

# **WATER RESOURCE MANAGEMENT IN SAO PAULO STATE, BRAZIL: A COMPARATIVE PERSPECTIVE**

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## **1 INTRODUCTION**

The reforms of the water management system in Brazil, especially in the Sao Paulo Metropolitan Area and the Paraiba's River Valley are analyzed as cases of an institutional transition towards a "hydro-policy", in which are build, sometimes in a controversial way, the conditions for new institutional spheres, changing the relationship between experts and laymen, technicians and users, and the public and private sector.

The Sao Paulo Metropolitan Area (SPMA), in Brazil, has a population of nearly 18 million people. The thirty-four municipalities located in this area have faced a steady population growth during the 1960's and 1970's, with a growth rate of 5.44% per year. In the 1990's these figures dropped to a still high 1.4% per year. Alongside demographic growth, other socio-economic problems have arisen. In 2000, the average per capita income of this population was of US\$ 240.00/month, illiteracy rate was 8.3% and life expectancy was of 63 years (FUSP, 2001). To put it simple, the chaotic growth of the SPMA imposes severe stress to its inhabitants, deep impacts on the environment, and enormous challenges to policy makers.

The Paraiba's River Valley is located between Sao Paulo and Rio de Janeiro. The region turned into a huge corridor that connects the two largest cities of Brazil – a condition that has brought to it enormous economic growth. However, this progress came at a high price: today, it is one of the most devastated regions in the country. The water basin faces serious problems concerning the quantity and the quality of its water, problems that arise from urbanization processes and intensive agricultural practices, which lead to the obstruction and pollution of rivers and creeks in the region. At the institutional level, this situation becomes even grimmer by the dispute between water users from the states of Sao Paulo and Rio de Janeiro, which involves even the Federal Government, since the Paraiba River is the main water supply source of the city of Rio de Janeiro.

The still fast demographic growth pace of these areas, their characteristics of low territorial planning, and the negative effects derived from the high concentration of industrial settlements lead to a series of very distinctive problems, such as the severe contamination of the waterways, high occurrence of floods, erosion problems, occupation of lowlands, a growing pressure over the water resources available for public supply, difficulties in protecting springs, limited water availability, and conflicts between regions over the use of the water.

To cope with these challenges, engineering efforts surely must be made, but it is in the institutional domain where real changes must take place, and they are already happening. In Brazil, water management has been both sectorized (with water quality separated from water supply) and centralized (at national and state levels). First implemented in the State of Sao Paulo, a series of state level reforms occurred in the 1990s, and a federal bill passed in 1997.

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This government oriented integrated water management – in the figure of Watershed Basin Committees – is based on laws that provide substantial participation by civil society and water users organizations. Patterned after the French system, Brazilian laws grant more power to decentralized institutions than do any other developing country and more representation to civil society than anywhere else.

However, the actual implementation of the reforms should produce quite different outcomes – understood as success or failure – depending on many factors that differ radically from region to region. One of the most important is the capability of civil society organizations to network for a strong, well defined and goal oriented participation in these committees in order to fulfill their demands, overcome water related challenges, and cope with socio-economic problems in these fragile areas. This paper examines the socioeconomic scenario and institutional framework of two watershed basin committees in the State of Sao Paulo, Brazil: the Sao Paulo Metropolitan Area Water Basin Committee (Alto Tiete Water Basin Committee) and the Paraiba do Sul Water Basin Committee.

## **2 THE WATER RESOURCE MANAGEMENT SYSTEM IN BRAZIL**

The socio-environmental dynamics regarding water resource management in Brazil are characterized by permanent tension between different and often conflicting interests in the use of water. In Brazil, the first attempt to legally organize these interests was the “*Water Act*”, passed in 1934, which focused on water resources mainly as a source of energy. (Moreira, 2001). This management model, which was standardized, centralized and segmented, under a strong influence of the electricity sector, persisted in Brazil up to the 1990s. Let us not forget that up to 1995 the DNAEE – the National Department of Waters and Electricity – was the sole department responsible for water resource management at a federal level, which reflects the historic option of prioritizing the use of water as an energy source, already stated in the Water Act.

However, since the beginning of the 1980s, and with a stronger emphasis during the 1990s, the country witnessed the creation of a series of new water management tools – a phenomenon observed both at state and federal level. The growing commitment and concern with water resource’s quality and availability, the increasing complexity involved in managing the various interests regarding water, added to the democratic transition of Brazilian society, are some of the historic factors which sparked such process. Up to this day, this new management system is still under construction, and therefore, presents different levels of maturity. It is based on some cornerstones that are common to both state and federal: the recognition of the water basin as a single management unit, the acknowledgement of the multiple uses of water, the definition of water as a property of social and economic value and the democratization of management through the participation of the civil society in the decision making spheres (Rocha, 1998; Vargas, 1999).

In 1997, a federal “Water Law” was approved as the outcome of a long negotiation process between different stakeholders involved in water resource management. This law established a milestone in the implementation of the water basin committees in Brazil, by instituting the Water Resources National Policy and the National Water Resource Management System. This system is composed by the National Water Resource Counsel, the States Water Resource Counsels, the Water Resource Organisms of the federal, state and city governments, the Water Agencies and the Water Basin Committees. It is also during the 1990s that some states began to establish their own systems dedicated to an integrated management of its water resources, as opposed to the systems that existed at the time. The State of Sao Paulo is the pioneer in this process, passing its water law in 1991.

### **3 THE WATER RESOURCE MANAGEMENT SYSTEM IN THE STATE OF SAO PAULO**

The reform of the water management systems in Sao Paulo starts with the division of the State's territory in 22 Water Resource Management Units (UGRH), each one of them with its own water basin committee. The water basin committee is a decision making arena composed by representatives from the state government, municipalities within the basin and civil society. The basic directives of the reform are: to guarantee of multiple uses of the water, with priority given to public supply and in agreement with a watershed management plan; the charging for water use; and organization of democratic decision making forums (Rocha, 1998).

The reform is based on three points: i) central and regional management committees (watershed basin committees); ii) a state's strategic plan for water resources, drawn upon each one of the 22 water basin's plan and iii) financial funding (Fehidro). The system works as a continuous and interactive process involving the three instances in a way that the water basin committees defines the regional priorities (water basin plans), which are organized in the state plan, turned into a law; the financial resources are, then, disbursed to each basin and managed by a local agency, under the directives defined by their water basin committees. (Rocha, 1998).

Since 1991, therefore previously to the federal reforms, the implementation of the system starts up, relying strongly on the organization of the 22 water basin committees, by the regional integration of the state and municipal organizations and by the participation of civil society in the process (Miranda 2001). Next, we analyze two specific management units: the Alto Tiete water basin and the Basin of the Paraiba do Sul Water Basin, with special emphasis on their water basin committees.

### **4 THE ALTO TIETE WATER BASIN**

The Alto Tiete water basin corresponds to the area drained by the Tiete River, a total of 5.985 km<sup>2</sup>, a large urbanized area composed of 34 cities. The urban changes caused in the last century, resulting of a flawed land planning, contributed to changes in the hydraulic and hydrologic regimens, making them extremely complex. The Alto Tiete Water Basin Committee was created to rationalize the water management, and due to the region's complexity it was divided into five sub-committees: Tietê-Cabeceiras, Billings-Tamanduateí, Juqueri-Cantareira, Cotia-Guarapiranga and Pinheiros-Pirapora.

### **5 THE BASIN'S PROBLEMS**

The Alto Tiete Water Basin is one of the most highly urbanized regions of the whole world, housing a population of 17.8 million inhabitants, with a forecast of about 20 million inhabitants by the year 2010. Its growth rate has presented a great decrease in the last few years and is today at 1.4% per year. This situation translates into great challenges from a perspective of water resource management. It is the most important area in the country, responding for 18% of the total Brazilian Gross Domestic Product (GDP), which corresponds to about US\$ 70 billion (FUSP, 2001).

The urbanized area occupies approximately 37% of the area of the basin and, although the population growth rate is visibly diminishing, this does not result in a reduction of urban growth. The environmental destruction is worsened by the forced expulsion of the low income people to the areas that surround the city, by the disorganized urban growth, by the lack of adequate infra-structure, and by the problems caused by the settling in spring and lowland protection areas. The direct consequence of this growth pattern in the surrounding areas is the constant need for investments in urban infra-structure, such as the extension of the water supply and sewage collection systems, as well as the garbage collection system (FUSP, 2001).

In face of such a chaotic picture of water resource management, the Alto Tiete Water Basin's Strategic Plan highlights some critical points:

### **5.1 Shortage of water –**

the total consumption of water in the basin exceeds by far its own water production. Therefore, water has to be “imported” from other water basins. The growth in demand is caused not only by growth of the population and industrial, agricultural and service sectors, but also by the need for expanding the water and sanitation network. Any significant increase in the offer, from surface springs shall come from imports from nearby water basins.

### **5.2 Compromising of the surface springs**

to make the shortage situation seem worse, all the surface springs within the limits of the Basin of the High Tiete are currently threatened, some of them in critical conditions. The main threat to these springs is the disorganized urban occupation of its protected areas.

### **5.3 Disorganized exploitation of the underground springs**

a large number of industries, condominiums and other isolated enterprises use the water bearing sources to supply its demand, but they do it in a disorganized way. The consequences of this lack of control over the exploitation of these springs are the lowering of the water levels and possible contamination of the wells.

### **5.4 Compromising of the quality of the surface waters –**

for years the Alto Tiete Water Basin suffered under an almost complete lack of investments in the sanitary sewage collection, transport and treatment systems of the region. Consequently, the surface bodies of water have reached critical levels, with damages to human health, to the aquatic ecosystem, with harm to the esthetics and losses in the commercial value of the riverbank areas. Today, 65% of the region's sewage is collected, and from this, 35% is treated.

### **5.5 Garbage management –**

the situation of the cities located in the Alto Tiete Water Basin with regards to the treatment and disposal of solid home residues is critical, with rare exceptions. Various cities dispose the collected residues over the surface in a very inadequate way. The final destination of the residues is still not a priority issue for many municipal administrations.

### **5.6 Waterproofing of the soil –**

the waterproofing of urban soil is a result of bad or sometimes simply inexistent planning, making the flood problem even greater. The process of use and occupation of the soil in the Sao Paulo Metropolitan Area has grown in a pattern of concentration and vertical growth, which contributes to an increase in floods, and makes their consequences even worse.

## **6 THE ALTO TIETE WATER BASIN COMMITTEE**

Founded in 1991 following the Water Resources State Law directives, the Alto Tiete Water Basin Committee legislates on all water related issues on a territorial radius defined by the Sao Paulo Metropolitan Area. All water related matters are discussed and decided at this forum made up by representatives from three segments of society: the state government, the municipalities located on the Basin, and civil society. The committee's plenary comprises 48

members, with 16 representatives from each segment. Given the complexity of the metropolitan area and its specific hydrological, territorial, institutional and political characteristics, the committee was divided into 5 sub-committees. The top priorities of the committee are monitoring the quality and quantity of the water resources, monitoring the sources of pollution, registering the deep wells, sanitation, project for cleaning the Tiete River, a revision of the Spring Protection Law, promoting the rational use of water and preventing floods.

During the years from 1996 to 1999, the committee alone invested in the Basin R\$ 11.4 million, which corresponds to US\$ 3.8 million. From this total, 55% was invested in projects, plans and studies about the basin, 30% in the qualification of human resources and environmental education activities, and 15% in works and services. These figures show how low is the committee's capability in obtaining significant funds for investments in structural works. These investments end up being done by the State, in the pace allowed by its own resources. Unless the committee finds an alternative means to finance itself – what should happen when the charging for water use starts – the system is not likely to become financially self sustainable.

One of the most important factors responsible for the frailty of the public policies in the Sao Paulo Metropolitan Area is the institutional chaos that has come to pass. In the more than 30 cities within the metropolitan area, the not always converging platforms present real difficulties for the elaboration of a common metropolitan development plan. Thus, the experience of integrated water management is an interesting initiative with new possibilities for inovative institutional arrangements.

## **7 THE PARAIBA DO SUL WATER BASIN**

The Paraiba do Sul Water Basin expands over territories that belong to the states of Sao Paulo, Minas Gerais and Rio de Janeiro, with a total draining area of 57,000 km<sup>2</sup>. In the Sao Paulo's state section – area under the responsibility of the Paraiba do Sul Water Basin Committee (CBH-PS) – the basin area is of 13,605 km<sup>2</sup>. The Paraiba's River Valley is the connecting axis between the metropolitan areas of Sao Paulo and Rio de Janeiro, which gives it great economic and social significance. With a population of over 2 million inhabitants, the Paraiba's River Valley is one of the areas of highest economic development in the country, it is highly urbanized and has a high concentration of industries. Nowadays, farming activities are responsible for only 1.36% of the resources generated by the economic activities in the area. However, historically speaking, we should mention that the coffee plantations and more recently dairy farming formed the basis of the economy of the area. These activities, alongside with sand mining, another important economic activity of the area, which has a strong impact on the environment, were responsible for a strong impact on the natural cover turning the valley into what is today one of the most devastated areas of the country.

## **8 THE PARAIBA DO SUL WATER BASIN COMMITTEE**

The Paraiba do Sul Water Basin Committee was created in November 1994, being the fourth committee to be implemented in the state of Sao Paulo. The main issue that led to the creation of the committee was the compliance with state's legislation. It is made up of 30 members, representing the state and city governments and the civil society. The attributions of the committee are: develop a *Basin Strategic Plan*, act as a mediator in conflicts regarding the use of water, establish mechanisms or criteria for charging the use of raw water and the classification of the water ways into use classes.

It is important to mention the main stakeholders in this process of forming and maturing of the committee. The state government played a leading role in its foundation, coordinating and conducting the whole process. The Sao Jose dos Campos municipal government – the largest city in the basin – with its full support had an active role in the creation and consolidation of the

committee. It is important that we mention that, in the case of the committee, the pre-existing social networks involving technicians from various sectors and organizations were also critical in the creation and consolidation of the committee.

The Paraíba do Sul Water Basin Committee is the one that has advanced most in the debates about the issue of charging for the use of water. According to the legislation, the committee is the instance responsible for approving and determining the values to be charged. The committee have chosen a process of volunteer registration in which each user should inform the committee of the amount of water he uses. This strategy proved its limitations, since the degree of participation was way below their expectations. The negotiations around a single value to be charged was not devoid of charged debates, which clearly marked the differences between the various sectors that compose the committee, and which resulted in an extremely low tax, which puts the sustainability of the system in great danger.

Another aspect to be mentioned is the fact that the Paraíba River, since it crosses three different states, fits into the federal legislation. This overlaying of administrative instances that regulate this water basin create a condition that allow the states to not always comply with the decisions that are made, compromising even further a cooperation that should be in place.

Since its creation, in 1994, until the year 2002, one of the most important activities sponsored by the committee was the creation of its *Strategic Basin Plan* for 2000-2003. These steps, allied to the approval of the charging for the use of water, were very important in the consolidation of the system. The *Strategic Basin Plan* defines 16 goals, establishes the action strategy and indicates measures to be prioritized in future interventions. The measures indicated include: structural actions, such as sewage treatment, replanting of degraded areas, outflow regulating reservoirs, and unclogging of water beds; and other non-structural actions, such as the control of soil erosion, irregular sewage emissions and uncontrolled urbanization, in addition to programs to promote education and protection of the waters. The *Strategic Basin Plan* is being systematically used as a management tool by the committee. Only the projects that are in compliance with the directives defined by the committee have received the committee's endorsement to obtain financing from the Water Resource State Fund. Another subject of great significance for the committee is the difficulty in reaching a common operational and political ground with the Federal Committee for the Paraíba River, the Ceivap (*Committee for the Integration of the Water Basin of River Paraíba do Sul*).

## **9 SOCIAL AGENTS AND PARTICIPATION**

The establishment of water basin committees has been the object of various questionings, especially for the uncertainty implied by the term "participation". During the last decades the "participative approach" became the rule of law of governments, NGOs, and international development agencies (Jacobi, 2000). But the concept of participation implies several different meanings, which aren't always clear. The questions regarding the indiscriminate use of the concept of participative approach have increased, especially in literature concerning sustainable development (MMA, 2002). One of the points raised is that normally those who make the policies, development plans or legislation forget to explain who will be participating in them. Community participation is not always beneficial, and does not involve all the members of community in the same way. Another problem regards a tendency to assume that the good will of the experts/technicians will always dissolve the power balance that have been established with the laymen sectors. This relationship do not disappear, but have to be worked on and negotiated between laymen and experts.

The challenges faced in the implementation of participative practices are intimately related with the role played by the system experts. The beneficiaries of public policies should leave behind the concept that administrators and experts always know everything, or at least know better, about what is good for everyone. This would imply a "demonopolization" of the work of

experts, according to the conception of German sociologist Ulrich Beck (Beck, 1999). However, to carry out this “demonopolization” we would have to overcome serious obstacles imposed by the system experts themselves. The legislative framework prioritizes the importance of the technical and scientific body and the knowledge produced by it in the power relation inside the decision making forums of the water basin. This tendency imposes clear limits to a higher community involvement within the committees affairs, and we might add, maintains the decision making power in the hands of those who have the technical and scientific knowledge, especially those related to engineering and technical matters.

Since the committee model was implemented, the priority has been the strengthening of entities that represent professional corporations, which helped implement the model itself, and may continue as representatives of the civil society, reinforcing the monopoly of the experts in the water resource management. This situation accrued due to the lack of significant information available to civil society organizations. The highly technical content of many meetings works as a disincentive to civil society’s participation. As a result, not only experts, but also less representative sectors get a share bigger than deserved. In order to guarantee this “demonopolization” and ensure a larger participation from civil society in the water resource management, these system experts must understand and accept some important contributions from science sociology and environmental sociology:

- 1) *that the social values are part of the perception that the laymen have of natural resources.*
- 2) *that the social values are also part of the expert’s knowledge and of the techniques that are created.*
- 3) *that there are limits for the standards of the potential risks and that the **management criteria** of the water management can be determined solely based on scientific knowledge.*

Of course, this will mean that the powerful role that is played by experts as related to the laymen will have to be redefined. And this is not only a question about the economic power relations, or a larger opening for the participation of the civil society in the decision making processes. This process requires a critical analysis of the conventional role that system experts occupy as related to the laymen. Accepting the fact that in the routine practices of implementing the legislation, various social networks can be formed to gather information, build up opinions and validate points of view, the power relations will be constantly and inevitably redefined.

## 10 CONCLUSION

By evaluating the above described processes, it is fair to say that the problems of the two analyzed water basins are extremely complex, and much more heterogeneous than those present in most of the Brazilian water basins. Many problems were aggravated through the years as a result of the lack of minimizing actions, and many deficiencies found in the system became critical – making the problems and difficulties in establishing priorities even greater than they were.

The challenges of this new system, based on a democratic and decentralized management structure, are too complex and hard to solve in the short term. It is clear that problems associated with the water resource management at Alto Tiete and Paraíba do Sul surpass by far the ability these institutions have to solve them. The problems pointed out here are the clearest outcomes of an uncontrolled and unplanned growth of these areas.

The social and regional complexity of the water basins has stimulated the search for solutions that might respond more directly to local concerns. In the Alto Tiete Water Basin, the creation

of subcommittees was a way of decentralizing the management and allowing them to keep a close eye on the problems, but it has also forged a larger fragmentation of the process. The subcommittee's dynamics is much diversified, and reflects its capacity for organizing and motivating local stakeholders. The committee represents a reality in which the diversity of the metropolitan problems makes it difficult to establish a cooperation atmosphere between the institutions involved in water matters.

The problems faced by the Alto Tiete Water Basin Committee concerns the quality of life of its inhabitants. The lack of a global policy that aims for the solution of these problems really limits the ability that the committee might have of solving this problem. Despite the limits, the committee has become one of the rare arenas of debate at the metropolitan level. By bringing together people from different backgrounds, institutions and places to a common set, it enhances the possibilities of arranging innovative solutions. It has increasingly contributed for a greater awareness of all stakeholders over the need for a qualified and consistent participation, thus strengthening democratic processes.

The great gap between building the system and getting it to work fully - a challenge that will become clearer when the charging for the use of water begins - is a great concern among the stakeholders of the process. At the same time, this long beginning can be understood as an important learning process for all the stakeholders. The dynamics of the collegiate allows for greater transparency and permeability in the relationship between community, the private sector, and the state. It brings together those who are in fact interested in the process and creates a formal forum for participation.

The participatory approach, which is the trademark of the whole system, seems to reduce the risks of the public apparatus being overtaken by immediate interest, thus enhancing the possibilities of actions directed to the social and technical negotiation, combining territorial interests and technical needs. Thus, it becomes a forum for the organization, negotiation, debate over problems, and it opens a space for the expression and defense of diverse interests.

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