused in this region:

*As such, adequate institutional environments are required for the resolution of these conflicts, for negotiations and so that eventual omissions in the legal frame framework may be dealt with. These environments form a network of factors, among which the following are decisive: i) a convergence of objectives; ii) that all involved fully understand the questions; iii) an ethical, transparent and democratic management process that nurtures bonds of trust and equity in the decision-making process; iv) the construction of a sense of social identity with the catchments, a sense of community and co-dependence (ANA 2002:12).*

Certainly, it is crucial to the efficacy of water management, particularly in regions such as the Northeast, where water pressures are key to economic and social wellbeing. However, I question the actual allocation of funds that have been allocated to this type of local infrastructure development, particularly in the rural areas with lower levels of population density and high levels of poverty. It would be assumed, just as the access levels in the wealthier, urban regions is dramatically higher than those of the rural poor, the amount of economic resources being placed on urban development is equally as disproportionate. Furthermore, is it realistic for a country with limited economic resources to spend so much of their international assistance on local initiatives? Is there sufficient institutional capacity at the local level to efficiently manage water resources? What are the goals of the participatory committees?

Water resources are central to political, social and economic power in the State of Ceará. The trend in decentralization of water resources and the growth of participatory water management needs to be carefully monitored and questioned in order to ensure the most equitable allocation and efficient use of water resources in this historically drought prone region. Particularly in regions such as Ceará, where there is history of "water crisis", there is also political legitimacy and importance placed on the role, function, and structure of policy, use and institutions in the region. This phenomenon has been observed with the amount of money, resources, and attention that has been paid to water resource management in the Northeast region of Brazil in the last few decades. The state of Ceará is considered by many to have implemented and initiated some of the most radical water reforms in the country and the institutions and policy development leading up to these policies are fundamental to understanding the future potential and 'gaps' in the goal of sustainable water resource management for some of South America's poorest populations.

### **Bibliography**

ANA (2002). *Evolução da organização e implementação da gestão de bacias no Brasil. Conferencia Internacional de Orgãos de Bacia, CIOB*. Madrid: 1-24.

Kelman, J. and M. Porto Water Resources Policy in Brazil, University of São Paulo Ministry of Environment: 1-14.

Magalhaes Jr., A. (Jan./June 2001). "Variables and challenges of the decision making process for Hydrographic Basin Committees in Brazil." *Ambiente e Sociedade* no.8: p.21-48.

<http://www.perh.hpg.ig.com.br/CE/ce.htm>

#### POLÍTICAS ESTADUAIS DE RECURSOS HÍDRICOS NO BRASIL

Base de dados com as leis das Políticas Estaduais de Recursos Hídricos e suas regulamentações Identificação de Planos de Recursos Hídricos elaborados no âmbito de cada estado (fonte: Marco Neves, consultor da SRH/MMA)

Saleth, Maria R. and Dinar, Ariel. October 8, 2003. Institutional Linkages, Transactions Costs, and Water Institutional Reforms: Analytical Approaches and Cross-Country Evidences. Publication for the International Policy Dialogue.

World Bank Report No. PID8111, *Brazil-Federal Water Resources Management Region Latin America and the Caribbean Sector Natural Resources (Water Resources Management)*, Project ID BRPA38895, Date PID Prepared August 30, 1996.

World Bank Report No. PID8172, BRAZIL-Small Municipalities Integrated Water Supply and Sanitation, Project ID P060555, Bank Approval Date February 27, 2003.

### **Appendix 1. Ceará ÓRGÃO GESTOR DE RECURSOS HÍDRICOS**

#### **SECRETARIA DOS RECURSOS HÍDRICOS**

Centro Adm. Governador Vírgilio Távora - Ed. Seduc - Bloco C - 2º Andar - Cambéa  
60819-900 Fortaleza - Ceará

Fones: (85) 488 8503 / 8505

Fax: (85) 488 8579

Email: [srh@srh.ce.gov.br](mailto:srh@srh.ce.gov.br)

web: <http://www.srh.ce.gov.br/>

#### **LEIS SOBRE POLÍTICA E SISTEMA DE GERENCIAMENTO REGULAMENTAÇÃO COMITÊS DE BACIA HIDROGRÁFICA**

#### **LEGISLAÇÃO DOS ÓRGÃOS DO SISTEMA ESTADUAL DE RECURSOS HÍDRICOS**

**Lei Nº 11.996, de 24/07/92** - Dispõe sobre a Política Estadual de Recursos Hídricos, institui o Sistema Integrado de Gestão de Recursos Hídricos - SIGERH e dá outras providências.

**Lei nº 10.148, de 02 de dezembro de 1977.** Dispõe sobre a preservação e controle dos recursos hídricos, existentes no Estado e dá outras providências.

**Lei nº 10.147, de 01 de dezembro de 1977.** Dispõe sobre o disciplinamento do uso do solo para proteção dos recursos hídricos da Região Metropolitana de Fortaleza – RMF – e dá outras providências.

**Decreto nº 26.462, 11 de dezembro de 2001.** Regulamenta os arts.24, inciso V e 36 da Lei nº 11.996, de 24 de julho de 1992, que dispõe sobre a Política Estadual de Recursos Hídricos e institui o Sistema Integrado de Gestão de Recursos Hídricos - SIGERH, no tocante aos Comitês de Bacias Hidrográficas - CBHS, e dá outras providências.

**Decreto nº 26.398, de 03 de outubro de 2001.** Regulamenta a exploração da aqüicultura em águas de domínio do Estado, ou pela União delegadas, e dá outras providências.

**Decreto nº 26.361, de 27 de agosto de 2001.** Altera dispositivos do Decreto nº 24.264, de 12 de novembro de 1996 e dá outras providências.

**Decreto nº 25.725, de 03 de janeiro de 2000.** Dispõe sobre a finalidade, a estrutura

organizacional e distribuição dos cargos de assessoramento da Secretaria dos Recursos Hídricos (SRH), e dá outras providências.

**Decreto nº 25.721, de 30 de dezembro de 1999.** Altera as alíneas `a` e `b` do art. 7º do Decreto nº 24.264, de 12 de novembro de 1996 e dá outras providências.

**Decreto nº 25.461, de 24 de maio de 1999.** Altera alíneas “a” e “b” ao Art. 7º do Decreto nº 24.264, de 12 de abril de 1996 e dá outras providências (cobrança).

**Decreto nº 25.443, de 28 de abril de 1999.** Altera o artigo 22 do Decreto nº 23.067, de 11 de fevereiro de 1994 e dá outras providências (outorga).

**Decreto nº 24.870, de 01 de abril de 1998.** Altera dispositivos do Decreto nº 24.264, de 12 de novembro de 1996 e dá outras providências (cobrança pelo uso da água).

**Lei nº 12.664, de 30 de dezembro de 1996.** Dispõe sobre o Fundo Estadual dos Recursos Hídricos - FUNORH, altera a Lei nº 12.245, de 30 de dezembro de 1993, e dá outras providências.

**Decreto nº 24.264, de 12 de novembro de 1996.** Regulamenta o art. 7º, da Lei nº 11.996 de 24 de junho de 1992, na parte referente à cobrança pela utilização dos recursos hídricos e dá outras providências.

**Decreto nº 23.068, de 11 de fevereiro de 1994.** Regulamenta o controle técnico das obras de oferta hídrica e dá outras providências.

**Decreto nº 25.461, de 24 de maio de 1999.** Altera alíneas “a” e “b” ao Art. 7º do Decreto nº 24.264, de 12 de abril de 1996 e dá outras providências.

**Decreto nº 25.443, de 28 de abril de 1999.** Altera o artigo 22 do Decreto nº 23.067, de 11 de fevereiro de 1994 e dá outras providências.

**Decreto nº 23.067, de 11 de fevereiro de 1994.** Regulamenta o artigo 4º da Lei nº 11.996, de 24 de julho de 1992, na parte referente à outorga do direito de uso dos recursos hídricos, cria o Sistema de Outorga para Uso da Água e dá outras providências.

**Decreto nº 23.047, de 03 de fevereiro de 1994.** Regulamenta o Fundo Estadual de Recursos Hídricos - FUNORH, criado pela Lei nº 11.996, de 24 de julho de 1992, alterada pela Lei nº 12.245, de 30.12.93.

**Decreto nº 23.039, de 01 de fevereiro de 1994.** Aprova o Regimento Interno do Conselho Estadual dos Recursos Hídricos - CONERH.

**Decreto nº 22.485, de 20 de abril de 1993.** Aprova o Regulamento da Secretaria dos Recursos Hídricos e dá outras providências.

**Decreto nº 14.535, de 02 de julho de 1981.** Dispõe sobre a preservação e o controle dos Recursos Hídricos, regulamentando a Lei nº 10.148, de dezembro de 1977.

**Decreto nº 26.902, de 16 de janeiro de 2003.** Cria o Comitê das Bacias Hidrográficas da Região Metropolitana

**Decreto nº 26.603, de 14 de maio de 2002.** Cria os Comitês das Sub-bacias Hidrográficas do Alto Jaguaribe e Rio Salgado.

**Decreto nº 26.435, de 30 de outubro de 2001.** Cria o Comitê da Sub-Bacia Hidrográfica do Banabuiú e institui seu estatuto.

**Decreto nº 26.267, de 11 de julho de 2001.** Institui Grupo de Trabalho Multiparticipativo para o acompanhamento do planejamento e implantação do Eixo de Integração da Bacia do Jaguaribe e Bacias Metropolitanas.

**Decreto nº 25.391, de 01 de março de 1999.** Cria os Comitês das Sub-bacias Hidrográficas do Baixo e do Médio Jaguaribe e institui seus estatutos.

**Decreto nº 26.457, de 30 de novembro de 2001.** Altera o quadro de pessoal da Fundação Cearense de Meteorologia e Recursos Hídricos – FUNCEME.

**Decreto nº 25.726, de 03 de janeiro de 2000.** Dispõe sobre a estrutura

organizacional e distribuição dos cargos de direção e assessoramento da Superintendência de Obras Hidráulicas (SOHIDRA) e dá outras providências.

**Decreto nº 25.725, de 03 de janeiro de 2000.** Dispõe sobre a finalidade, a estrutura organizacional e distribuição dos cargos de assessoramento da Secretaria dos Recursos Hídricos (SRH), e dá outras providências.

**Decreto nº 23.038, de 1º de fevereiro de 1994.** Aprova o Regimento do Comitê Estadual de Recursos Hídricos – COMIRH.

**Lei nº 12.217, de 18 de novembro de 1993.** Cria a Companhia de Gestão dos Recursos Hídricos do Ceará - COGERH, e dá outras providências.

**Decreto nº 22.487, de 20 de abril de 1993.** Aprova o regulamento da Fundação Cearense de Meteorologia e Recursos Hídricos e dá outras Providências

**Decreto nº 22.485, de 20 de abril de 1993.** Aprova o Regulamento da Secretaria dos Recursos Hídricos e dá outras providências.

**Lei nº 11.380, 15 de dezembro de 1987.** Cria a Superintendência de Obras Hidráulicas, define a sua estrutura e dá outras providências.

**Lei nº 9.618, de 18 de setembro de 1972.** Autoriza o Chefe do Poder Executivo a instituir a Fundação Cearsense de Meteorologia e Chuvas Artificiais - FUNCEME e dá outras providências.

### **Portarias**

**Portaria nº 221/2002** - Estabelece o procedimento administrativo para a obtenção da outorga de direito de uso da água para aquicultura

**Portaria nº 220/2002** - Autoriza a COGERH a receber e protocolar pedidos de outorga de uso dos recursos hídricos e de licenças para obras de oferta hídrica

**Instrução Normativa nº 01/2002.(SDR)** - Dispõe sobre a exploração da aquicultura em águas de domínio do Estado, ou pela União delegadas.

**Portaria nº 048/2002** - Autoriza expedição de outorgas preventivas

**Portaria nº 345/2001** - Recomenda aos setores da SRH e às suas vinculadas(COGERH, SOHIDRA e FUNCEME) a adoção obrigatória da outorga

**Portaria nº 293/2001** - Estabelece parâmetros hidráulicos e econômicos para os vales perenizados dos rios Jaguaribe e Banabuiu e para o Canal do Trabalhador

**Portaria nº 431/99** - Fixa o valor da tarifa para o Canal do trabalhador

**Portaria nº 430/99** - Fixa o valor da tarifa para o Vale do Acarape

(From <http://www.perh.hpg.ig.com.br/CE/ce.htm>)

## **Appendix 2. Objectives for continued implementation and monitoring of the water-use initiatives of the State of Ceará (brainstorming).**

### **DATA COLLECTION**

- 1) Create a literature review of participatory and incentive-based water resource management initiatives, particularly drawing from cases in Latin America and other semi-arid regions;
- 2) Develop surveys to better understand the priorities of stakeholders in the water allocation committee;
- 3) Focus surveys on the goals/desired outcomes and reasons for participation of Committee stakeholders;
- 4) Help to develop a rating system for Committee stakeholder prioritization.

### **ANALYSIS**

- 1) Use committee survey results to help develop a framework for efficacy analysis;
- 2) Look at the goals of stakeholders and compare with those of federal, state, and funding source priorities;
- 3) Create a framework for analyzing the different components/goals of the allocation committees (equity, environmental sustainability, economic development, drought relief, etc)

## **OUTREACH**

- 1) Development of plans for water conservation and use-efficiency training particularly focused to the Fortaleza region;
- 2) Include environmental education outreach materials;
- 3) Help to determine the main sources of water-use waste on the municipal and industrial levels to focus the outreach materials (i.e. tourist industry, hotels, household use, etc)

## **FUNDING AND PARTNERSHIPS**

- 1) Research into the diversification of funding mechanisms on the local and regional level;
- 2) Research partnership and collaborative capacity-building potentials for the project.

## **APPENDIX 3. A estrutura institucional do Programa conta com os seguintes atores que interagem para a execução dos diversos componentes:**

### Coordenação federal:

- *Comitê Gestor do PROÁGUA/Semi-Árido – É o órgão deliberativo superior do Programa, sendo integrado por membros do Ministério do Meio Ambiente -MMA, da Secretaria Especial de Políticas Regionais - SEPRE e do Ministério do Orçamento e Gestão - MOG;*
- *Secretaria de Recursos Hídricos do Ministério do Meio Ambiente (MMA) – É responsável pela Política Nacional de Recursos Hídricos do País e pela implementação das ações do PROÁGUA/Semi-Árido. Atua como Secretaria-Executiva no Sistema Nacional de Gerenciamento de Recursos Hídricos e faz parte do Comitê Gestor do PROÁGUA;*
- *Unidade de Gerenciamento do Programa da Secretaria de Recursos Hídricos (UGP/SRH) do MMA – É a unidade coordenadora do processo de gerenciamento físico-financeiro global do Programa. É o órgão de articulação com a Secretaria do Tesouro Nacional, com o BIRD, com os Estados e com demais atores institucionais que participam da implementação do Programa;*
- *Secretaria Especial de Políticas Regionais (SEPRE) – É responsável pela integração dos aspectos regionais das políticas setoriais. Faz parte do Comitê Gestor do Programa e atua como coordenadora e executora das ações desenvolvidas por sua Unidade de Monitoria e Avaliação do Programa;*
- *Unidade de Monitoria e Avaliação (UMA) da SEPRE – No âmbito do Sistema de Gerenciamento Global do Programa é a unidade responsável pela monitoria e avaliação do Programa, coordenando o processo relativo a essas atividades, criada pela Portaria nº 2 de 14/1/98 do Ministério do Planejamento e Orçamento.*

### Coordenação estadual:

- *Conselho Estadual de Recursos Hídricos – Órgão normativo e deliberativo do Sistema Estadual de Recursos Hídricos;*
- *Órgãos Gestores Estaduais – Órgãos pertencentes à estrutura orgânica dos Estados, sendo responsáveis pela gestão de seus respectivos recursos hídricos e pela aprovação dos POAs estaduais;*
- *Unidades Estaduais de Gerenciamento do PROÁGUA (UEGPs) – Estruturadas pelos Órgãos Gestores Estaduais e responsáveis pelo gerenciamento executivo do Programa em seus respectivos Estados.*

### Entidades Financeiras:

- *Banco Internacional de Reconstrução e Desenvolvimento (BIRD) e OECF – Agências multilaterais de cooperação, financiadoras do PROÁGUA/Semi-Árido.*

### Atores Institucionais:

- *Comitê de Bacia - Entidade colegiada de representantes do Poder Público e representantes de organizações civis, de forma paritária. Participam da aprovação de planos, programas e projetos, para utilização de recursos hídricos em determinada bacia hidrográfica. Deverão ser fomentadas ações para a criação e a instalação dos Comitês;*
- *Agências de Água - Instituições que exercem a função de secretaria-executiva de um ou vários comitês de bacias hidrográficas de águas de domínio da União e dos Estados, respondendo pelo apoio administrativo e técnico e financeiro, podendo, inclusive, atuar na capitulação de infratores às normas de utilização dos recursos hídricos;*
- *Organizações Civis – Grupo composto pela participação de consórcios e associações intermunicipais; associações de usuários; associações técnicas e de ensino e pesquisa, e organizações não-governamentais (ONGs).*

*(Proagua/Semiarido 1999)*

### **Appendix 4. Governmental strategies used to “reduce the negative impacts of drought in the Region (need to edit!!)**

- *PMSS II - Second phase of the Program of Modernization of Water Company and Sanitation in selected States of the North, northeast and of the Center-West. The program emphasizes: the assistance technique for the institucional fortalecimento; the consolidation of the regulation of the sector and the private participation; e investments to provide services with sanitation and water supply in devoid urban areas in the selected States;*
- *Projeto-Piloto de Recursos Hídricos of the Ceará - in preparation inside of the PROGERIRH, it aims at to the promotion of measures for the management of the hídricos resources in the State;*
- *Program of Urban Development of the Ceará - PROURB - for the support to basic the urban infrastructure development, including the water supply for 40 pertaining to the*

state of Ceará cities. The project foresees the expansion of the hydraulical infrastructure and the institucional and legal estruturação of the sector;

- *Management of the Hídricos Resources (Bahia) - it aims at to the proposal of measures institucional politics and and to the financing of with priority infrastructure workmanships;*
- *Program of Combat to Pobreza Rural (PCPR) - existing program in all the States northeast for the financing of infrastructure workmanships in the agricultural area in small scale, as water suppliment systems or other types of investments identified, operated and kept for poor agricultural communities northeast;*
- *Program Solidary Community - an initiative of joint in governmental and not governmental level of diverse projects and politics of combat to the hunger and the misery;*
- *Program of Generation of Job and Income - PROGER, that objective to stimulate the generation of job and income by means of financing the devoid people and communitarian groups, whose institutions executors are the Secretariat of Job and Wage of the Ministry of the Work, the Deliberative body of the Deep one of Support to the Worker - CODEFAT, the Bank of Brazil, the Federal government saving bank - the state CEF, FINEP, governments and state commissions of job.*
- *National PROÁGUA - financed with resources of the Federal Government, for the development and the institucional qualification, the management of the hídricos resources and the infrastructure implantation, it aims at to the water suppliment in the Northeast and other Brazilian regions;*
- *PROÁGUA/Semi-Árido - guided to the water suppliment prioritariamente for human consumption, it provides activities of fortalecimento of state agencies directed to the management of hídricos resources and a set of workmanships toward the construction of reservoir and assembly of expositories that will take water of barrages and reservoirs to the populations still not contemplated in devoid areas of the product.*

*(Proagua/Semiarido 1999)*

#### **Appendix 5. Water-related Brazilian Insitutions**

MMA - Ministério do Meio Ambiente

MOG – Ministério de Orçamento e Gestão

MPO - Ministério do Planejamento e Orçamento

PAD - *Project Appraisal Document*

PAPP - Programa de Apoio ao Pequeno Produtor Rural

PMSS - Programa de Modernização do Setor de Saneamento

POAs - Planos Operativos Anuais

POAC - Plano Operativo Anual Consolidado

PROÁGUA/Semi-Árido – Programa de Desenvolvimento Sustentável de Recursos Hídricos para o Semi-Árido Brasileiro

PRODOC – *Project Document* (Documento do Projeto)

PROGER - Programa de Geração de Emprego e Renda

PROGERIRH - Programa de Gestão dos Recursos Hídricos do Ceará

PROURB - Programa de Desenvolvimento Urbano do Ceará

SEPRE - Secretaria Especial de Políticas Regionais

SFC – Secretaria Federal de Controle do Ministério da Fazenda

SIG - Sistema de Informações Gerenciais

SIM - Sistema Informatizado de Monitoria

SNGRH - Sistema Nacional de Gerenciamento de Recursos Hídricos

SRH - Secretaria de Recursos Hídricos do Ministério do Meio Ambiente

UEGP - Unidade Estadual de Gerenciamento do PROÁGUA

UGP - Unidade de Gerenciamento do PROÁGUA

UMA - Unidade de Monitoria e Avaliação

Tabela 4 – Monitoramento de Recursos Hídricos no Brasil-Instituições Federais

<b>Instituição</b>	<b>Atividade de Monitoramento</b>
ANEEL – Agência Nacional de Energia Elétrica/Minist. de Minas e Energia	Administração da rede hidrometeorológica nacional → maior rede de monitoramento de águas no Brasil;
CPRM – Ministério de Minas e Energia	<i>Operação da rede hidrometeorológica da ANEEL → Principal atividade</i> Execução de levantamentos hidrogeológicos e hidrológicos sistemáticos. Instalação e manutenção de poços subterrâneos
INMET-Instituto Nacional de Meteorologia/ Ministério da Agricultura e do Abastecimento	Monitoramento hidrometeorológico nacional, permitindo o acompanhamento de dados de precipitação no Brasil. Administração, instalação, manutenção e operação da rede nacional de observação meteorológica (padrões da OMM-Organização Meteorológica Mundial).
INPE – Instituto Nacional de Pesquisas Espaciais/Ministério da Ciência e Tecnologia	Monitoramento climático de dados de tempo e de clima por meio do Centro de Previsão de Tempo e Estudos Climáticos (CPTEC).
EMBRAPA – Empresa Brasileira de Pesquisas Agropecuárias / Ministério da Agricultura e do Abastecimento	Atividades de monitoramento de dados hidrológicos a partir de uma divisão denominada "Embrapa Monitoramento por Satélite"
CODEVASF-Companhia de Desenvolvimento do Vale do São Francisco – Secretaria Especial De Políticas Regionais (Sepre)	Instalação e operação de estações hidrológicas: 07 estações climatológicas e 86 estações fluviométricas; Monitoramento da qualidade das águas.
Secretaria de Recursos Hídricos – Ministério do Meio Ambiente	Centralização do Sistema Nacional de Informações sobre os Recursos Hídricos. Apoio técnico e financeiro a iniciativas de monitoramento de quantidade e qualidade das águas.
IBAMA – Instituto Brasileiro do Meio Ambiente/MMA	Monitoramento das transformações do meio ambiente e dos recursos naturais; Fiscalização e apoio técnico a iniciativas de monitoramento de qualidade das águas..
Secretaria de Qualidade Ambiental nos Assentamentos Humanos – SQA/MMA	Apoio técnico e financeiro a iniciativas de monitoramento de qualidade das águas
Secretaria de Coordenação dos Assuntos da Amazônia-MMA	Apoio técnico e financeiro a iniciativas de monitoramento de qualidade das águas..
Secretaria de Desenvolvimento Urbano e Meio Ambiente da Presidência da República	Apoio técnico e financeiro a iniciativas de monitoramento de qualidade das águas

(from Malaghaes)