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Major Paper

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Democracy, Citizenship and Civil Society Participation in Watershed Management : The Case of the Piracicaba, Capivari and Jundiai River Basin Committee (CBH PCJ) State of Sao Paulo-Brazil

A Major Paper Submitted to the Faculty of Environmental Studies in partial fulfillment of the requirements for the degree of Master in Environmental Studies, York University Ontario, Canada

Supervisor: Prof. Ellie Perkins

Sister Watersheds Project
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Foreword

The Major Paper Submitted to the Faculty of Environmental Studies is a partial fulfillment of the requirements for the degree of Master in Environmental Studies, York University Ontario, Canada. The research paper is the outcome of theoretical and field work research undertaken throughout the academic years from September 2003 to July 2005. A Plan of Study with the title of "Governance and Resource Management for Socio-Environmental Development" has been developed throughout that period under the advising of Prof. Bonnie Kettel. The field work has been undertaken in Brazil under the mentorship and supervision of Prof. Ellie Perkins as part of the "Sister Watersheds" project. The outcome of which is the submitted major paper with the title of "Democracy, Citizenship and Civil Society Participation in Watershed Management: The Case of the Piracicaba, Capivari and Jundiai River Basin Committee (CBH PCJ) State of Sao Paulo-Brazil".

My learning process at the FES throughout the various academic activities has been an interesting experience for a research career that I am looking forward to in the field of development with a specialization in water resources management. I hope the quality of my work would qualify me to undertake further research activities in order to develop my research interests to a higher level. Finally I would like to thank all those who contributed to my personal and professional development throughout that experience here at FES.

Best Regards
RH

Dans la mémoire D'Ivone

"My religion consists of a humble admiration of the illimitable superior spirit who reveals himself in the slight details we are able to perceive with our frail and feeble mind"

Albert Einstein

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FACTS[1]

Available fresh water amounts to less than one half of one percent of all the water on earth. The rest is seawater, or is frozen in the polar ice. Fresh water is naturally renewable only by rainfall, at the rate of 40-50,000 cubic kilometers per year.

Thirty one countries and over 1 billion people completely lack access to clean water.

More than five million people, most of them children, die every year from illnesses caused by drinking poor-quality water.

A child dies every 8 seconds from drinking contaminated water.

The annual profits of the water sector are less than half of those of the oil sector. But only about 5 percent of the world's water is currently in private hands.

In the past century over half of all wetlands on the planet have been lost to development and conversion. Wetlands are important to the health of natural systems and people because they act as filters and flood buffers.

The underground aquifer that supplies one-third of the water for the continental US is being depleted eight times faster than it is being replenished.

In India, some households pay 25 percent of their income for water.

The manufacture of computer wafers, used in the production of computer chips, uses up to 18 million liters of water per day. Globally, the industry uses 1.5 trillion liters of water and causes 300 billion liters of wastewater every year.

57 billion liters of bottled water were sold worldwide in 1996 and sales of over 143 billion liters are expected by 2006. People in the United States consumed over 17 billion liters of bottled water in 1999 at a cost of nearly US$5 billion.

[1] Adopted from; Maude Barlow, "Blue Gold"; Gil Yaron, "The Final Frontier"; Public Services International www.world-psi.org;Fortune magazine; World Water Vision; Pacific Institute www.pacinst.org; www.hf.caltech.edu/whichworld/tour/waterscarcity.html

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Abstract

To which extent do democratic rights and civil liberties contribute to better environmental management? How can local citizens or advocacy groups have the right to appeal a decision they believe harms an ecosystem or is unfair? What is the best way to fight corruption among those who manage our forests, water, parks, and mineral resources? These are all questions about *how* we make environmental decisions and *who* makes them—the process we call *environmental governance.* Water in that respect is an essential element in sustaining all life on earth and its importance in preserving the different ecosystems is beyond dispute. Integrated Water Resources Management (IWRM) imposes therefore the challenges of coordinating the use of both natural systems -characterized by multiple land uses- and social systems -characterized by competing end uses of natural resources. The watershed approach, manages the basin's area using ecological rather than administrative boundaries since development, land use, cultural, and other processes are viewed as interconnected. Brazil is one of the countries applying the river basin management model based on IWRM guidelines. In the Brazilian political context, the new legislative setup -inspired from the French system- requires the participation of the civil society amongst other government entities and water users (public and private) within the institutional framework of a river basin committee. Such an initiative marks the birth of the democratic decentralization of water resources in the country, yet it still faces some challenges and offers lessons to be learnt.

The current research has been conducted on the level of the Piracicaba watershed (including the Piracicamirim micro-watershed/state of Sao Paulo) with a special attention to the political participation of the civil society segment inside the Piracibaba, Capivari and Jundiaí River Basin Committee (CBH PCJ). In order to achieve the research objectives, the basic elements of analysis relied on some considerations necessary to further indicate the real challenges and obstacles for an effective and more inclusive participative process of the civil society entities present in the PCJ committee. Those considerations can be classified in the following categories: i-Socio-economic, ii-Political, iii-Operational and Institutional. Though the mapping process identified the voting power of civil society actors inside the PCJ basin committee, it has been unable to identify the extent to which this voting power is used and employed. A limitation to the current research has been therefore the absence of a precise indicator for participation and the extent of its effectiveness. Deploying a series of interviews with formal personnel of involved institutions, industry representatives, civil society entities, academics and government agencies, research findings have been addressed in 5 major categories, those are; action on the micro-watershed level, the importance of environmental education, accountability and secure power transfer matters, partnership building and support policies (role of access to information, training to avoid institutional voids and organizational support for local actors).

Key words: Water Resources, Institutional development, Water Governance, River basin/Watershed management, Public involvement, Watershed Committees, Civil society, Stakeholders and Participation, Agenda 21

Chapter 1

Introduction

1.1. Background: Environment, Development and River Basin Management

In a contemporary scale, the concept of "river basin management" emerged around the 1970s[2] [Cordeiro 1994 *in* Garcia 1999]. The main objective was to reduce silting up in dams and to control landslides or flooding, and in very few instances, all the natural resources of the river basin were managed (Garcia 1999). Integrated agriculture, forestry and livestock projects have helped to improve this aspect but did not compensate for the general lack of a well coordinated system for the management of the natural resources of entire river basins or watersheds (Douroujeanni 1996). To a large extent, environmental management at the river basin level did not go beyond the phase of studies, planning and proposals for forming organizations.

Only at the end of the 1970s, that is, five to seven years after the United Nations Conference on the Human Environment (Stockholm, Sweden, 5–16 June 1972), did the environmental dimension begin to be taken into account in Latin America. First came environmental impact studies, and later environmental quality analyses (Christopher 1998). During the late 1980s and early 1990s, developing countries all over the world instituted a wide range of environmental and social reforms, often in response to international pressures from donor governments (Fox and Aranda 1996), multilateral and bilateral aid agencies, and activist non-governmental organizations. Interest in sustainable integrated area development -as a goal- was renewed in the 1992 Dublin Conference on Water and the

[2] The late 60's and early 70's witnessed an increasing amount of attention in various Latin American countries in an attempt to replicate the experiences of the Tennessee Valley Authority (TVA) in the United States.

Environment and the 1992 UN conference on Environment and Development in Rio de Janeiro, both of which called for comprehensive management of resources, using the river basin as a focus (Christopher 1998). Such interests have been later on reinforced in the 1998 Paris conference on Water and Sustainable Development, the 2000 Hague Ministerial Declaration on Water Security in the 21st Century, the 2001 Bonn International Conference on Fresh Water, the 2002 World Summit in Johannesburg, the 2003 Japan third World Water Forum in and the 2004 Dakar conference for the Network of International Commissions and Trans-boundary Basin Organizations.

For Latin America as a whole, interest in integrated river basin management was revived in the 1990s (Garcia 1999). This has resulted in the creation of river basin authorities in several countries. The French and the British experiences on water and river basin management have been noted with interest in many Latin American countries, which has contributed to the formation of several institutions (Latin American Network for Watershed Management) and regional networks (Latin American Network of Basins Organizations, LANBO) (Tortajada 1999).

1.2. Political Context for Water Resources Management in Brazil

Brazil is a federal republic of 8.5 million km^2 located in the southern hemisphere, between the Equator and the Tropic of Capricorn. The country is divided in 26 states and a federal district, where the capital, Brasilia, is located. Brazil is known as a country plentiful in water, with the highest total renewable fresh water supply of the planet (Gleick 1998). Average availability 'per capita' is 48.314 m^3 per capita/year (FAO Aquastat 2002) which is well above 1700 m3/person.year, estimated to be the threshold below which the country

cannot provide itself with sufficient food production (Postel 1997). Rapid urban population growth and industrialization over the past years have introduced important implications for

Map 1.1 Political Map of South America and Brazil (CIA 1994)

the environment in the country. As shown in figure 1.1, the sectors of irrigation and industry present the highest water consumption levels in the country using larger amounts of water and, consequently depleting the available sources. At the same time, those sectors are degrading these resources with their wastes (Porto 1998).

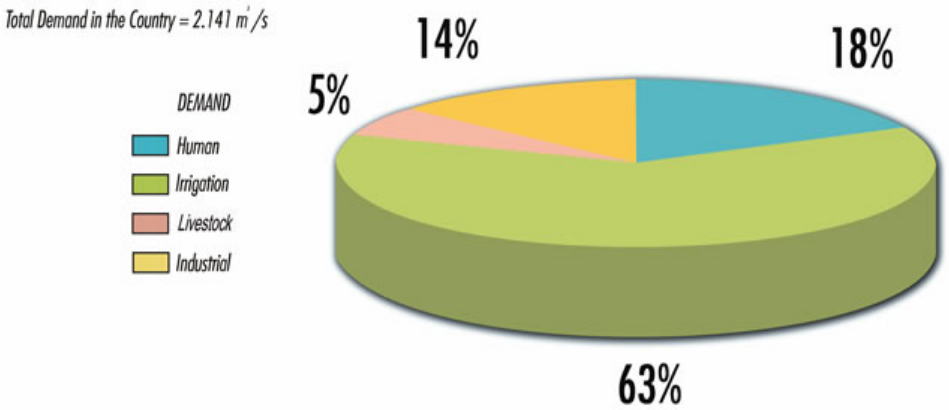


Figure 1.1 Percentage Distributions of Water Demands in Brazil (ANA 2003)

Brazil today is an interesting case in Latin America for the democratization and the integrated management of its water resources on a river basin scale. In spite of the vastness of its territory and regional differences, the country is undergoing a major change in the way water is managed and perceived by different segments of society. Water management in Brazil is a process where the participation of civil society alongside with other public and private actors is an imperative for the wellbeing of the environment and goes in conformity with sustainability principles and Agenda 21. As a result, there is a push towards greater citizen and civil society participation in local government activities.

In Brazil, there is a social and political mobilization of the society aiming at managing the country's waters in a form that overcomes the unilateral action of the government as rooted historically in the system. Therefore, a new system has been established to strengthen communication channels and dialogue between the society and the government. Accordingly, while taking into consideration the Brazilian territorial dimension and its vast and rich cultural, social and environmental diversity, a new movement of social participation in the decision-making process, in matters related to water issues in the country, has been a priority in the recent formulation of water policy.

Participatory planning and democratic decentralization of water resources has a relatively recent history in the Brazilian context, rooted in the political movements that have brought the Workers Party (PT) federally to power in many municipalities and has increased its recognition at the national level (De Castro & McNaughton 2003). The Brazilian (PT) has been therefore involved in a number of different municipal governments in projects increasing citizen involvement in local decision-making (Ostrom 1996, Abers 2000). The Political directions and the social movements support in that respect active

citizen participation in local decision-making, and are internationally recognized for their work in implementing a participatory budgeting process in many Brazilian cities. To this end, two major components over the last decades have created changes in Brazilian planning. One was the democratization process and approval of the new constitution in 1988, which represented a shift away from centralized control to the decentralization of urban management functions back to the municipal level and the other is the success of the Workers Party (PT) in the administration of Brazilian cities (De Castro & McNaughton 2003). The political agenda and democratic directions in Brazil have consequently led to the increasingly important role of municipal governments in providing for the welfare of citizens (Samuels 2000). Municipalities are by necessity becoming more pro-active in terms of service provision and development policy (Rodrigues-Pose, Tomaney, and Klink 2001). To achieve such objectives within the Brazilian context, the following elements have been established as basic principles for water management in the country (Porto & Kelman 2000);

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

Those principles mark the birth of key ideas and political initiatives that meet the government's commitment to implement a new pattern of ecological, sustainable, fair and economic development. In that respect, social participation and control are fundamental principles, for the shared management of waters and for the expansion of citizenship.

1.3. Sister Watersheds Project and Agenda 21

This research is part of the activities of the "Sister Watersheds" project (Projeto Bacias Irmãs). The project, with the sub-title "Capacity Building of the civil society for Watershed Management", is a partnership between the University of Sao Paulo in Brazil, the ECOAR institute for Citizenship– a Brazilian NGO working in the field of environmental education- and York University in Toronto, Canada. The project is funded by the Canadian International Development Agency (CIDA). The "Sister Watersheds" project's general objective is to "Develop innovative methodologies to support public participation in environmental decision-making".

The project activities as a whole in two Brazilian cities (Sao Paulo and Piracicaba) revolve around three specific objectives and a defined set of actions, which are:

Specific objective 1: To map and record social and biophysical data of the basins using (in light of) the comparative studies (hydro-social map).

Actions for objective 1:

1.1 Mapping, using primary and secondary data the demographic, geographic, institutional, socio-economic and historical aspects of the basins.
1.2 Work towards publishing and exchanging results that have been generated/reported (amongst the basins and amongst the basins and their partners).
1.3 Undertake analysis and consistently update the compiled data

Specific objective 2: To develop, experiment and evaluate methodologies and pedagogical tools related to the participation of the civil society in the process of integrated water management.

Actions for objective 2:

2.1 To survey methodologies, tools and pedagogical activities related to the participation of the civil society in the process of integrated water resources management.
2.2 To survey the socio-environmental perception of the communities in each sub-basin using action in chosen schools.

Specific objective 3: To evaluate the impact of environmental education programs in the communities that represent the project's focus.

Actions for objective 3:

3.1 Conduct a bibliography on the methodologies to evaluate impacts of Environmental education projects

3.2 Take advantage of the studies undertaken in phase II of the project (action 2.2.), to create an initial parameter about the profile of the public's needs and goals (population of the communities in the basins)

3.3 Proceed with partial evaluations of the methodologies, tools and activities realized and used in the project in relation to the educational intervention executed with the communities.

3.4 Evaluate the impact of the program as a whole, in a concluding evaluation through a study to be undertaken at the project's final stage with the communities included in the project.

The current research paper is part of the "exchange" component of the project and addresses a related research question as indicated in the next section.

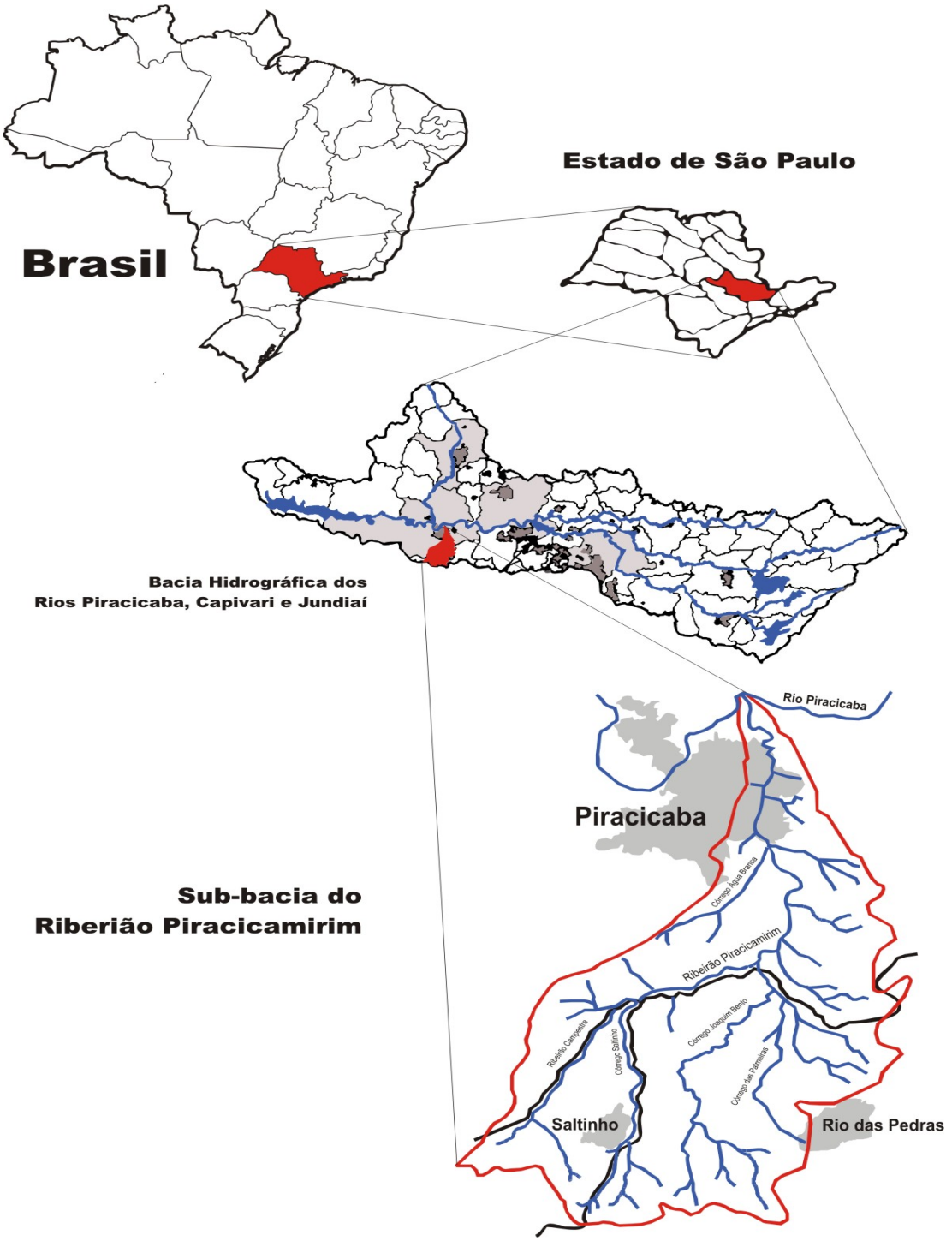
1.4. Research Paper Objectives

My primary research goal was to identify the different challenges for the participation of civil society in watershed management in the state of Sao Paulo. The research was conducted at the level of the PCJ River Basin Committee and the Piracicamirim micro-basin (also referred to as the PISCA watershed) in the municipality of Piracicaba, Sao Paulo State. With the basic assumption that my research should be useful in practice, the scope of the analysis has been directed to the level of the PCJ River Basin Committee in order to;

i) Identify challenges for the participation of civil society belonging to the PISCA watershed in the PCJ river basin committee and its different affiliations.
ii) Identify the obstacles for an inclusive decision making process –in practice and beyond the policies and institutional setup of the water bodies in Brazil in theory.
iii) Further understand the meaning of democratic decentralization of water resources management in practice; does it exist and to what extent do power relations negatively affect the participation of civil society,
iv) Further highlight any hidden factors due to political, economic, social, environmental or economic drivers hindering the participation of civil society in the PCJ RBC.

With the end goal of portraying the emerging institutional arrangements/challenges in water resource management in the state of Sao Paulo in relation to the civil society segment, the current research paper is divided into nine chapters. The first chapter offers background on the research purposes and the political context of water management in Brazil. Chapter 2 explains the research methodology and the basic elements of its design. In light of Agenda 21 and the basic principles of Integrated Water Resources Management, chapter three conducts a review of the literature on the notions of Democracy, Empowerment and Decentralization in the context of River Basin/Watershed Management. Stakeholders' theory, Social Capital and institutional development are also presented as the theoretical framework. Chapter 4 highlights the historic role of the Brazilian government in water resources regulation (1930-2005) leading to the current institutional innovations in light of the political-economic context and policy changes of different periods. The chapter further explains the current water resources management system in Brazil on the federal level and conducts a generic mapping of the main water institutions in the country. Chapter 5 introduces the research case, conducts a physical and socio-economic description of the studied watershed and highlights the environmental and the related water supply/pollution problems in the Piracicaba watershed and one of its corresponding micro-watershed (Piracicamirim). Chapter 6 explains the internal structure and the institutional arrangements of the Piracicaba, Capivari and Jundiai river basin committee (CBH PCJ) with a focus on the structure of participation of the different segments. Chapter 7 conducts a detailed mapping of the State and Federal basin committees of the Piracicaba, Capivari and Jundiai watersheds including the 11 Technical Committees and the corresponding participating segments. The mapping exercise helps to answer the following questions; *Who's included*

in "civil society"? Does the structure of the PCJ committee itself include some groups while excluding others? Is the PCJ committee homogeneous or does participation vary across the different sub-committees? Using the mapping exercise as a base with input data from a series of interviews with various actors involved in the watershed and the river basin committee, chapter 8 seeks to answer the following question; *How does the institutional setup of the water committees influence participation? Do the constraints on their participation vary for each group? Or are there common constraints? Why do these constraints exist?* Chapter 8 presents the research findings under 5 categories and undertakes a discussion in light of the literature review and findings in relation to the studied PCJ watershed committee. Chapter 9 finally presents the concluding notes, and some future themes for research. Some recommendations are also addressed for the "Sister Watersheds" project on possible ways of raising opportunities for civil society to overcome such challenges and the potential of future partnerships amongst civil society and other actors (public and private).



Map 1.2 Research Area Location: Piracicaba Watershed and Pisca (Piracicamirim sub watershed)

Chapter 2

Field Work and Research Methodology

"The research question should drive the methodology... How often do we do the opposite? We take as a given whatever methodology we are comfortable with or skilled in using and then adjust our research questions to fit. And how many opportunities for learning we let pass by doing that" - J. Richard Hackman (1992)

2.1. Methodological Framework

The primary research question at hand seeks to identify the different challenges for the participation of civil society in the PCJ river basin committee throughout the process of democratic decentralization of water resource management in the state of Sao Paulo-Brazil. The *general methodological framework* deployed is based on Global Agenda 21 – a document signed by 170 countries, resulting from RIO 92 (UN Conference on the Environment and Development), which involves the elaboration of a program for a new model of sustainable development. Such a framework goes in conformity with the guidelines for the "Sister Watersheds" project and provides basic directives for international development projects in light of the global consensus to address vital issues in today's political economy and global commons.

Within this methodological framework, the following elements have been considered in this study to document the experience of civil society and water users of different sectors in water resource use and utilization, and associated problems in the studied watershed;

- The water quality and quantity related problems of water resource users and their impact on livelihood activities.
- The nature of competition /conflicts among different water use sectors.
- Institutional support for conflict resolution among different water users (between and among different water use sectors).
- Suggestions for addressing unresolved problems.
- Similarities and differences of views between agency personnel and resource users.

2.2. Methodology Design

The first assumption that I have made in choosing a methodology is that my research should be useful to practice. The current research undertaken in the Piracicaba river basin (state of Sao Paulo) focuses therefore on the institutional dynamics for the participation of civil society in the Piracicamirim (Pisca) micro-watershed in the PCJ River Basin Committee (CBH PCJ). As a result, the field work has been undertaken at the level of the River basin committee to which the watersheds belong.

From a methodological standpoint, the following are basic elements of the institutional analysis of this study;

a. Institutional Mapping, using primary and secondary data on the demographic, geographic, institutional, socio-economic and historical aspects of the basins.
b. Surveys of the socio-environmental perception of the civil society in the researched sub-basin and its corresponding river basin committee.
c. Evaluation of the impact of environmental education programs in the communities that represent the project's focus

2.3. Data Collection

The undertaken study collected information on a host of variables that may be categorized in four broad headings: socio-economic situation in the watershed, legislative developments for water resources management on the state and federal levels, organizational structure of the river basin committee and institutional constraints in the researched committee.

The majority of data has been gathered through participant observation and semi-structured interviews with relevant actors of the case study, which may include participants in the committee and external government officials. The Research Process included face-to-face involvements with particular individuals and groups within particular organizations

and stakeholders, with the intention of understanding how different entities (RBC/civil society groups) experience, give meaning to, act and interact with respect to particular situations. Analysis of government documents and secondary research, media commentary, and interview data has been used to contextualize and corroborate interviewee's observations (triangulation). The data collection activities deployed for field research and major paper analysis can therefore be divided in 3 major categories;

a- Basic data collection activities
b- Interviews with Stakeholders inside the PCJ river basin committee
c- Observation of sister watersheds project activities in ESALQ- Piracicaba

2.4. Summary Field Work Methodology

In light of the guidelines of the National Water Resources Management system in Brazil, and within the specific context of the state of Sao Paulo, the research and fieldwork deployed to investigate the research question in hands depended on a variety of data collection activities as previously indicated. A wide array of stakeholders with different institutional and organizational affiliations involved within the Piracicaba, Capivari and Jundiai (PCJ) watersheds have been therefore interviewed. A multitude of perspectives will be thus presented throughout the current research case by those involved in the political and institutional setup of the PCJ river basin committee. The research process also involved civil society entities, researchers, activists, government personnel and technicians working in the area of water resources management.

Deploying this series of interviews with formal personnel of involved institutions, such methodological framework has been chosen in order to include the widest range of views from a multitude of stakeholders involved in the studied institutional setup. All views have been considered as essential factors for a deeper understanding for the

challenges of the civil society participation inside the PCJ committee thus representing their problems and views, narrowing the focus to a micro-watershed scale (Piracicamirim in Piracicaba). This has consequently led to include various perspectives in relation to the research question, thus attempting to grasp the reality of each of the involved stakeholders without favoring a view over the other, thus reaching a comprehensive understanding for the real challenges of participation in the PCJ river basin committee. A limitation to the current research has been however the absence of a precise indicator for participation and the extent of its effectiveness.

Chapter 3

Literature Review

`People already have the knowledge; what they must have are the rights over their local environments. This is the big problem in the world today. The vast majority of people have become passive observers, and a few people are taking decisions for everyone else. That is the prime reason why the environment… is being destroyed`(Agarwal and Narain 1991)

3.1. Rivers, River Basins and Watersheds

Efforts to control rivers date back 5000 years or more (Christopher 1998). Chorley (1969), indicates that using a basin as a planning and administrative unit was probably first done in AD 1752. Later on, the idea of coordinating the demands made within a basin was promoted by Sir William Wilcocks when he was planning to regulate the Nile in the 1890's (Christopher 1998).

Basins are bio-geophysical units with a high degree of functional integrity, and are relatively homogeneous systems, even when upper, middle and lower sections have different conditions and human activities (Christopher 1998). A river basin or a watershed is an area that is defined by nature itself, essentially by the limits of the run-off areas of surface water converging towards a single watercourse. A river basin may be also understood as a "geo-hydrological unit that drains at a common point" (Brooks et al. 1992). The watershed, its natural resources and its inhabitants have physical, biological, economic, social and cultural qualities, which endow them with their own special characteristics (Douroujeani 1994). The Watershed or river basin approach tries therefore to manage the basin's area using ecological rather than administrative boundaries since development, land use, cultural, and other processes are viewed as interconnected (Kothari 2000). Brochet 1993 indicates that careful management of watershed areas is also vital for good agriculture

or forestry and to control soil degradation, and can help stabilize stream flows, reduce the sediment load of streams and improve groundwater recharge.

According to Hufschmidt (1991) "river basin planning is based upon the application of the scientific method and principles of welfare economics within a framework of public policy that can accommodate multiple objectives". Sakthivadivel and Molden (2002) distinguish three stages of river-basin development into three stages: development, transition and allocation (utilization) stages. In the development stage, institutions are heavily concerned with building infrastructure whereas in the utilization stage managing supply of water to various uses is a primary concern. Christopher 1998 also classifies the management and planning practices in river basins –national or international- also known in the literature as River Basin Development Planning and Management (RBDPM) into three main activities; planning, management and conflict resolution.

3.2. River Basin/Watershed Management

A classic definition of watershed management (1964) describes the concept as "the art and science of managing the natural resources of a watershed in order to control the discharge of the water in terms of quality, quantity, location and time of occurrence" (Douroujeani 1994). Figure 3.1 explains watershed management as a planned *system* in 3 major categories: Resource management actions, implementation tools and institutional arrangements (Hufschmidt 1991).

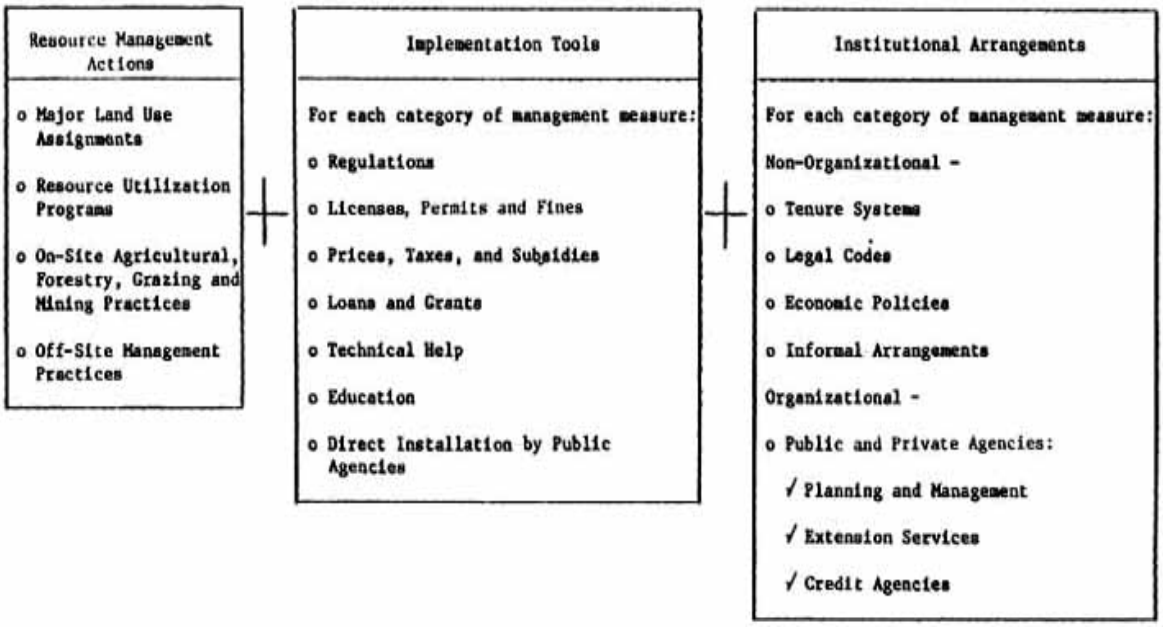


Figure 3.1. Watershed management as a planned system
(Hufschmidt 1991 FAO Corporate Document repository)

For our purpose in this review, for South America and most of Central America, a better definition of watershed management is the one formulated by the College of Engineers of Peru, whereby watershed management is defined as "the application of principles and methods for the rational and integrated use of the natural resources of the watershed –essentially water, soil, vegetation and wildlife– aimed at achieving optimal and sustained production of those resources with minimum damage to the environment for the benefit of the inhabitants of the watershed and the communities linked to it" (Tortajada 1999).

Watershed Management is also referred to as the "new watershed approach." According to Born and Genskow (2001), distinguishing features of this new approach are; decentralized and shared decision–making, collaboration, engagement of a wide array of stakeholders (including non–governmental interests), and goals evidencing concern for ecosystems protection. This new approach differs from the traditional one that is more

fragmented and reliant upon centralized agency decision–making and command–and–control strategies (Douroujeani 1994).

3.3. Agenda 21 and Integrated Water Resources Management (IWRM)

Water Resources Management has evolved throughout the last decades in relation to the changing political and socio-economic aspects of river basin communities in various regions and sub-regions. Kurian (2004) indicates that Integrated Water Resources Management (IWRM) has been proposed as a strategy to increase water productivity and improve water quality using the river basin as a management system and a decentralized unit. In that respect, in the 1992 Rio Summit on Sustainable Development, one of the clearest sets of water resources management principles was developed and agreed upon. Agenda 21 describes them as follows (P.Millington 1996);

> **"Integrated water resources management is based on the perception of water as an integral part of the ecosystem, a natural resource and a social and economic good, whose quantity and quality determine the nature of its utilization. To this end, water resources have to be protected, taking into account the functioning of aquatic ecosystems and the perennial nature of the resource, in order to satisfy and reconcile needs for water in human activities. In developing and using water resources, priority has to be given to the satisfaction of basic needs and the safeguarding of ecosystems. Beyond these requirements, however, water users should be charged appropriately. Integrated water resources management, including the integration of land- and water-related aspects, should be carried out at the level of the catchment basin or sub-basin"**

Integrated Water Resources Management (IWRM) is referred to by adapting the "Jonch-Clausen and Fugl's" conceptualization of people-nature interactions in a river-basin context.

> **"In the natural system integration typically involves land and water; surface water and groundwater, water quantity and quality. However, equally important, but less traditional, is the integration of the human system …Institutional issues are central to IWRM considering that sustainability in all its forms, organizational and environmental, has to be ensured in the context of multiple land uses, multiple uses of water, over-time changes in State policies, spatial differences in implementation of NRM strategies by external agents (State /NGOs) and variations in beneficiary participation in water allocation and conflict resolution" (Barker and Molle 2002).**

The integrated management of a river basin relies therefore on the conjunction of two groups of complementary actions. One group of actions directed towards developing the natural resources (using, converting and consuming them) present in the river basin in order to boost economic growth, and a second group of actions directed towards managing them (conserving, reclaiming and protecting them) with the aim of ultimately ensuring environmental sustainability (Millington 1996). Figure3.2. classifies those two groups of complementary actions into the five stages of integrated watershed management.

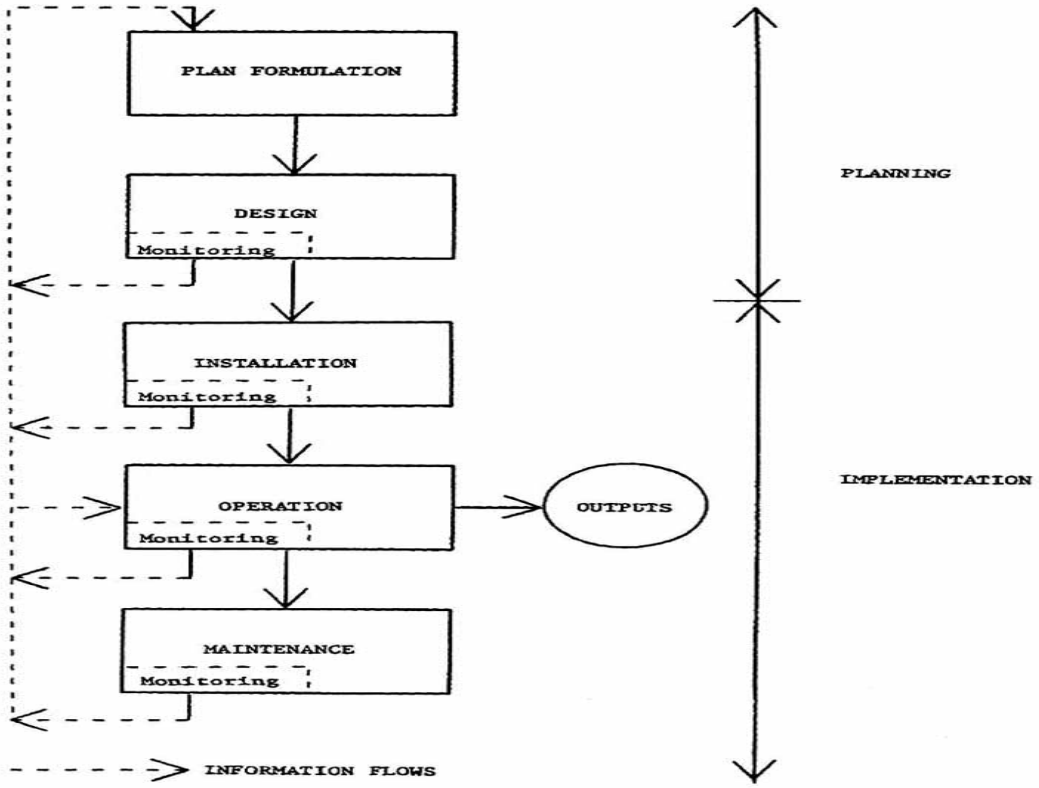


Figure 3.2 Five stages of Integrated Water Resources Management (Hufschmidt 1991)

3.4. Democracy, Empowerment and Decentralization

There are a variety of ways in which a government can cede or share power over natural resources and the environment with other stakeholders. For most of the world's citizens, having a significant voice in public decision-making would be a new experience (Ribot 2002a). Kapoor (2001) outlines some of the theoretical benefits of participatory

environmental management: it ensures the representation of a diversity of groups, builds on the wide range of knowledge held by these diverse groups, aims at enhancing mutual understanding, incorporates local knowledge and experience into planning, clarifies and stabilizes communications and power relations between stakeholders by making communication more transparent, "enhances iterative programming," and "encourages local ownership, commitment and accountability."

Today, decentralization is the centerpiece of policy reforms around the world including local government agencies, nongovernmental organizations (NGOs), and even the private sector. Political *or democratic decentralization* where the central government transfers decision-making power and financial resources to elected representatives of people at regional or local levels is an essential element of society empowerment. Democratically elected institutions are often considered the best candidates to receive decentralized powers from the central government (World Resources Institute, UNDP, UNEP and WB 2003). These local representatives gain significant discretion in making decisions and rules about resource use, likely within prescribed limits.

Decentralization—the transfer of powers or responsibilities from a central government to local institutions—goes directly to the question of who gets to make decisions about natural resources. Decentralization can make environmental decision-making more accessible to communities and their representatives, in turn increasing the relevance of those decisions and the likelihood they will be implemented. *But decentralization can also occur in ways that leave the status quo—central government (and sometimes elite groups) dominance of decision-making—largely unchanged, with little*

benefit to the environment or local empowerment (World Resources Institute, UNDP, UNEP and WB 2003).

3.5. Participation in River Basin Management

It is widely acknowledged that public decision-making, consultation and participation in watershed management is seen as good practice (WWF 2001; Chave 2001; Water Policy 2001). Social capital and community capacity can be viewed as basic community-based conservation concepts and also form the basis of watershed council organization (Habron 2003). Attention to key planning concepts such as goal development, decision-making, leadership, and group effectiveness provide key components for the success of watershed groups and other community-based conservation institutions (Griffin 1999, McGinnis 1999, Mullen and Allison 1999). Such participatory practices help "to define problems, set priorities, select technologies and policies, and monitor and evaluate impacts and in doing so are expected to improve performance" (Johnson et al. 2001). The value of these deliberative processes (that aim to solicit public debate) over other forms of decision-making is argued cogently by Collentine et al. (2002) who see intrinsic advantages in increased legitimacy and deliberative democracy and debate particularly over methods that rely on acceptance/rejection modes of participation (Lankford 2004).

In summary, the advantages to participatory management are that it "aims at a holistic approach, it is decentralized and community-oriented, it puts people and equity (not just growth) first, and it pays particular attention to issues of inclusion/marginalization (of women, indigenous peoples and minorities)" (Kapoor, 2001).

3.6. Institutions and Organizations

The local institutions that are granted decision-making powers in relation to water resources vary, and can include (Dupar and Badenoch 2002; Ribot 2002a, World Resources Institute, UNDP, UNEP and WB 2003).

- *Elected local authorities, such as a mayor, a town or village council, or a planning* commission.
- *Agents from government ministries of the environment, forest, wildlife, or other natural* resources.
- *Elected or appointed user groups, such as a*gricultural cooperatives or wildlife management groups.

New Institutional Economics (NIE) makes a distinction between *institutions* and *organizations*. Kurian 2004 indicates that what organizations come into existence and how they evolve are fundamentally influenced by the institutional framework; "the institutional framework may be broadly defined in the case of IWRM with reference to three functions: constitutional function, organizational function and operational function. The constitutional function basically relates to establishing laws and framing policies. The organizational function concerns river-basin management: allocating river flows, assimilative capacity, infrastructural construction (dams or canals), ecosystem maintenance, etc".

Institutions are defined as the "rules of the game" or regularized patterns of behavior, they are made up of formal laws, informal constraints and enforcement characteristics of formal and informal rules (North 1990). Ostrom (1990) points out that institutions exist at multiple levels: constitutional choice rules, collective choice rules and operational rules. Kurian2004 further indicates that institutions evolve depending on the nature of water-resources issues that a river basin faces and, in that sense, they are not static systems but are adaptive and dynamic.

On the other hand, organizations provide a structure to human interaction. They include youth groups, water user organizations and trade unions. Organizations represent groups of individuals bound by some common purpose to achieve objectives. The importance of organizations has many dimensions as indicated by the FAO model of Regionalization and Differentiation (RED IFO Model, 1997);

- **Organizations can guarantee the participation of rural populations in the formulation of the modalities for decentralization, and that they are not formulated solely by the central government. The objectives, the modalities and pace of decentralization can thus be discussed with local actors.**
- **Organizations facilitate institutional innovations that allow actors in development to actively participate in policy differentiation and in the regionalization of demands for support. It's through organizations that different social groups can become actors in their own development because they reinforce their ability to reclaim functions previously centralized.**
- **Finally, organizations are important because the success of decentralization depends on the existence of local structures of mediation and consultation, which transform social pressure into development projects and programs. But the important role of social pressure must be recognized. Centralized states had the tendency to see conflicts as nothing but opposition to their interventions, whereas often, conflicts were demands for intervention. These demands took the form of conflicts because there wasn't any forum for dialogue at the local level. With decentralized mediation mechanisms, social pressure could be a vehicle for structuring demands and synthesizing them into a rural development strategy.**

3.7. Social Capital and Stakeholders Theory

A typology of stakeholders reveals the variety of interests or "stakes" that groups of people hold in organizations or causes (Wheeler 2001). Some theorists have also added individuals and groups that speak for the natural environment, non-human species, and future generations to this list (Wheeler and Sillanpää 1997) Primary stakeholders have interests that are directly linked to the fortunes of an organization including shareholders and investors/funders, employees, customers, suppliers, and residents of the communities

where the organization operates. Secondary stakeholders, on the other hand, have indirect influences on an organization or are less directly affected by its activities. Figure 3.3 identifies 3 levels of engagement amongst stakeholders in three dimensions of sustainability; compliant, responsive and engaged

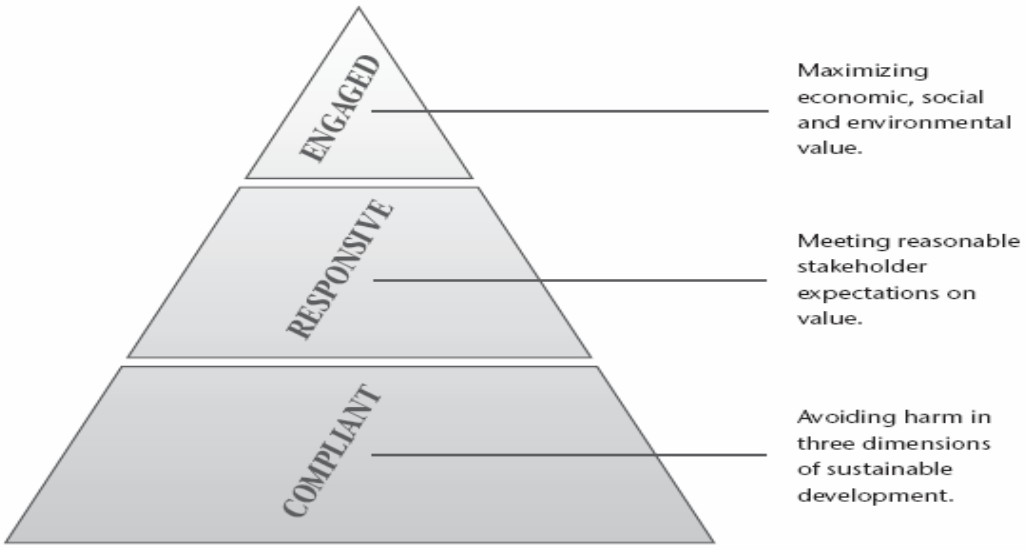


Figure 3.3: Degree of institutional engagement with stakeholders in three dimensions of sustainability
Wheeler et al (2001)

It has only been in the past several years that researchers have turned their attention to studying social capital (Wasserman *et al.* 1994, Schuller 2001, Wheeler et al. 2001) within organizations. For the purposes of this study we adopt the definition indicating that social capital has the following three key dimensions (Nahapiet and Ghoshal, 1998; Tsai 2000; Cohen and Prusak, 2000).

(i) The structural quality of a relationship refers to the structure of the social network in which the relationship is embedded.
(ii) The relational quality of the relationship deals with the levels of mutual trust and reciprocity.
(iii) The cognitive quality of the relationship reflects the levels of shared understanding and goals.

A recognized definition of social capital from the literature is this: "Social capital consists of the stock of active connections among people: the trust, mutual understanding, and shared values and behaviors that bind the members of human networks and communities and make cooperative action possible"(Tsai 2000).

Moving towards building the capacity of social capital is an essential goal of development strategies such as the Millennium Development Goals. "Capacity" in that respect could be defined as the ability of an individual and/or institution to perform functions effectively, sustainably and efficiently. 'Capacity-building' consists therefore of three basic elements **(**Cohen and Prusak, 2000, Wheeler 2001**)**:

a- the creation of an enabling environment with appropriate policy and legal frameworks;
b- institutional development, including community participation;
c- human resource development and the strengthening of managerial systems.

3.8. River Basin/watershed Organizations and Water Institutions

Garcia (1999) indicates that establishing watershed entities serves the following objectives;

- Coordinate the actions of several overlapping national[3] organisms and administrative jurisdictions
- Promote the role and responsibility of the various interest groups in the basin
- Facilitate concertation as a problem-solving mechanism.
- Provide a mechanism achieving greater involvement by the stakeholders and to agree on schemes to account for opportunity costs.

A review of some of the recent work done by the United Nation's Economic Commission for Latin America and the Caribbean (ECLAC, 1997), indicates that the objectives of "River Basin Organization" RBO's (Comitê do Bacia Hidrográfica CBH) are: (a) To integrate sustainable development of the whole river basin region, (b) To develop and

[3] In the sub-regional domain, this approach may be useful in solving problems related to water resources management of trans-boundary river basins, as a vehicle to promote sub-regionally coherent water policies and legislation, which may become increasingly needed given present globalization and integration efforts and trends. However, it does not mean that basin committees or councils must be established across the board." It should also be noted that there have been many cases in which the lack of co-ordination has resulted in one of the two authorities (i.e., the river basin or regional authority) absorbing the other, or else there has been a situation of permanent conflict between the two.

manage its natural resources, or (c) To develop and manage water resources only, either in a multi-sectoral or a sectoral approach. Wiener 1972, Le Marquand 1989, Mitchell 1989, Rowntree 1990, Thanah and Biswas 1990 in Christopher (1998) have indicated that river basin planning and management bodies offer a framework for integrating water management with environmental, social and economic development, where the process supports the integration between planning, construction and operational management between policies, program(s) and project(s); between national, regional and local entities, and between sectors and departments.

Having presented the basic concepts in the literature related to watershed management, social capital and stakeholder involvement in water institutions, the following section introduces the broader context of the research case for water management system in Brazil.

Chapter 4

The Water Resources Management System in Brazil

4.1. Background on Water Resources Management in Brazil (1930-2005)

In Brazil, the first State Water Resources Plan[4] was proposed in the state of Sao Paulo in 1991 (Braga 1999). Later on, the Brazilian Federal Water Act was issued in 1997, adopted from the French water experience and management system (Porto & Kelman, J 2000). The 1997 Federal Act established the sector principles, management instruments and institutional framework of the country's water resources management system.

In order to understand the dynamics and the politics of the water management system in Brazil, considering the participation of the various segments of the society and the economy, an overall understanding of the country's water management system is necessary. This chapter therefore provides historical background on the development of the Brazilian water law and legislation leading to its present form. A generic description is also provided of the institutional bodies related to the water resources management system (SIGRH[5]) in Brazil, highlighting its current institutional setup and linkages.

4.1.1. Political and Legislative Context: Historical Development

Water-regulation history began, as did most of Brazilian State building, in the 1930s. A Water Code was adopted in 1934 after long debates over the hydroelectric power provision and the role of the public and private sectors in providing energy (Lima, 1984 and 1989). At that time, the country was basically an agrarian economy and the code was modern enough to propose the integration of multiple uses of water. At that stage, "the

[4] A regular evaluation of the plan is done through an annual report prepared by the executive office of the State Water Resources Council for each management unit.
[5] Sistema de Gerenciamento de Recursos Hidricos (SIGRH)

water code assured adequate attention for all interests in the resource: irrigation, households, fisheries, energy generation, sewage, conservation, recreation, and so on" (Kerr do Amaral 1996).

In the 1950s, as the country pushed hard to industrialize, power generation was the predominant use of water As a result, both industry and government disregarded the Water Code and there was no dispute over the accelerated urbanization of Brazil. Conflicts however began to appear at the beginning of the seventies, between the use of public resources in wastewater treatment and sewage services versus their use in hydroelectric power generation (do Amaral 1996). At that stage, the country's fast rate of industrialization and its institutional fragmentation have contributed to the rise of environmental concerns and the degradation of water resources services and hence the urban quality of living.

The first attempt to establish planning and management of water resources by Basin was in 1978. The Inter-Ministry Administration Act nº 90, of the Ministry of Interior, Mines and Energy, set up the Integrated State Executive Committees for Hydrographical Basins (CEEIBHs), reporting to a specific committee of the federal government (Bacias Irmãs 2005). Practically, these committees limited themselves to reconciling interests among several public players, but, apparently due to the lack of decision making power, the exclusion of municipal districts and civil society of its structure, and due the superficial character of its meetings, the initiative gradually continually lost power until it was put out (Secretaria de Meio Ambiente 1995).

Brazilian government opened a discussion about the country's water policy in 1984. The main objective was to reform the water resources sector and to increase its efficiency, and therefore reduce costs and promote development (Porto, M. & Kelman, J. 2000). The Federal Constitution of Brazil, issued on the 5th of October 1988, stated that it is a federal duty to implement the National Water Resources Management System, responsible, among other things, for planning, regulation and control of the use, preservation and restoration of the country's waters. It also described water as a public good, and government property. For the sake of better understanding the building of the institutional apparatus for water resources management in Brail since the 1930´s, highlighting the evolutionary process in the last 10 years, a chronology of some institutional landmarks is given below:

1930/64: no national agency responsible for the environment. Intense use of natural resources for industrialization (first hydroelectric facilities, especially in the Southeast region of the country)

1964/74: Consolidation of an institutional arrangement based on sectors: energy and water distribution and sewage services. Policies are centralized and fragmented in sectors. Military regime creates a robust public administration characterized by centralization of the decision-making process and by the specialization of agencies.

1974/1985: Financing problems. State-owned public utilities used to attract foreign loans. Environmental issues begin to appear on the public agenda. Environmental problems due to the industrialization process lead to the creation of regional agencies and of the first national agency responsible for environmental issues. The 1972 UN Conference influence the process.

1985/1996: Redemocratization of the country and economic crisis favor the emergence of new debates about priorities of the use of natural resources. New actors (NGO's, municipalities, courts, etc.). Initiatives toward a new institutional arrangement in some states. Federal and state Constitution with special chapters dealing with the environment and water resources. State reinvention experiences. Municipalities and states gain decision power from the new Constitution. Creation of new institutions to regulate and control the environment and water resource: less fragmented and centralized then previously.

1987: Declaration of Salvador (ABRH, 1987), Brazilian Water Resources Association, on modern principles as guidelines for establishing a new water resources management system;

1988: the Federal Constitution of Brazil opens the way to implement a National Water Resources Management System, making it clear that water is on Brazil's agenda for the future;

1989: Declaration of Foz do Iguace (ABRH, 1989), Brazilian Water Resources Association, calling the attention of water managers to principles such as:
(1) water quality and quantity aspects cannot be dissociated;
(2) the watershed is the territorial unit for management purposes;
(3) water is an economic good and, as such, its utilization must be charged to promote rational use;
(4) since water is a public good, water use permits must be issued and no one may withdraw water without a permit;

1991: State Law on Water Resources Management System, state of Sao Paulo, includes principles establishing, for the first time in Brazil, a bulk water charging system, and decentralizing water management in the state through the adoption of River Basin Committees, defining the watershed as the territorial unit for water management purposes;

1991: the first version of the Federal Law for a National Water Resources Management System is discussed in the House of Representatives;

1991: Declaration of Rio de Janeiro (ABRH, 1991), Brazilian Water Resources Association, stresses the importance of integrated water resources management, and the immediate need to consider ecosystem balance in restoring and conserving the country's waters;

1992: Dublin Statement (ICWE, 1992), encompasses four principles:
(1) Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment;
(2) Water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels;
(3) Women play a central part in the provision, management and safeguarding of water;

Figure 4.1: Political and Institutional development (1930-2005)
(Adopted from Porto 1998 and Kerr do Amaral 1996)

4.1.2. The 1991 and 1997 Water Bills in Brasil for Integrated Water Resources Management (Laws 7.663/91 and 9.433/97)

The State of São Paulo Decree Law nº 27,576/87 created the first State Council of Water Resources, exclusively constituted by State Government organs and entities, whose task was to propose a Government Policy on the state's water resources, to structure a State System of Water Resources Management, and to elaborate a State Plan on Water Resources. Decree Law nº 32,954, of February 7, 1991, approved the State Plan on water Resources (PERH), a technical document that revealed the worrisome future situation of

water resources in the State of São Paulo, if water demand and demographic growth continued at the same pace as observed until then. Law 7,663 of December 30, 1991 enacted the State Policy on Hydric Resources and the Integrated System of Water Resources Management**,** with important articles trying to discipline the many uses of public water, which set a milestone in conducting management of the State of São Paulo's water resources. The establishment of Brazil's *National* modern water resources management system took place in 1997 as the president of Brazil signed the Federal law 9,433. The law was enacted on January 8, 1997, basically within the same spirit of the São Paulo State Law 7,663/91, however, it included the necessary adjustments to cover the whole national territory. This federal law instituted the following entities for the management of water resources: the CNRH - National Council of Water Resources; the CERHs - State Councils of Water Resources; the River Basin Committees; and Water Agencies.

The law[6] states that whether the water course is federal or state property depends on the territory occupied by the watershed. If it encompasses more than one state or if the river is an international boundary, than it is federal property, otherwise it is owned by the state (Porto 1998). The consideration of such a multitude of different aspects in water resources management had already been stressed by the Brazilian Water Resources Association in the Salvador Declaration, issued one year earlier, in 1987, stating that "the integrated water

[6] During the debate of the bill, the text was extensively modified. The first author was Deputy Fábio Feldmann, who drew up a fourth and final proposal after a long period of discussions. In August 1995, Deputy Feldmann left the Congress to head the São Paulo State Environment Secretariat. Deputy Cedraz took over and also produced four texts, the last one being one of the shortest and most popular. For the final text of the federal law, stakeholders, researchers, House representatives, public officers and decision makers discussed it intensively for almost seven years (Porto 98)

resources management system must recognize the need for decentralization of the decision-making process, in order to be able to encompass regional differences" (ABRH, 1987).

The Federal law of 1997, in its first article, declares that water is a public asset, with economic value, and its management should always provide multiple uses through a decentralized institutional model, with government, users and community participation. In its third and fourth articles, the Law gives emphasis to diversity and to inter-sectoral integration between the union and the states, as concerns water management (Porto 1998). The National Water Act of 1997 (Law 9.433) defines therefore the National Water Resources Policy, with its objectives, principles and instruments, and also the National Water Resources Management System, establishing the institutional arrangement under which the country's water policy are to be implemented.

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

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

The final text as approved by Congress and signed into law by the president, can be explained by dividing it into three main sections: (i) sector principles; (ii) management instruments; and (iii) an institutional framework for the operation of the principles and implementation of the instruments (Garrido 1998).

(i) The sector principles constituting the National Water Resources Policy in Brasil are as follows (Porto & Kelman 2000):

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

stakeholders and society.

(ii) Management instruments with general guidelines for implementing the water resources policy emphasize the need for integrated management, flexibility to accommodate regional differences, the coordination among different sectors, the importance of land use planning to the water management and the integration between inland and coastal water management. The following specific "tools" are considered in the Act for implementing the policy:

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

(iii)**Institutional framework** for the operation of the principles and implementation of the instruments including various agencies on the federal and state level. The National Water Resources Management System (*Sistema Nacional de Gerenciamento de Recursos Hídricos* – SINGREH) is the institutional framework for the decentralized and shared management of the use of water as illustrated in figure 4.2.

4.2 Generic Mapping for the National Water Resources Management System in Brazil (*Sistema Nacional de Gerenciamento de Recursos Hídricos* – SINGREH)

The following section conducts a basic and generic mapping of the main water institutions forming the National Water Resources Management System in the country. The section also tries to highlight the institutional linkages amongst these organizations and their role in their role in the implementation of the new system in place.

4.2.1 Agencies at the federal and state levels with areas of competence related to the management of water resources

The National system is constituted of the following institutions (National Water Agency – Management Report 2003);

1- The National Water Resources Council (*Conselho Nacional de Resources Hídricos* – CNRH),
2- The Secretary of Water Resources of the Ministry of the Environment (*Secretaria de Resources Hídricos do Ministério do Meio Ambiente* - SRH/MMA),
3- The National Water Agency (*Agência Nacional de Águas* – ANA).
4- The Water Resource Councils of the States and Federal District (*Conselhos de Recursos Hídricos* - CERH).
5-Federal, state and Federal District public authority agencies concerned with the

management of water resources, Watershed Basin Committees and Water Agencies.

Figure 4.2: Organization of watershed basin management in Brazil (National Water Agency – Management Report 2003)

The SINGREH operates at the federal level whereas other entities at state level are formed by a Council, Basin Committees (divided into Committees for federal rivers and Committees for state rivers), and Water Agencies. The National Water Resources Management System is implemented under the Ministry of the Environment. It comprises the following institutions and member organizations of SINGREH as shown in Table 4.2 summarizing their attributes (Porto, M. & Kelman, J. 2000). Appendix 4.1 provides a detailed description of the mandates and the functions of these institutions.

Organization	Attributes
National Water Resources Council (Conselho Nacional de Recursos Hidricos – CNRH)	Political agency responsible for the supervision and creation of rules for SINGREH, including the articulations of national and state/sector water resource planning and establishment of general criteria for granting concessions and collection.
Water Resources Secretary (Secretaria de Recursos Hidricos)	Formulate the National Water Resource Policy and act as the Executive Secretary of CNRH
National Water Agency	Implement in its area of responsibility, the National

(Agencia Nacional de Agua ANA)	Water Resource Policy, integrated with SINGREH
State Water Resources Organization	Central and coordinating agency for the State Water Resource Management System (Sistema Estadual de Gerenciamento de Recursos Hidricos) with powers similar to ANA in its area of responsibility, especially the granting and inspection of the use of water resources under the power of states.
Watershed Basin Committee	Political Association of public authorities, users and civil society that encourages debates about questions related to the use, recovery and preservation of water resources, integrates the actions of intervening organizations, approves the watershed plan and monitors its implementation and approves collection criteria for the use of water
Watershed Basin Agency	Executive secretary of the committee responsible for the update of water balance for the available water resources, keeping the record of basin usage and the operationalization of water use collection

Table 4.1 National Water Resources Management System: the member organizations of SINGREH National Water Agency – Management Report 2003

4.3 WATERSHED COMMITTEES AND AGENCIES

From an institutional perspective, the difference between the Watershed Committee and the Watershed agency is that the former approves the resource investment plan, which is administered by the River Basin Agency. The River Basin Agency on the other hand charges for the use of river water, and is responsible for financial management and has its own budget. The following section identifies the main institutional attributes of both bodies functioning at the river basin level.

4.3.1 Defining Watershed committees in Brazil (Comitê Bacia Hidrografica)

Watershed or River Basin Committees (Comitê Bacia Hidrografica) are democratic collegiate entities formed by representatives of the state, municipal districts and organized civil society organs for management of Water Resources. Geographically, the watershed

committees are divided according to the country's national hydrographic division (Appendix 4.2).

The Committees composition is defined by the respective Statutes, with even votes distribution[7] among the three segments represented, which are: 1-State Secretary representatives or representatives of organs and entities of the direct and indirect administration, whose activities are to link with management or use of water resources, environment protection, strategic planning and the State financial management, actuating in the corresponding hydrographical basin; 2-representatives of municipal districts of the corresponding hydrographical basin and 3-representatives of civil society entities, headquartered in the hydrographical basin. The Committees' decisions are made by simple majority (Porto *et al.*, 1998): In the Basin Committees for frontier rivers and rivers that mark many frontiers, the Union representation includes Foreign Office representatives and, in territories including indigenous lands, representatives of the National Indian Foundation (FUNAI) and of the respective indigenous people.

The River Basin Committees (CBH) tasks include approval of proposals of the corresponding watershed, which integrate the state plan for water resources (PERH) and its updates, and annual and long-term programs for fund application in services and works of interest to the management of the water resources area, and proposals for plans of usage, conservation, protection and recovery of the basin water resources, supported by public hearings. Such committees have the following duties:

· To approve, after public hearings, a master plan defining preferential uses, protection and restoration of the water bodies;

[7] The proportionality among those segments was defined by National Council on Hydric Resources, through Administrative Act nº 05, as of April 10, 2000.

· To approve investment proposals, rank water resources projects and decide on allotment of funds;
· To arbitrate on conflicts among stakeholders;
· To promote educational programs and public awareness campaigns,
. To publicize new projects;
· To prepare a `Water Availability, Use and Quality Report' on the watershed, to be submitted to the State Water Resources Council.

4.3.2 The Water Agencies: the executive branch of the river basin committees

Each River Basin Agency should perform all the executive work related to water management in the basin. A single river basin agency may serve as the executive office for one or more river basin committees. The funds for financing the operation of these river basin agencies should be provided through the collection of bulk water fees. The water agency is responsible for all the technical work required to locally manage the water resources. The supplying of expertise for data base management, for hydrologic studies to evaluate water availability, for ensuring adequate water withdrawal decisions, for assessing and evaluating new water resources projects, as well as providing technical support to the committee on any other technical issue, are all the responsibility of the agency(Porto & Kelman 2000).

The aim of the following section is to study the PCJ watershed area and a sample micro-watershed (Piracicamirim) included in its area of jurisdiction in order to examine the typical impacts of industrial, residential and agricultural activities on the watershed management and development. The selected micro-watershed is where the activities of the "Sister Watersheds" project are taking place and is located in one of the most urbanized areas of the Piracicaba region which also falls under the jurisdiction of the PCJ river basin committee. Civil society entities of the micro-watershed have been also included in the interviews process in order to examine the extent of their participation and articulation inside the PCJ river basin committee.

Chapter 5

Research Case: The Piracicaba Watershed and the Piracicamirim (PISCA) micro-watershed - State of Sao Paulo

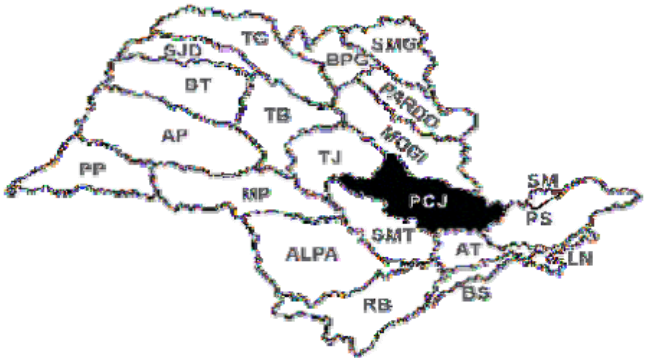
In the state of São Paulo, the State Law 7663/91, at the time of its enactment in 1991 -6 years earlier than the federal act, created the first River Basin Committees (Comitê do Bacia Hidrográfica CBH) in two critical areas: the watershed area of the Piracicaba, Capivari and Jundiaí rivers installed in November of 1993; and the Tietê Upper reaches watershed, in the metropolitan area of São Paulo, in December of 1994. The 1994/1995 São Paulo State Plan on Water Resources further defined the present 22 Hydrographic Management Units (UGRHI), which later received the work of river basin committee (CBH) formation. In light of such background, and drawing on the understanding of the national water resources management system in Brazil (chapter 4), the current chapter studies the state system for water resources management in São Paulo with a focus on the Piracicaba, Capivari and Jundiaí watershed area and its corresponding river basin committee. The chapter also conducts a physical, social and environmental diagnosis of a *sample micro-watershed* "Piracicamirim" located in the municipality of Piracicaba in order to identify the critical "areas of concern and action" on such a scale, baring in mind that the sustainability of the PCJ watershed as a whole is the aggregate of the situation of the sub and micro-watersheds forming the area of jurisdiction under the PCJ committee.

5.1. The state system for integrated water resources management in Sao Paulo

The state of São Paulo is located in Southeast Brazil and is surrounded by Rio de Janeiro (to the Northeast), Minas Gerais (to the North), Mato Grosso do Sul (to the West) and Paraná (to the South). The state of São Paulo, according to the Brazilian National

system for hydrographic division, is located in the Paraná Hydrographic region with a total area of of 248.209 square Km (IBGE 05/2002).

The state is divided into 22 Hydrographic Management Units (UGRHI) corresponding to 21 River Basin Committees as shown on Map 5.1 including the São Paulo Metropolitan Area (SPMA); one of the world's largest urban agglomerations and the most urbanized, industrialized and affluent city in Brazil. The **"**State Council on Water Resources" in



Map 5.1: The 21 River Basin Committes and Hygrographic Management Units (UGRHI) in the state of Sao Paulo

São Paulo is constituted of 33 members from state secretary or representatives from the following sectors; Water Resources, Sanitation and Works, Environment, Energy, Economy and Planning, Agriculture, Health, Transportation, Science Technology and Economic Development, Sports and Tourism, Finance, Administration and Public Services Modernization. The following are the Programs established for State Plan on Water Resources, those are:

- Planning, Management, Evaluation, Information and Training;
- Multiple Use of Water;
- Effluent Treatment, pollution control, Water Quality;
- Underground Waters;
- Springs for Urban Provisioning;
- Irrigation;
- Water in Industry;
- Flood Control;
- Erosion and Aggradations (sanding up);

- Municipal districts affected by reservoirs and Springs Protection Laws;
- Inter-State and Federal coordination;
- The Private Sector participation.

The São Paulo state management system is based on three instances, on whose articulation relies the success of the state water resources management system including water provision, sanitation and environment areas conservation (Porto, PHD 5028):

- Deliberative: formed by the State Council of Hydric Resources - a collegiate entity of central level (with even representation by the State, Municipal Districts and the Civil Community, each one with 1/3 of the votes) and the River Basin Committees CBH that actuate in decentralized units associated to hydrographic basins (also with even representation of the State, Municipal Districts and Civil Society, each one with 1/3 of the votes);

- Technical: formed by the CORHI - The Coordinating Committee of the State Plan on Water Resources, whose functions comprise supporting the State Council of Water Resources and, in a decentralized form, the CBHs in formulating the State Plan on Water Resources - the PERH - a proposal integrating the Basins' Plans and the Situation Report, which serves as an instrument for evaluation the plans' execution;

- Financial: formed by FEHIDRO - The State Fund of Hydric Resources - intended to give financial support to the State Policy on Hydric Resources.

5.2. The Piracicaba, Capivari and Jundiai Watersheds

5.2.1 Geographic and administrative Characteristics

The Piracicaba, Capivari and Jundiai (PCJ) watershed area is situated the eastern portion of the state of São Paulo and is one of the five river basins located in the industrial regions of the state (Marca D'Agua 2003). The watershed considered to be of medium size with 14.042,64 km^2 is located in a sub-tropical region between the geographic longitude coordinators of 45° 50' e 48° 30' west and of latitude 22° 00' e 23° 20' south with mean annual precipitation of 1400 mm (Porto 1998).

The Piracicaba, Capivari and Jundiai rivers are tributaries from the right side of the Tiete River. The 3 main rivers forming the PCJ watershed area flow in parallel from the east to the west. The Piracicaba River flows for 250 km from its springs in "Serra da

Mantiqueira" in the state of Minas Gerais[8] to the Tiete River in São Paulo. The Capivari and Jundiai rivers flow for a distance of 180 and 125 km respectively (Marca D'Agua 2003). There are a number of effluents and creeks corresponding to these 3 rivers, thus forming the *sub* and *micro* watersheds of the PCJ area, those include; Rios Piracicaba, Jaguari, Atibaia, Camanducaia, Corumbataí, Passa Cinco e Ribeirões Anhumas, Pinheiros e Quilombo in the Piracicaba watershed (11.313,31 $km^{2)}$; Rios Capivari, Capivari-Mirim e Ribeirões Água Clara e Piçarrão in Capivari watershed (1.611,68 $km^{2)}$; Rios Jundiaí, Jundiaí-Mirim, Córrego Castanho e Ribeirão Piraí in the Jundiaí watershed (1.117,65 km^2) (Bacias Irmãs 2005).

Map 5.2. The Piracicaba, Capivari and Jundiai Watershed area

[8] **Municipalities of Camanducaia, Extrema, Itapeva e Toledo**

As shown on Map 5.2. the Piracicaba, Capivari and Jundiai watersheds are comprised of a total of 62 municipalities[9]. Amongst those 62 municipalities, 45 are totally included in the area of the watershed and 17 are partially included in the watershed. Those 62 municipalities fall under the area of jurisdiction of the PCJ river basin committee. The joining of these three river basins (including the sub and micro watersheds) forms an autonomous territorial unit declared as a Hydrographical Unit for Water Resources Management of the Piracicaba, Capivari and Jundiai rivers (URGH-PCJ) as previously shown on Map 5.1. The main cities located in the PCJ watershed are: Campinas, Piracicaba, Jundiaí, Limeira, Americana, Sumaré, Santa Bárbara d'Oeste e Rio Claro.

Table 5.1 Municipalities included in the watershed area of PCJ in function of the sub-basins

watershed	Sub-watershed	Municipalities
Piracicaba	Piracicaba	Águas de São Pedro, Americana, Campinas, Charqueada, Hortolândia, Iracemápolis, Limeira, Monte Mor, Nova Odessa, Paulínia, Piracicaba, Rio das Pedras, Saltinho, Sta. Bárbara d'Oeste, Sta. Maria da Serra, São Pedro e Sumaré.
	Corumbataí	Analândia, Charqueada, Cordeirópolis, Corumbataí, Ipeuna, Iracemápolis, Itirapina, Piracicaba, Rio Claro, Sta. Gertrudes, São Pedro.
	Jaguari	Americana, Amparo, Artur Nogueira, Bragança Paulista, Camanducaia, Campinas, Cordeirópolis, Cosmópolis, Extrema, Holambra, Itapeva, Jaguariúna, Joanópolis, Limeira, Morungaba, Nova Odessa, Paulínia, Pedra Bela, Pedreira, Pinhalzinho, Piracaia, Sto. Antonio de Posse, Tuiuti, Vargem.
	Camanducaia	Amparo, Extrema, Holambra, Jaguariúna, Monte Alegre do Sul, Pedra Bela, Pedreira, Pinhalzinho, Sto. Antonio de Posse, Toledo, Tuiuti
	Atibaia	Americana, Atibaia, Bragança Paulista, Camanducaia, Campinas, Campo Limpo Paulista, Cosmópolis, Extrema, Itatiba, Jaguariúna, Jarinu, Joanópolis, Jundiaí, Louveira, Morungaba, Nazaré Paulista, Nova Odessa, Paulínia, Piracaia,Valinhos, Vinhedo.
Capivari		Campinas, Capivari, Elias Fausto, Hortolândia, Indaiatuba, Itatiba, Itupeva, Jundiaí, Louveira, Mombuca, Monte Mor, Rafard, Rio das Pedras, Sta. Bárbara d'Oeste, Valinhos, Vinhedo.
Jundiaí		Atibaia, Cabreuva, Campo Limpo Paulista, Indaiatuba, Itupeva, Jarinu, Jundiaí,Mairiporã, Salto, Várzea Paulista.

Adopted from: Report on the status of water resources in the Piracicaba, Capivari and Jundai watersheds 2002-2003, PCJ River Basin Committee

[9] Some sources indicate that the number of municipalities included in the watershed are 76. That number is justified if considering additional 14 municipalities partially included in the watershed area but with seats in other river basin committees. For simplicity matters, the figure of 62 municipalities will be the one used in the research case.

Table 5.1 identifies the municipalities included in the sub-watersheds and the micro-watersheds under the jurisdiction of the Piracicaba, Capivari and Jundiai (PCJ) river basin committee. Map 5.3 further .identifies the micro-watersheds included in the Piracicaba sub-watershed.

5.2.2 Demographic Characteristics

The Piracicaba, Capivari and Jundiaí river basin is formed by 58 municipalities from the state São Paulo and 4 municipalities from the state of Minas Gerais. The 62 municipalities under the area of jurisdiction of the PCJ river basin committee represent a population of 4.22 million inhabitants according to the 2000 census (Marca D'Agua 2003). The residents of urban areas represent 3.97 million inhabitants (94.2%) and those of rural areas represent 250.000 (5.8%). Figure 5.1 illustrates the demographic development in the PCJ watershed for the years from 1970 to 2005.

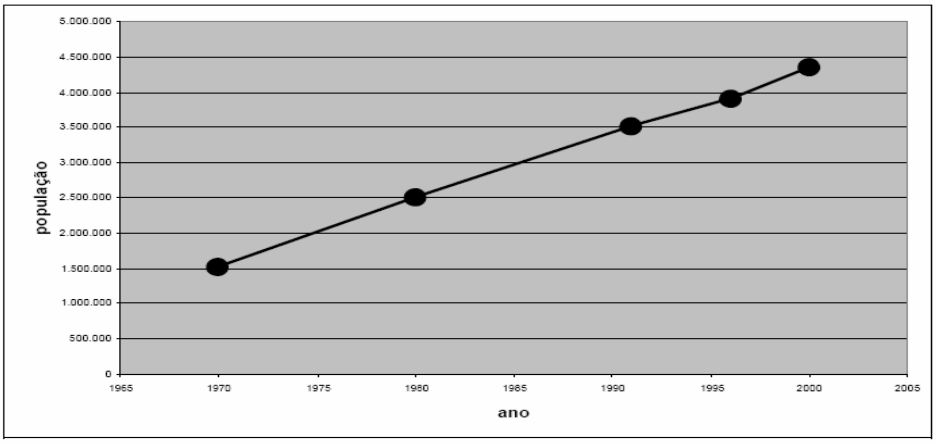


Figure 5.1 - demographic development in the PCJ watershed for the years from 1970 to 2005
Source: IPEA e IBGE

As for the level of urban development, the region of the Piracicaba, Capivari and Jundai watersheds (Map 5.2.) has witnessed significant growth rates between 1980 and 1990. The urban growth rate as presented in figure 5.2 is to a big extent a result of the industrial

development in the region and is also due to the region being one of the major centers of development in the State of Sao Paulo.

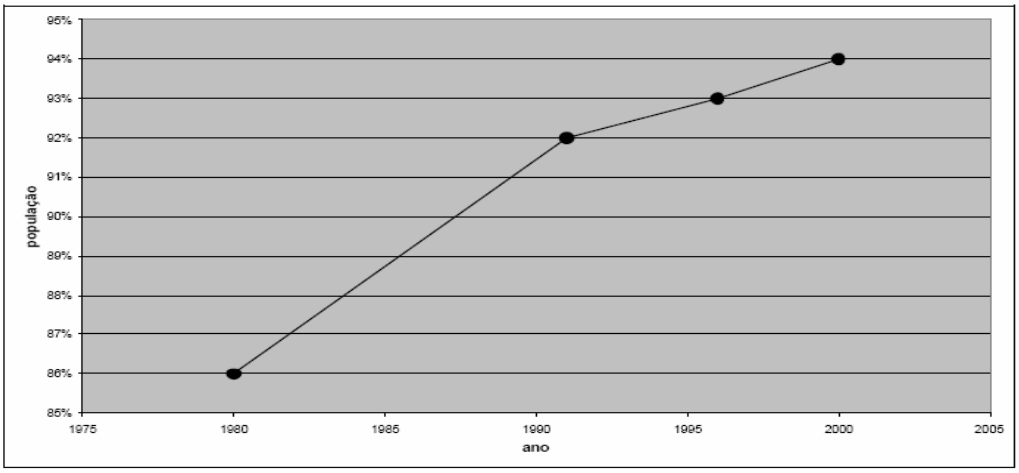


Figure 5.2. Rate of Urbanization of the municipalities included in the PCJ watershed Source: IPEA e IBGE

5.2.3. Socio-Economic Characteristics

The Piracicaba watershed constitutes a real model for a developed basin with typical environmental problems such as the lack, and low quality of the water (Favaro et al 2004). The region containing 62 municipal districts, is outstanding not only in its agricultural importance but also in the rate of industrial development in the region with over 4 million inhabitants. In accordance with the state decree number 8468, September 1976, for the classification of aquatic resources, the Piracicaba river basin had the best water quality for the reservoirs and springs (CETESB 1994). Nevertheless, given the rate of urbanization in the watershed and as the rivers pass close to the more populated urban centers, the quality fell being considered the poorest quality (CBH-PCJ 1998). Today, almost two decades later, the resource "water" in the Piracicaba watershed is heavily used to supply large urban areas and industries, to irrigate crops and to generate electricity (Porto 1998).

Water quality and scarcity is also caused by the excessive use. The industrial sector boom during the 1980s, resulted in heavy industrial and residential development. Also, during the development in the last decades, the region has attracted diverse activities with orientation to the consumption oriented and degradation of the aquatic resources. The largest consumers of water in the basin are industries (23%), domestic (23%), irrigation (8%), in addition to the amount of water which is diverted by the Cantareira system - withdrawing 33m3/second from the Piracicaba river- (46%) for exportation to the state capital São Paulo (Secretaria de Recursos Hídricos, Saneamento e Obras Estado Sao Paulo, 1997).

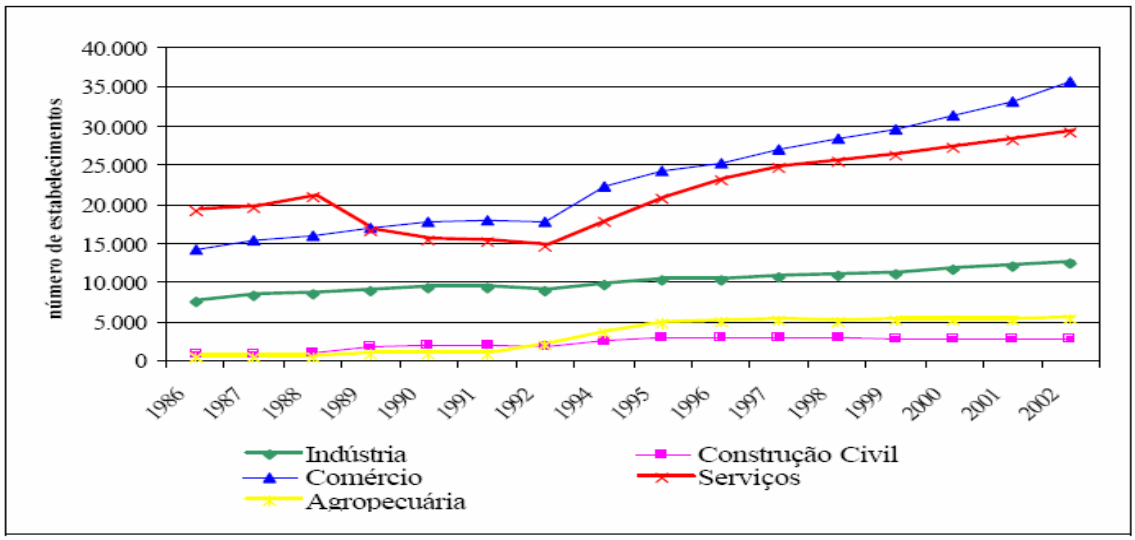
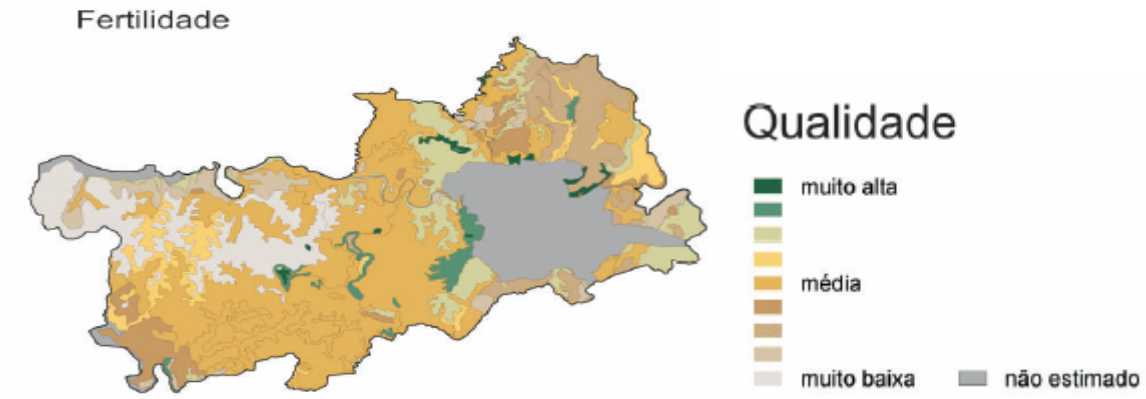


Figure 5.3. – Evolution in the economic activity per sector in the municipalities included in the PCJ watershed Source: RAIS (vários anos).

The chief economic importance of the river basin could be observed through the development in five major economic sectors since 1986 to the present as shown in figure 5.2. The growth in the sectors of commerce and services since 1992 marks the economic importance of the watershed to the economy.

Land fertility also reflects the degree of development in the watershed. Agriculture is highly mechanized and irrigated, producing crops of sugar-cane, corn, citrus and fruits, besides cattle and hog production (Porto 1998). As a result, the main soil use is by the producing crops needing large quantities of herbicides and phosphate fertilizers. To illustrate such a case, Map 5.3 identifies the degree of land fertility in the municipality of Piracicaba, one of the most urbanized municipalities in the watershed.



Map 5.3 Land Fertility in the PCJ watershed area
Source: Rural Atlas of Piracicaba 2004

5.2.4 Pollution and environmental conditions in the Watershed

Parallel with the increase in the demand for water there has been an increase in the amount of pollution by organic material from domestic and industrial sewage, since 80% of the water used returns to the rivers in the form of sewage (Favaro et al, 2003). Human activities causing significant environmental impacts include the biggest iron and steel plant complex in Latin America, large mining projects and large eucalyptus plantations (Guerra, 1993). The establishment of such activities has created an accelerated and unsustainable demand for natural resources, with the consequent negative impacts on terrestrial and aquatic ecosystems and their biodiversity, as well as on the social and economic conditions

of the local populations. Deforestation, soil erosion, water and air pollution are well-known results of the fast economic growth during last four decades (F.A.R. Barbosa et al 1999).

5.2.5 Water Supply and Demand

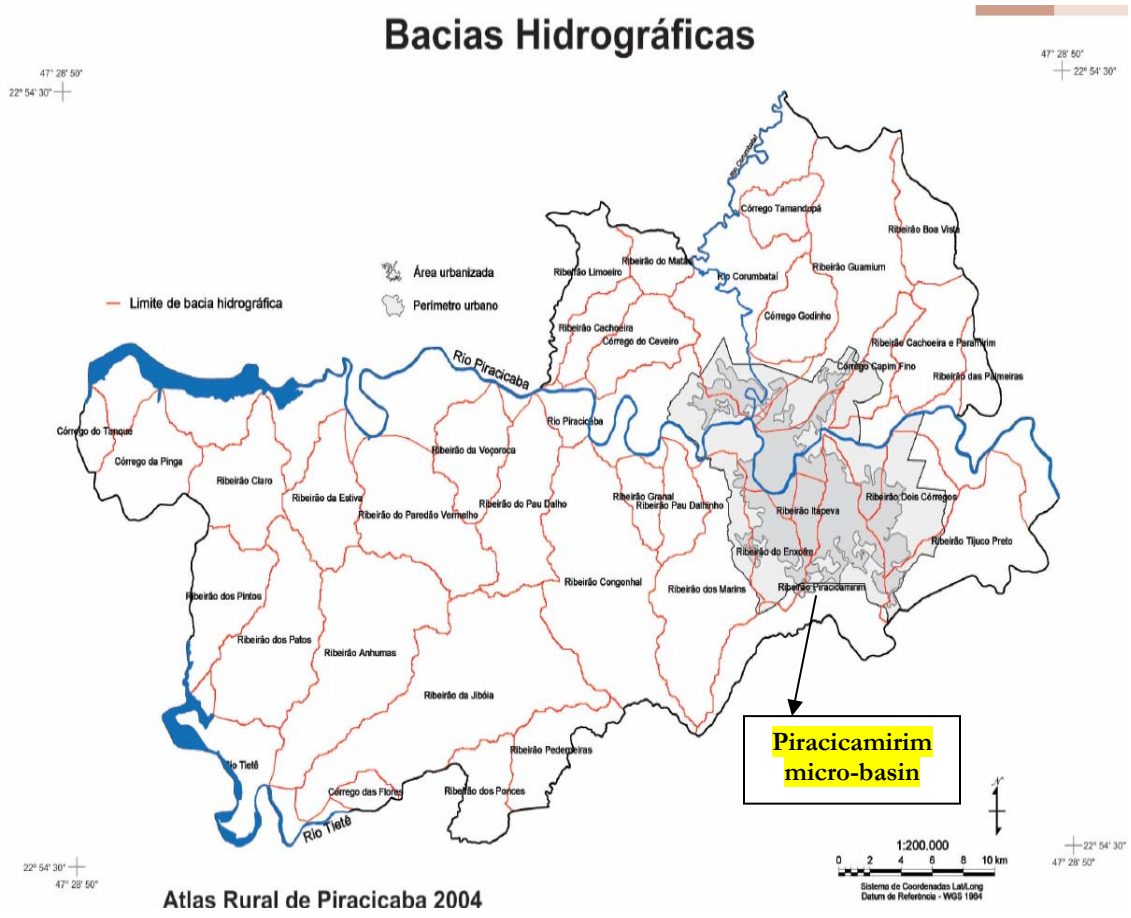
The Metropolitan Region of Sao Paulo (RMSP), is considered as the most populated and industrialised region of Latin America and the economic capital of Brazil. The RMSP hosts some 18 millions inhabitants living in 39 adjacent cities and represents an area of 8050km² of which 1500 km² are urbanized (Braga, 2000). Sao Paulo, the central municipality in the RMSP represents ¼ of the total area and half of the population. The city of Sao Paulo has been facing with water shortage since the XIXth century as the development of the water supply system has always been unable to pace with the high rates of the population growth in the area (Sabesp 2000).

In the largest industrial centre of Brazil with a high rate of urban growth, the relationship between *use* and *availability* of water is out of balance. On an average of 103,9 l/s of available superficial water of the Alto-Tiete catchment, 43,3 m3/s are captured for the domestic, industrial and agricultural demand estimated of 80,2 m3/s . Some 61,1 m3/s is necessary to attend for domestic supply (Fusp 2000). The Piracicaba, Capivari and Jundiai watershed is responsible for almost 50% of the water supply of the city of Sao Paulo (Marca D'Agua 2003), thus redirecting 33 m3/s representing 46% of the water resources from the PCJ watershed under the Cantareira system to supply the city[10]. As a result, there is not enough water to provide for all uses and there is a constant tension in regard to the application of the Cantareira system (Appendix 5.1.) (Porto 1998).

[10] The supply of the Tiete watershed also involves various inter basin water transfer including a reversion system of the natural flows of the Rio Pinheiros (one of the affluent of the Tietê), which is now only used to control flooding in the city.

5.3. The Piracicamirim micro-watershed (Pisca)

The Piracicaba, Capivari and Jundiaí watershed area is comprised of 3 main watersheds, 5 sub-watersheds and a number of micro-watersheds as presented in Table 5.1 and previously on Map 5.2. The Piracicamirim (Pisca) micro-watershed is one of various micro-watersheds included in the Piracicaba sub-watershed (Map 5.4).



Map 5.4 Micro-watersheds included in the municipality of Piracicaba

The Piracicamirim micro-watershed includes 3 municipalities from the State of São Paulo -as shown on map 5.4, those are: Piracicaba, Saltinho and Rio das Pedras, with a total course of 133 Km2 (IBGE, 1999). Piracicamirim forms the biggest urban micro-basin in the sub-basin of Piracicaba. The population in the micro-watershed is estimated to be 95.000 habitants.

The health of the Piracicamirim micro-watershed depends on the residential, economic and environmental conditions in the three municipalities included in the area. Tables 5.2 and 5.3 identify the demographic development in the three municipalities forming the Piracicamirim micro-watershed, and highlight the situation of urban settlements in the three municipalities. It should be considered however that for the purpose of the current research, the analysis will be conducted primarily on the part of the micro-watershed included in the municipality of Piracicaba (Bacias Irmas Report 2004).

Map 5.5 Municipalities in the Piracicamirim Micro-watershed

Source: Bacias Irmas Report 2004

Table 5.2.Demographic data for the municipalities of Saltinho, Rio das Pedras and Piracicaba- SP 2004

	Saltinho	Rio das Pedras	Piracicaba
Rate of annual growth of population 2000 a 2004 (em % aa)	1,45	1,92	1,65
Total Population (hab)	6.136	25.301	350.915
Demographic density hab/km2	61,98	114,48	259,36
Urbanization Rate (%)	85,22	94,40	96,91
Urbana Population (hab)	5.229	23.885	340.076
Rural Population (hab)	907	1.416	10.839

Source: Bacias Irmãs Report 2004

Table 5.3 – Data on the existence of informal settlements in the municipalities forming the Piracicamirim micro-watershed

	Saltinho	Rio das Pedras	Piracicaba
Existense of favelas	Não	Sim	Sim
Existense de Cortiços	Não	Sim	Não
Existense of Irregullar settlements	Não	Não	Sim
Existense of habitats in areas of risk	Não	Sim	Sim

Source: IBGE, Pesquisa Informações Básicas Municipais, 1999

In Piracicaba, the majority of the population concentrates in the basin's urban áreas representing around 9% of the total area of the PCJ watersheds. Maps 5.6 and 5.7 indicate the historical of the urban development in the region. Figure 5.4 further indicates the vectors of urban expansion in Piracicaba for the years 1822 to 2000. The sectors of urban expansion are divided into principle, secondary and recent sectors of urban expansion.

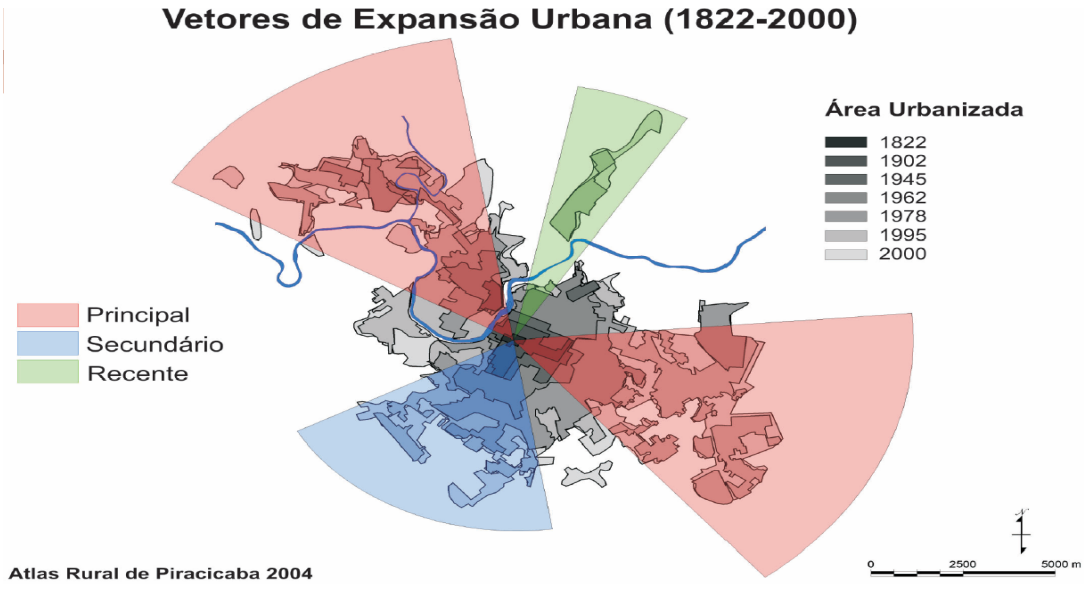
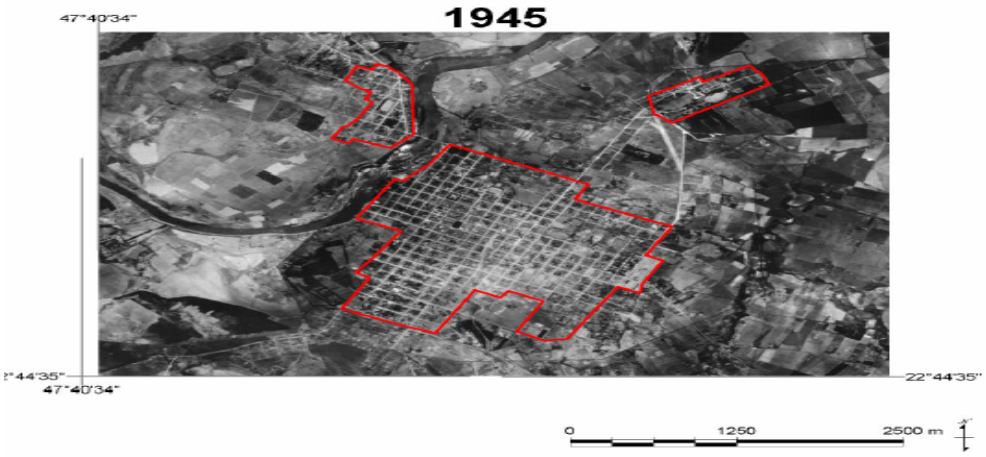


Figure 5.4 vectors of urban expansion in Piracicaba (1822 -2000)

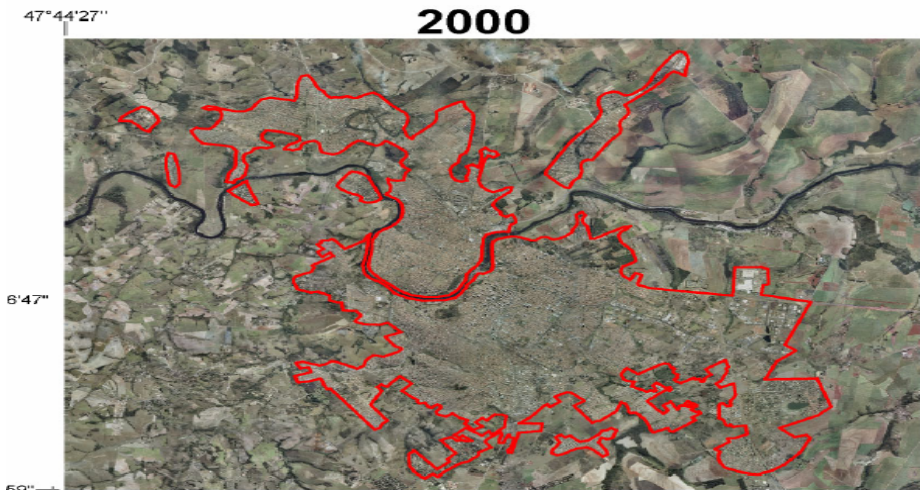
Source: Atlas Rural of Piracicaba 2004

The municipality of Piracicaba is one of 62 municipalities in the PCJ watershed. The municipality contains a large number of micro-watersheds as shown on map 5.4. The economic and urban development as well as the environmental conditions of each of these micro-watersheds varies, from a municipality to another, in function of a number of variables as highlighted earlier in this chapter. The Piracicamirim micro-watershed is an interesting case to highlight in that respect due to its economic and demographic characteristics. Agro-industry and sugar cane are the primary economic activities in the micro-watershed. The latter represents more than 60% of land use in the micro-watreshed area in Piracicaba[11](Bacias Irmãs Report 2004). The expansion of such economic activities in the watershed has imposed urban developments for the last half century as shown on maps 5.6. and 5.7.



Map 5.6. Satellite image of the city of Piracicaba and the Piracicamirim micro-watershed in 1945

[11] In the municipalities of Saltinho and Rio das Pedras the sectors of Agro-pecuaria and agro-industry represent the main sectors of financial and economic activities



Map 5.7. Satellite image of the city of Piracicaba and the Piracicamirim micro-watershed in 1945

In light of such a background, the quality of water in the Piracicamirm micro-watersheds –similar to other micro-watersheds- has been affected negatively throughout the course of the urban development. Environmental education programs have been therefore initiated in Piracicaba through the University of Sao Paulo (ESALQ) to address such problems on the micro-scale. Though the Pisca project (Appendix 5.2.) represents a strong initiative in that respect, there are other elements of participation necessary to be considered in order to evaluate the role of the civil society on such a scale (micro-watershed).

5.4. Purpose of the Case Study

Having presented the national water resources management system in Brazil as well the specific context of the watershed area under the jurisdiction of the PCJ River Basin Committee with a focus on the Piracicamirim micro-watershed, the participation of the civil society included in the PCJ watersheds will be examined throughout the next chapters. Despite the fact that there is no exact way to examine the extent of the participation of the civil society on a watershed, sub-watershed or micro-watershed level, the field work through the Sister Watersheds project activities in its chapter at the municipality of

Piracicaba examined the actions of the civil society on a micro-watershed scale (Piraciamirim) with the aim of identifying the challenges of the participation of the civil society on such a scale.

In order to do so, the following chapters will identify the institutional setup of the PCJ committee and will attempt to examine the institutional mechanisms for the civil society participation. Chapter 7 will conduct a mapping process to identify the present entities with voting power in both the federal and state river basin committees. In addition, deploying data from a series of interviews with representatives in the CBH PCJ, academics in the field of water resources management and civil society entities functioning in the municipality of Piracicaba, chapters 8 and 9 address key findings on the participation of the researched segment.

Chapter 6

Institutional Characteristics of the PCJ River Basin Committee

6.1. The emerging institutional arrangements in the PCJ river basin committee

In December 1987, the Piracicaba Capivari and Jundiaí basin was considered critical [resolution number 5 from the Water Resource Council] (FUNDAP 1991) as a result of the rapid population growth in the watershed, the various sources of pollution, in addition to the depletion of water from the river basin as highlighted in chapter 5. The present chapter explains the *evolution* of institutional responses in the Piracicaba, Capivari and Jundai watersheds leading to the establishment of the PCJ River Basin Committee with its current mandate, structure and scope of operation.

Historical Background and institutional evolution of PCJ committee

In 1988, the basins of Piracicaba, Capivari and Jundiaí in the State of São Paulo were considered a model of management by the state decree no 28.489 (Kerr do Amaral 1996). The Coordination Committee of the State Plan for Water Resources in Sao Paulo (Comitê Coordenador do Plano Estadual dos Recursos Hídricos CORHI) established a "Technical Group" [Grupo Tecnico do Piracicaba (GTPI)] including technicians from various state organs as a diagnosis group for the watershed restoration FUNDAP (1991). In addition to such an initiative, the region has been also studied by several agencies with multilateral support as a result of the public pressure to conserve the river basins (FUNDAP 1994). Several of these studies jointly with the work of the CORHI have contributed to the conception of the PCJ river basin committee (CBH PCJ).

The establishment of the PCJ committee has been later on facilitated by the law 7663/91 (Marca D'Agua 2003). creating the State Water Resources Management System

in the state of São Paulo in 1991. In 1992, an Executive Group (Grupo Executivo- GEX) has been established as a subordinate entity of the Ministry of Energy and Sanitation (Secretaria de Energia and Saneamento) with the main responsibility –amongst others- to elaborate a proposal and a report on the state of the Piracicaba and Alto Tiete rivers (Marca D'Agua 2003). The elaboration of this work took place in collaboration with a technical group from the Departamento de Agua and Energia Electrica DAEE, the Secretary of Environment and Planning (Secretaria de Meio Ambiente/ Coordenadora de Planejamaneto Ambiental (SMA/CPLA) and the Foundation for Administrative Development (Fundação do Desenvolvimento Administrativo (FUNDAP)) (Marca D'Agua 2003). The main goal of the committee installation group was to be "representative, legitimate, and democratic, aiming at the integrated management of water resource in the basin" (FUNDAP, 1994). It intended also to "stimulate the different social actors to collaborate and to legitimize the new arrangement that could not be imposed" (Ibid). In that respect, some difficulties faced by the installation team were to establish fair participation criteria and novelty. It took 15 months to install the committee, from September 1992 to November 1993. At last, in November 1993, the representation inside the committee was considered legitimate by all actors involved. Until the installation meeting, 40 meetings have been undertaken including the state, municipal and civil society entities during a period of 5 months, establishing a fair level of participation and legitimacy for the different entities.

Such an initiative marks the birth of a new policy network has been resulting in the first River Basin Committee created in the State of São Paulo –and in the country- for the basins of Piracicaba-Capivari and Jundiai. The mobilization of various actors aimed at addressing the following issues (H. Kerr Do amaral 1996);

i. the crisis of the former institutional arrangement.
ii. The exhaustion of the financing pattern threatening the stability of private-public sector relations
iii. the growing concern with environmental quality
iv. the increase of disputes related to the allocation of water amongst different users

6.2. Institutional Setup for the PCJ-CBH and PCJ Federal

As a result of the above mentioned developments, the PCJ committee has been established on the18th of November 1993 (FUSP 2000) as the first River Basin Agency created in the State of Sao Paulo – and in the country- for the basins Piracicaba-Capivari and Jundiaí. The outcome hás been a joint effort that has regrouped in the River Basin Committee, the Consortium of cities of the Piracicaba - Capivari region, users, local institutions, and the State government. Later on, the Federal river basin committee for the Piracicaba, Capivari and Jundai watershed has been established under the Federal law of 1997. The Federal river basin committee of the Piracicaba, Capivari and Jundiai rivers (PCJ Federal) has been created by the decree for the president on May 20th 2002 in accordance with the federal law no. 9.433/97 designated at the 20th ordinary meeting of the stadual committee (Sao Paulo)(Marca D'Agua 2003). The watershed is declared as federal territory because it involves more than one state. In this case, those are the State of Minas Gerais and Sao Paulo. The state law differs from the federal law in respect of the percentage of the members defined for the participation of each segment (municipal government, water users, civil society) inside the River Basin Committee as will be projected in Chapter 7 (Mapping process). It should be also noted that the Federal and State basin committees possess each different areas of jurisdiction as some rivers are declared federal and others state. The corresponding areas of jurisdiction influence the decision making power in regards to a specific debate or any other negotiated matter.

6.3. Mandate PCJ

There are overlapping responsibilities amongst the state (CBH PCJ) and the Federal committees (PCJ Federal) for the PCJ watershed. The CBH PCJ and the PCJ Federal river basin committees proposed actions are (Porto 1998):

(1) To decentralize management of the water resources, with public participation and integration of water quantity and quality aspects;
(2) To implement a bulk water-charging system;
(3) To implement a cost sharing process in multiple-use water resources works;
(4) To coordinate action in critical events;
(5) To allocate water use with the objective of maximizing social bene® ts;
(6) To establish priority criteria to allocate state funds for investment;
(7) To arbitrate on conflicts between users.

6.4. Financing Mechanisms

The State Fund of Water Resources (FEHIDRO) receives budgetary resources from the State and Municipal Districts, provided by the financial compensation received by State from the Union for hydrologic power use, by national and international loans, and, in the future, by charging for water use. The FEHIDRO is supervised by a Guiding Council, the COFEHIDRO - Guiding Council of the State Fund of Hydric Resources, which is also composed by three parties (State, Municipal Districts, and the Civil Society), to whom rests to guide and approve the Fund's funding and resources application in consonance with the objectives and goals established in the State Plan for Water Resources (PERH). There is also a direction in the watershed with the main target of bringing together the government and users in order to increase funding from multilateral agencies. Such action is based on the argument that common objectives and extensive participation of all users will lead, to the maximization of social benefits. The expectation is to invest US$1 billion during the next 10 years, mostly in drinking water systems, wastewater treatment, soil conservation programmes, urban and agricultural pollution abatement and environmental education (Coplaenge 1999).

A future Financing mechanism is the instrument of "Cobranca de Agua" or Water use charge, and is currently a subject of debate inside the River Basin Committee. Among the assignments of the PCJ Committee, -whose area of jurisdiction includes territories in the States of Minas Gerais and São Paulo, is to determine the amount of the taxes on the use of "federal rivers", such as the Jaguari and Piracicaba Rivers. The resources thus raised will be managed by the National Water Agency (Agência Nacional de Águas – ANA), which will return the funds to the river basins where they originated, based on recommendations made by the River Basin Committee. The expectation of technicians and regional authorities is that this water tax paid on a federal level, which will be put into effect by means of presidential decree, will accelerate the approval of the São Paulo State bill by the legislature.

6.5. Structure of the State (CBH PCJ) and the Federal (PCJ Federal) River Basin Committees

The state law differs from the federal law in respect of the percentage of the members defined for the participation of each segment (municipal government, water users, civil society) inside the River Basin Committee. Table 6.1 Identifies the structure of the Federal (1997) and State (1991) River Basin Committees for the Piracicaba, Capivari and Jundiai watersheds.

The Piracicaba, Capivari and Jundiaí River Basin Committee is composed of representatives of the central and state level governments (Minas Gerais and São Paulo states), municipal governments (62 municipalities whose territories are partially or totally within the basin area), private sector and legitimate representatives of civil society organizations sharing concerns for water issues (ANA 2005). In accordance with law 9433/97, the composition of the river basin committee is divided amongst the government,

	PCJ Federal – Federal Committee	CBH PCJ State Committee
Members	**50**	**51**
Representantes do Poder Público	**40% (20 membros)** - **03 Federal (União)** - **04 Estado de SP** - **03 Estado de MG** - **08 Municípios de SP** - **02 municípios de MG**	**1/3** - **17 representantes de órgãos do Governo de SP**
Representantes de Usuários de Recursos Hídricos	**40% (20 membros)** - **17 Estado de SP** - **03 Estado de MG**	**1/3** - **17 prefeitos municipais**
Representantes de Organizações Civis	**20% (10 membros)** - **09 Estado de SP** - **01 Estado MG**	**1/3** - **17 Entidades da Sociedade Civil**

Table 6.1 The structure of the Federal (1997) and State (1991) River Basin Committees for the PCJ watershed

the water users (those with an economic use of water) and the communities. The public power entities represent 40 % of the composition of the committee and include the state and municipal governments as well as the federal agencies where applicable. The water users segment forms 40 % of the committee. The entities communities representing the remaining 20 % are comprised of four civil society entities, those are; universities and research institutions, environmental entities, labor unions and workers' groups and the consortiom (PCJ 2003).

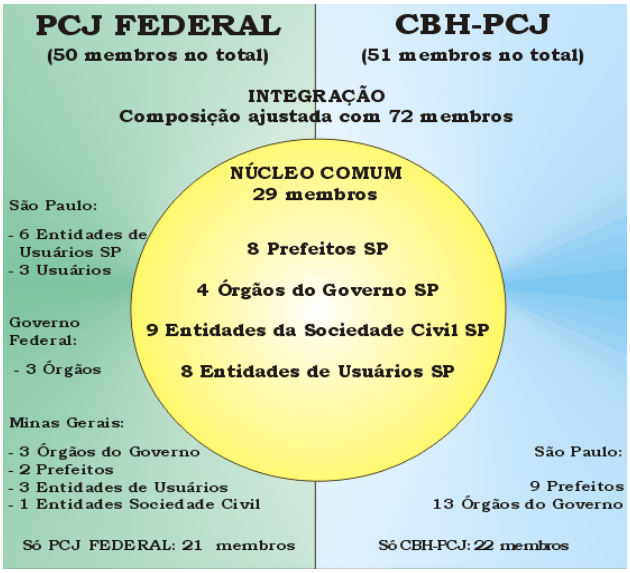


Figure 6.1 Composition of the state and federal Committees PCJ

6.6. The Consortium of the PCJ watershed

The Piracicaba, Capivari and Jundiaí (**PCJ) Consortium** is a private non-profit organization with the purpose of recovering and protecting water resources in the designated watershed area. The Consortium PCJ was created as a result of the need to have a regional body to resolve issues related to water resources in the PCJ region given the existence of economic and industrial centers such as the region of Campinas, in addition to areas with high rate of urban development such as Piracicaba.

Initiated in 1989 -simultaneously with the elaboration of the water resource system by the public sector, the mayors of all municipalities located in the basin decided to create a forum for integrated action regarding sewage and solid waste treatment and disposal, environmental protection and education, among other actions, to ensure proper water quality. The Consortium involved 11 cities, a number that has grown today to 39 cities and 36 companies (Gazetta da Piracicaba 2005). The consortium also contributes to the

economic, social and environmental sustainability of the region by focusing on the areas of: Cities Support; Technical Cooperation; River Basins Management; Industrial and Urban Waste Treatment; Domestic and Health Solid Waste Management; Protection of Water Springs for Public Supply; Public Water Distribution Systems Management; Replanting Forest Areas, and Environmental Education (Kerr do Amaral 1996). The PCJ Consortium has assisted the creation of other similar initiatives, which utilize sound management practices such as: cost recovery, budgeting and priority definition, executive secretariat structure, environmental education, participatory process model and methodology, etc. The experience has contributed to the definition of a River Basin Management Policy.

The Consortium has four functional organs:

- the council of municipalities (mayors and representatives of companies, members of consortium)
- a fiscal council (representatives of city councils)
- an assembly of entities (representatives of civil society)
- an executive secretariat (technical team)

In June 1996 after changes made to bylaws, new members joined the consortium (public and private companies). More than a non party political entity, the consortium became legally an association of public and private end users of water than presently includes xx municipalities and xx companies.

Main Accomplishments of the Piracicaba- Capivari and Jundiai Consortium:

- regional awareness of environmental problems
- general plans and projects for sewage treatment in 17 municipalities
- general water abstraction and production plan for the piracicaba capivari river basins
- practical experience in technology for sewage treatment in cosmopolis and rio claro treatment plants
- development and execution of the water spring protection project, that has already planted approximately one million trees
- increase in domestic sewage treatment rate from 3% to 12%
- initiation of the solid waste program

- development of awareness and environmental education, the water week, involving more than 160 thousand students
- Project of international cooperation with the seine-normandy water agency, ADEME and CUD (France) and the Jucar Hydrographic confederation (spain).

Chapter 7

Mapping of the civil society in the PCJ river basin committee

"How we decide and who gets to decide often determines what we decide"
(World Resources 2002-2004)

Stakeholders in the State River Basin Committee for the Piracicaba, Capivari and Jundiai watersheds (Comitê do Bacia Hidrografica CBH PCJ) and the PCJ Federal watershed committee (PCJ Federal) are comprised of the segments of the civil society, water users and government representatives on both levels; the municipal government and the state agencies. Civil society could be defined as the organized forms of institutions, movements and associations, often non-governmental and not for profit. Users are defined as all the entities with economic and commercial use of water; those could be private or public user organizations. Government representatives are from the state and the municipal bodies and organs including local governments, municipalities and federal agencies. The following chapter provides a generic mapping for all actors involved in the Piracicaba watershed and in the PCJ River Basin Committee. The aim of the mapping process is;

i) To identify all entities of civil society in the PCJ River Basin Committee with a voting power in the committees (CBH PCJ and PCJ Federal)
ii) Highlight the institutional links between civil society segment and other actors in the CBH PCJ
iii) To identify excluded civil society entities on the micro-watershed level.

The mapping exercise is a stepping stone in the research process that will allow to further analyse the challenges of the participation of the civil society in the political decision making process in the PCJ River Basin Committee.

7.1. How is the civil society included in a River Basin Committee?

The process to include the civil society in the watershed committee is the following; the executive secretary of the committee (Department for water and Electric Energy DAEE

in the case of PCJ CBH) announces the procedures for the election process, where the entitites register and get their statutes revised. Following this process, the executive secretary (DAEE) prepares a list of all the qualified entities (criteria based on status and statutes), classifying them in 8 groups: scientific associations, technical associations related to water management, union organizations related to water resources, sanitation and environment, associations to defend the environment, entities with commercial use of water, services and leisure, agricultural users, industrial users and public agencies for water provision. A new modification has been added by re-classifying the civil society entities in 4 categories, as shown in the next section (NEDER, 2002).

7.2. Considerations in the Mapping process

- In both committees CBH PCJ and PCJ Federal, the 3 segments forming the institutional setup are defined as follows;

  Segment A: Government – Defined as public entities on the state and the municipal levels. In the latter case those are usually the county's (Prefeituras) secretary for environment.

  Segment B: Water Users – Defined as all the entities with an economic use of water. Those are classified in the following categories; Water provision, Industry, Agriculture, and Fishing/ leisure/ Tourism.

  Segment C: Civil society – Defined under four categories of institutions and organizations, those are;
  Actor1: Universities, Institutes for higher education and Research & Technological Development entities.
  Actor2: Labor Unions, Non-Governmental technical associations and community associations
  Actor3: Environmental Entities
  Actor4: Consortium and inter-municipal associations of a watershed/river basin.

- The state river basin committee (CBH PCJ) possesses a majority of government representatives classified in municipal and state representatives each possessing 17 votes (2/3 of total voting power).

- The proportion of government representatives in the Federal river basin committee (PCJ Federal) is less than the one in the state committee. In PCJ Federal the

government votes combined form 40% of the total voting power. The Civil society segment possesses 20% of the voting power and the Water users segment possesses 40% of the voting power.

- Aside from the area of jurisdiction, it should be considered that the structure of the state watershed committee (CBH PCJ) and the PCJ Federal watershed committee differ in one major aspect. That is, the users and the civil society are put in the same category in the state committee CBH PCJ under the category of the civil society whereas they are treated separately in the Federal committee under two different categories; water users and civil society.

- This implies that the total voting power granted for both of these sectors in the state (CBH PCJ) river basin committee is only 1/3 versus 2/3 of the votes to both the state and the municipal public powers. In PCJ Federal watershed committee, the water users possess 40% (20 votes) of the total voting power. The civil society in this case possesses 20% (10 votes) of the total voting power.

- The State of Minas Gerais is included in the PCJ Federal watershed committee as the rivers forming the Piracicaba, Capivari and Jundiai watershed cross the state borders of Sao Paulo and Minas Gerais. As a result, the latter possesses some seats in the PCJ Federal committee as indicated in table 7.1.

- The state watershed committee and the Federal watershed committee conduct in conjunction with each other the plenary meetings. The existence of a common nucleus facilitates such a process. Voting powers are separated though when it comes to discussing issues pertaining to the Federal Rivers.

- The CBH PCJ and PCJ Federal are comprised of 11 Technical Rooms to which are affiliated a number of working groups defined by themes. Those are shown in table 7.4.

- Actors from different segments have the right to participate in one or more of these technical rooms even if they do not possess a voting power. All issues are discussed in the Technical Committees and then transferred to the plenary for voting.

- This further implies that the participation of the civil society is not only restricted to those who posses a voting power. Various entities and movements participate in various Technical Committees (Camaras Technicas) and participate in the debate on certain questions and themes of discussion of importance to the watershed society and water users.

7.3. Voting power of various segments inside the PCJ River Basin Committee

As shown in figure 7.1, the voting power for the civil society segment in the CBH PCJ and PCJ Federal is not equal. In the former, the civil society segment possesses 17

votes and is equal to the other 2 segments of public power (municipal and state). In PCJ Federal, the civil society segment has access to only 20 % of the votes in the committee whereas the sectors of public power and water users receive 40% each. Actors with voting power participate and vote through a plenary for the river basin committee. The participation of other entitites in the river basin committee is also open for all segments of the society to participate in the 11 thematic technical cameras. Voting power is not granted however in this case. The following section identifies the entities of the civil society with voting power to further allow measuring and analyzing its status and power in decision making inside the river basin committee.

State Committee (Law 7.663/91)	Federal Committee (Law 9.433/97)
a- Public Power = 34 members State 17 + Municipalities 17 b- Users = 8 member c- Civil Society = 9 members Uni + NGOs + Unions + Consorcium	a- Public Power = 40% = 20 members (Union + State (SP+MG) + Municipalities (SP+MG) b- Users = 40% = 20 members (Abas + Industria + Agric. + Pesca/Lazer/Turismo c- Civil Society = 20% = 10 members Uni + NGOs + Unions + Consorcium
Public Power 34 members	**Public Power 20 members**
Government of the state of Sao Paulo = 17 members	Union = 3 members
	Government of the state of Sao Paulo = 4 members
Municipalities from the state of Sao Paulo = 17 members	Government of the state of Minas Gerais = 3 members
	Sao Paulo Municipalities = 8 members
	Minas Gerais Municipalities = 2 members
Users 8 members	**Users 20 members**
Water provision = 3 members	Water provision = 6 members (SP)
Industry = 2 members	Industry = 2 members (SP)
Agriculture = 2 members	Agriculture = 2 members (SP)
Fishing/ leisure/ Turismo = 1 member	Fishing/ leisure/ Turismo = 2 members (1SP+1 MG)
Civil Society 9 members	**Civil Society 10 members**
Consorcium= 1 member	Consorcium= 1 member (SP)
Universities and research institutions = 2members	Universities and research institutions = 2 members (SP)
Unions and Technical Organizations = 2 members	Unions and Technical Organizations = 2 members (SP)
Environmental entities = 4 members	Environmental entities = 5 members (4 SP + 1 MG)

Table 7.1. Rights to vote in the CBH PCJ and PCJ Federal all segments included

7.4. Mapping of the State watershed committee CBH PCJ

7.4.1 Actors with voting power in the CBH PCJ

Segment A: Municipal Government (Prefeituras)

In the CBH PCJ, the *municipal segment* is comprised of 17 representatives with a right to vote from the municipal prefeituras included in the watershed (Appendix 7.1). Each Municipal County (Prefeituras Municipais) includes a body that conducts the urban planning of the municipality according to a directive plan including; construction licenses, land use, economic planning, puclic works, the planning and management of the environment and the administration of municipal parks (Coplaenge 2003).

Segment B: State Government

The *state segment* is comprised of 17 representatives from the federal and state levels from a variety of agencies as shown in table 7.2.

Secretariat of Energy, Water Resources and Sanitation
State Secretary for the Environment
Secretariat of Agriculture and Water Provision SAA
Ministry of Health - DIR XV
Secretary for Planning
State Secretary for Transportation
Secretary of Science, Technology, Economic Development and Tourism
Secretary of Finance
State Secretary for Youth, Sports and Tourism
Department for Water and Electric Energy DAEE
CETESB company for Technology and Environmental Health
Foundation for Forestry Production and Conservation
SABESP Sao Paulo state company on water sanitation
CODASP Sao Paulo Company for Agricultural Development
4th Company for Environmental Police in Campinas - SSP-SP
Secretariat for Social Assistance
State Secretary for Education

Table 7.2. Representatives with rights of vote from the State segment in the CBH PCJ

Segment C: Civil Society and Water Users

Civil society and water users entitites with right to vote in CBH PCJ are shown in table 7.3.

ASSEMAE ASSEMAE National Association for Municipal services on Sanitation
ASSEMAE ASSEMAE National Association for Municipal services on Sanitation
Industrial Federation of the State of Sao Paulo
BRACELPA Brazilian Association of Cellulose and Paper
Rural Union of Piracicaba
Rural Union of Campinas
Rural Union of Rio Claro
GRUDE Group of Ecological Protection for the PCJ Basins
UNICAMP State University of Campinas
ESALQ – USP Escola Superior de Agricultura "Luiz de Queiroz"
AEAP Association of Engineers and Architects of Piracicaba
AEAL Association of Engineers and Architects and Agronomist of Limeira
SORIDEMA Rio Claro Society for Environmental Protection
PreservAÇÃO Association for Environment Protection of Limeira
INEVAT Institute for Studies of Vale do Tietê
ELO Ambiental
Inter-municipal Consortium of the PCJ Basins

7.4.2. Technical Committees and Working Groups (Camaras tecnicas e Grupos de trabalho)

The CBH PCJ is comprised of 11 Technical Committees (Camaras Tecnicas CT), the themes of these committees are;

Technical Committees	Working Groups
Underground Water CT-AS	Installation of Water Agencies in PCJ watersheds
Environmental Education	Areas of environmental Preservation
Integration and Diffusion	License Renewal for Cantareira system
Hydrologic Monitoring	Water use Charge
Licenses and Permits	Elaboration of proposals for monitoring and fiscalization of underground water in the watershed
Basin Plan	Studies and suggestions for the Corumbatai river
Planning	Criteria Elaboration for the State Fund of water Resources FEHIDRO
Conservation and preservation of water resources	Criteria Elaboration for EIA
Sanitation	Monitoring the Cantareira system
Environmental Health	Studies and proposals for Pirai River
Rural Development	

Table 7.4. Technical Committees (Camaras Tecnicas CT), Working Groups(Grupos de Trabalho GT) in the Piracicaba, Capivari and Jundiai River Basin Committee

7.5. Mapping of the civil society in PCJ Federal watershed committee

7.5.1. Actors with voting power in PCJ Federal

In the federal committee of the PCJ river basin -established by law no. 9.433 for 1997, the government representatives are divided in two categories; the municipal authorities –usually presented by the municipal mayors- and the representatives from the state agencies with technical knowledge related to water resources management. Each of these segments possess 10 voting power, thus their 20 votes constitute 40% of the voting power in the PCJ Federal River Basin Committee. The municipal segment is comprised of 10 representatives with a right to vote from the **municipal government (prefeituras)** included in the watersheds. The state agencies representatives are usually representatives from the institutions with a technical link with water resources management, those are presented in table 7.5.

Segment A: Government

The Governmennt segment is comprised of a variety of federal and state agencies, those are;

SERHS Secretariat for Energy, Water Resources and Sanitation
SMA State Secretariat for Environment
SAA Secretariat for Agriculture and Water Provision
State Secretary for Health - DIR XV – Piracicaba
SEMAD-MG State Secretariat for Environment and Sustainable Development
IGAM-MG Institute for Water Management
FEAM-MG State Fund for Environment
SRH-MMA Secretariat of Water Resources of the Ministry of Environment
Ministry of Health
SNSA-Ministry of cities, National Secretariatof Environmental Sanitation

Table 7.5. Voting Power for the State agencies representatives from the institutions with a technical link with water resources management

Segment B: Water Users

The Users segment is comprised of 20 actors with a right to vote representing 40% of the power of decision making inside the PCJ Federal river basin committee, those are;

SECTOR	ACTOR WITH VOTING POWER
Urban Provision	ASSEMAE National Association for Municipal services on Sanitation
Urban Provision	ASSEMAE National Association for Municipal services on Sanitation
Urban Provision	ASSEMAE National Association for Municipal services on Sanitation
Urban Provision	ABCON Brasilian Association for public services on water and waste treatment
Urban Provision	SABESP Sao Paulo state company on water sanitation
Urban Provision	SABESP Sao Paulo state company on water sanitation
Urban Provision	CODEN Nova Odessa Company for Development
Industry and Mining	FIESP Industrial Federation of the State of Sao Paulo
Industry and Mining	BRACELPA Brasilian Association for Paper and Cellulose
Industry and Mining	UNICA Agro-industry union in Sao Paulo
Industry and Mining	CIESP –Industrial Centre for Santa Bárbara D´Oeste- State of Sao Paulo
Industry and Mining	CIESP – Campinas Industrial Centre São Paulo
Industry and Mining	SINCER Industry Union for Construction and Ceramics of Santa Gertrudes
Industry and Mining	SinMec Industry Union of Metal, Mecanics and Electricity of Cambuí, Camanducaia, Extrema e Itapeva
Irrigation	Rural Labor Union of Piracicaba
Irrigation	Rural Labor Union of Campinas
Irrigation	Rural Labor Union of Rio Claro
Irrigation	Union of Rural Producers
Irrigation	GRUDE Group for Ecological protection for the Piracicaba River Basin
Fishing and tourism	Association of Turism Network Serras Verdes do Sul de Minas

Table 7.6. Voting Power for the water users segment in PCJ Federal

Segment C: Civil Society

The Civil society segment is comprised of 10 entities with a right to vote representing 20% of the power of decision making in the PCJ Federal river basin committee, those are;

UNICAMP Universidade Estadual de Campinas
ESALQ – USP Escola Superior de Agricultura "Luiz de Queiroz"
AEAP Association of Engineers and Architects of Piracicaba
AEAL Association of Engineers and Architects and Agronomos of Limeira
SORIDEMA Rio Claro Society for Environmental Protection
PreservAÇÃO Association for Environment Protection of Limeira
INEVAT Institute for Studies of Vale do Tietê
ELO Ambiental
AME – Environmental Association of Extrema
Intermunicipal Consortium of PCJ Basins

Table 7.7. Voting Power for civil society segment in PCJ Federal

7.6. Concluding Remarks on the mapping process:

1. The Governance of the Piracicaba, Capivari and Jundai watersheds belongs to a stadual and a federal basin committee. This is due to the fact that the Piracicaba river springs in "Serra da Mantiqueira" in the state of Minas Gerais to the Tiete river in São Paulo passes through the state of Minas Gerais and the state of Sao Paulo as per federal law 9.433/97.

2. The Stadual Basin Committee of Rios Piracicaba, Capivari and Jundiai (CBH-PCJ) was created in 1991 according to the state law 7.633. The installation of the committe took place only in 1993 as the first basin committee in the state of São Paulo and in Brazil.

3. The Federal Basin Committee of Rios Piracicaba, Capivari and Jundiai was created in May 2002. The River Basin Committee, according to Brazilian Water Law no. 9.433 (1997), is part of the National Water Resources System. It is designated to function as a water parliament and its composition is fixed by law. It includes water resources stakeholders, local authorities, organized civil society and government.

4. The Department of Water and Electric Energy (DAEE) holds the position of the Executive Secretariat of the PCJ River Basin Committee (RBC). The DAEE provides the physical space as well as the administrative arangements for the functioning of the PCJ stadual and federal committees.

5. The Technical Committees (Camaras Tecnicas) are an innovative negotiation space that allows the unconditional participation of the different segments of the society and the economy. The technical committees discuss various proposals and suggestions for action according to the theme of the committee before transferring the matter to the Technical Committee of Planning who by turn transfers it to the committee plenary.

Chapter 8

Analysis and Discussion

"*Decentralization has, not only an administrative value, but also a civic dimension, since it increases the opportunities for citizens to take interest in public affairs; it makes them get accustomed to using freedom. And from the accumulation of these local, active freedoms, is born the most efficient counterweight against the claims of the central government, even if it were supported by an impersonal, collective will*."

A. DE TOCQUEVILLE

8.1. Research Context and Analytical Framework

Viewed in the context of geo-hydrological boundaries shaped by river basins, Integrated Water Resources Management (IWRM) can place enormous demands on institutions to synchronize the use of natural and social systems. The role of such institutions is to produce optimum results in the form of lower levels of resource conflicts, reduced deforestation and soil erosion in catchment areas and improved livelihoods of the rural populations (Marca D'Agua 2005). Gottfried (1992) adds that the economic value of a river basin may be increased when institutional mechanisms evolve to synchronize inter-linkages of different land uses and inter-sectoral competition for water.

In Brazil, laws 7.663/91 and 9.433/97 established respectively the state and the federal basin committees, for the Piracicaba, Capivari and Jundiaí watersheds, thus translating decentralization ideas and debates into reality. It should be noted however, that in order to arrive to this end, 15 years of contradiction and disputes around democratization of the water resources sector have elapsed on questions such as: centralization/decentralization, use for energy/public supply or irrigation, federal government/state and municipal government control and, economic development/environmental preservation (Porto 1998). Along with all these debates and changes related to the management of water resources in the country, the participation of

civil society has been also translated into reality, through the tripartite structure of the river basin committees in the state of Sao Paulo and in the country as a whole. This reality, however, still faces additional and ongoing challenges, hence the objectives of the current research case study.

The previous chapters intended to project the physical/environmental characteristics and the demographic trends (chapter 5) of the Piracicaba, Capivari and Jundiaí watersheds as well as the corresponding institutional arrangements (chapter 6) of their river basin committee (CBH PCJ). Chapter 7 served as a mapping process to identify the civil society entities involved in the decision-making process within the PCJ Federal and State committees. In light of this background, chapters 8 and 9 aim at addressing the research questions previously mentioned in chapter 1. Accordingly, figure 8.1 highlights a three-dimensional analytical framework for watershed management structures. Those are classified into: Management system elements, management activities and the management process. *The current research focuses on the management system elements with a special attention to the institutional arrangements of river basin committees in Brazil.*

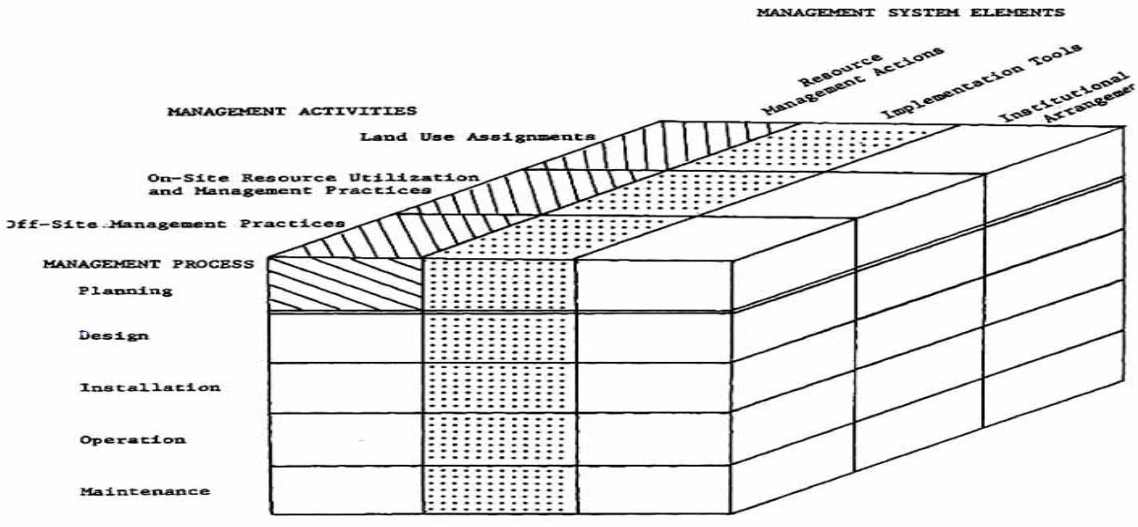


Figure 8.1 Examples of watershed management tasks required at the planning stage, classified by management activities and management system elements. SOURCE[1] Strategies, approaches and systems in integrated watershed management FAO Corporate Document Repository online

8.2. Participation and Democracy in Water Resources Management:Basic Challenges

On the one hand, literature predicts that decentralization can make environmental decision-making more accessible to civil society communities and their representatives (Ribot 2002), hence increasing the relevance of those decisions and the likelihood they will be implemented. An important consideration on the other hand however should be that *decentralization can also occur in ways that leave the status quo—central government dominance of decision-making—largely unchanged, with little benefit to the environment or local empowerment* (World Resources Institute 2003). Therefore, there should be an understanding of the basic problems associated with decentralization in any given context. Those are classified into 5 risks (FAO RED-IFO Model 1997);

Risk 1. The Replacement of Supply-Driven Intervention with Demand-Driven Intervention

"In centralised systems, development policies are at the top level by central government authorities and not taking into account the demands of local populations."

Risk 2. Asymmetry in Information

"The concentration of information at the central level of government takes away from local populations the possibility of knowing the institutional, economic and technological context in which they live, and participating effectively in policy determination."

Risk 3. Paternalistic Legacy (leading to diminishing support services)

"From the point of view of centralized policy makers, onlt state interventions could correct the failures of the market, and open the way for development. This paternalistic approach maintained that rural populations could not effectively use the institutions of the market because they had neither the capacity to do so nor the resources to find solutions to their own problems."

Risk 4. The tradition of Clientelism (leading to the capture of decentralization)

"The asymmetry in levels of organization on the local level could translate into the capture of functions and resources transferred under decentralization, by local elite, municipalities, and the most organized and richest organizations."

Risk 5. Institutional Rigidity and the Pace of Decentralization

The inflexibility of centralized institutions and that of civil society organizations do not allow such entities to adapt in the required time frame to the challenges of decentralization policies. It is not enough to adopt decentralization, it must be implemented in a coherent fashion that varies from one context to the other."

8.3. Realities and challenges in the context of the Piracicaba, Capivari and Jundiaí River Basin Committee (CBH PCJ)

The above mentioned challenges for decentralization and hence participation of the civil society in environmental decision-making depend on a number of variables and considerations which vary from one watershed to the other. In the context of the Piracicaba, Capivari and Jundiai River Basin Committee those can be classified in 3 categories: the socio-economic considerations of the PCJ watersheds, the political considerations for the water management system on the state and the federal levels; and the institutional and operational context of the PCJ basin committee. The aim of the following section is to highlight such realities in order to be able to put the above mentioned challenges of decentralization into context and hence apply it to the current research case study in the Piracicaba, Capivari and Jundiai (PCJ) watersheds.

8.3.1. Socio-Economic Considerations

In the researched area (PCJ), the industrial, economic and agricultural activities in the watersheds contribute 9% of the GNP of Brazil. The demand for water resources therefore reflects socio-economic realities, especially that there is a high level of investments directed towards the agricultural and inductrial sectors. The major source of demand for water resources comes from the industrial sector representing 43.1 % of total

water resources in the region, the domestic demand represents 37.2% and demand for irrigation purposes represents 19.7% (Carmo 2001).

In relation to domestic water provision and supply, the urban impact can be seen throughout; water use/consumption and water sanitation/treatment. As a result, the degree of water quality imposes a significant impact on the quantity of water to be provided. In a municipality like Piracicaba with high demographic trends, water provision becomes more difficult due to the necessity of treating the water in order to provide the necessary conditions/quality for water consumption.

Also, the question of water resources degradation in the PCJ watersheds is mainly the result of urban and industrial *usage* and *waste*. The water sanitation system in operation in the region includes 85 % of the urban population but, only 18% of the water is treated. Of 66 localities in the region, only 24 possess any type of water treatment (Coplaenge 1999). In the industry, similar to the residential use, the impact of water resources consumption is present on two fronts; the use in the industrial process (i.e. Beer industry, Beverages etc…) and the pollution impacts of industrial activities.

Water waste is also an important element in water resources management that should be considered in the studied watersheds. In 3 municipalities of the region more than half of the water is wasted before reaching the final consumer. It is also worth noting that in 58 municipalities of the region, only 11 have water waste under 20% of the total amount provided which is the internationally accepted level. In the municipalities with higher population density, such as Campinas and Piracicaba the indices for water waste are 34,9 % and 45,5% respectively. This is A situation that is not very different from the Tiete watershed in the Metropolitan Region of Sao Paulo. The Cantareira water transfer system

as indicated in section 5.2.5 also adds to the complexity of the socio-economic situation in the studied watershed and has been one of the main motives for the establishment of the PCJ Inter-municipal Consortium and the PCJ River Basin Committee.

8.3.2. Political Considerations

The PCJ Basin Committees (State CBH PCJ and PCJ Federal) are democratic collegiate entities formed by representatives of the state, municipal districts and organized civil society organs for management of water resources. Thus summarized, it seems that we are dealing with an elementary question of *public service modernization.*

In such a modernization and decentralization, an important player in the political scene for water management in the PCJ watersheds is the Inter-municipal Consortium (section 6.6.). The Consortium, classified as a civil society entity, could be seen as the strongest in its category inside the basin committee. The fact that it is a mixed organization of private and public entities imposes several realities in relation to its bargaining, lobbying and mobilization power. The Consortium (established in 1989) was only granted a seat in the basin committee in 1997 and has been fighting for such an institutional presence for some years. The presence of such an entity inside this negotiation space represents a first step towards an effective participation of the civil society segment. Yet, it is insufficient to just have one entity playing the major role of the whole civil society segment. Actually, such a case could represent a new form of centralization inside a decentralized model. One should therefore recognize the reasons why such imbalance in power amongst the civil society entities exists presented as follows.

8.3.2.1. Challenges to Participation in PCJ watersheds

From a political point of view, aside from the PCJ Consortium, the other civil society entities lack organization and force inside the negotiation space of the basin

committee. This is due to the lack of political experience, as they are new comers to the new governance model. It could also be due to the lack of capacity and training in some key areas that directly influence the negotiation and technical skills of the segment actors. Various civil society segments are not aware yet of the new rights the legislation gives them. Moreover, those entities who are already aware of those rights, do not know how to use such rights in a way that advocates their views and interests. The challenges for the political participation can therefore be classified into internal and external factors. The former result from a limited internal technical capacity, weak internal organization, lack of articulation and goal definition, limited resources and in some cases, lack of clear vision. The external factors are a result of the imbalance of the political power inherited from the old centralized system, lack of transparency and information flows, lack of true intentions to share and divide the already centralized power that the big actors possess (private sector and government). For some, the new model is a form of democratization, yet, in reality, this form can represent a disguised form of an un-democratic system if, proper measure of power transfer are not well taken into consideration in a way that ensures the inclusiveness of the new actors to the political scene. Aside from such political considerations, the case of the Piracicaba, Capivari and Jundiai Basin Committee in the state of São Paulo should be perceived as a young management model (also the first in the country) that is still being developed based on the region's future visions of development and the dimensions/depth of participation that will be granted to various actors.

8.3.3. Operational and Institutional Considerations

There are a number of institutional factors which affect the ability of the PCJ committee to do its work more effectively, these include the following:

1. At present, the main and only source of regular financing of the PCJ River Basin Committee is the state fund for water resources (Fundo Estadual de Recursos Hídricos) through its agency (FEHIDRO). The sources of these funds are mainly the royalties that the energy companies pay to the state. It should be considered however, that a future financing mechanism is currently being discussed through a special working group (Grupo de Trablaho Cobranca) for water use charge. Such mechanism represents a big controversial debate amongst those viewing water as a social right and those advocating the valuation of water as a natural resource.

2. The received funds are channeled towards the execution of projects related to the treatment of effluents, the elaboration of studies on the basin, building technical capacity of civil society, recycling projects, reforestation and environmental restoration of the basin amongst other activities.

3. The PCJ river basin committee is formed by stakeholders/water users, the civil society and representatives of government (State and Federal)[12]. They collectively decide how to: (i) allocate water; (ii) implement new development projects; (iii) arbitrate conflicts among stakeholders, and (iv) impose pollution control restrictions (Porto M. & Kelman J. 2000).

4. The social and economic heterogeneity of the stakeholders' different purposes for water use and their coverage of different geographical locations spread over the whole watershed. This further implies a multitude of interests –often in conflict- in relation to water use and allocation, that are likely to extend in the future to conflicts over of water use charges.

5. In the PCJ River Basins, the participation of civil society, industry/water users and government is present on two fronts; the first is the participation in the plenary of the state and federal watershed committees (CBH PCH and PCJ Federal) as indicated in the mapping process. The second is the participation in one or more of the eleven thematic technical committee (Camaras Tecnicas) of the river basin committee (table 7.4).

6. In that respect, the watershed committee is a place for negotiation and discussion in order to reach consensus among the various stakeholders in relation to the various social, economic and environmental aspects of water resources management as indicated in point 1.

[12] due to the administrative jurisdiction for the rivers belonging to the basin in the states of Sao Paulo and Minas Gerais)

7. Though participation is open to the various segments inside the technical committees, the decision making power comes only through the actors with voting power in the plenary of the state or the federal committees, as indicated in the mapping process.

8. The working groups (Grupos de Trabalho) are sub-groups created inside the technical committees to look into a specific problem or a specific project that involves a multitude of technical aspects related to water management[13].

9. The Basin Plan is an official document that indicates the situation of the basin and the projects to be implemented during the period of the plan. The current plan is the one covering the period 2004-2007.

10. It should be taken into account that the committee does not implement any of the projects. The committee develops the "Basin Plan" and contracts other entities and consultant groups who actually implement the approved projects as discussed in the technical rooms and as voted upon in the committee plenary.

Such institutional and operational considerations represent the functional realities of the river basin committee and will allow us in light of the political and socio-economic facts previously addressed to further understand the real challenges for the mobilization of the civil society sector in the studied region as will be addressed by the next sections where the the research findings are highlighted and analysed.

8.4. Research Findings

The primary research question in hands attempted to identify the different challenges for the participation of the civil society in watershed management in the state of Sao Paulo. With the basic assumption that my research should be useful in practice, the scope of the analysis has been directed to the level of the PCJ River Basin Committee in order to achieve the following research objectives as previously indicated in section 1.4.

i) Identify the challenges for the participation of the civil society belonging to the PISCA watershed in the PCJ river basin committee and its different affiliations.

[13] This is the case for the Corumbatai river in the Piracicaba watershed, where a special working group is formed inside the camara tecnica of Environmental Health as indicated by a member of this working group, Professor Regina Monteiro the researcher in the Center for Nuclear Energy and Agriculture (CENA) in the University of Sao Paulo.

ii) Identify the obstacles for an inclusive decision making process –in practice and beyond the policies and institutional setup of the water bodies in Brasil in theory.
iii) Further understand the meaning of democratic decentralization of water resources management in practice; does it exist and in effect, or to which extent power relations negatively affect the participation of the civil society,
iv) Further highlight any hidden factors due to political, economic, social, environmental or economic drivers hindering the participation of the civil society in the PCJ RBC.

With the end goal of portraying the emerging institutional arrangements/challenges in water resource management in the state of Sao Paulo in relation to the civil society segment, the current section addresses the basic research findings related to the researched segment;

⇒ *Who's included in "civil society"?*

The civil society segment as shown in the mapping process (Ch.7) is comprised of 4 major categories; universities and research institutions, environmental entities, labor unions and the consortium. The consortium is by far the most organized and strong entity of the civil society segment since it is composed of a mixed of 34 private companies, 42 municipal governments and a number of conservation entities (NGO's). The consortium represents a strong model of responsible citizenship and environmental awareness inside the PCJ river basin committee, however, it is also by far the only civil society entity with capacity and ability to function effectively given the politics of water and the power relations amongst different actors in the state of Sao Paulo water management scene. This implies in turn that the new system although democratic in its legislative setup, does not embrace the full notions of democracy and power sharing in practice despite the actual presence of the 4 different categories of civil society in the PCJ institutional setup. A primary research finding is therefore that inclusiveness is not an enough indicator of democracy. In fact the

elections process is just a form of disguised centralization since it does not change the decision making power inside the river basin committee. Effective representation imposing of the civil society imposing change and addressing the real problems of local communities should be the concern for a real democratic and inclusive process. The fact that they are there and present is not enough.

⇒ *Does the structure of the PCJ committee itself include some groups while excluding others?*

In theory, the structure of the PCJ river basin committee has been designed to involve all actors/categories within the civil society segment. There are however three weak points that should be considered regarding inclusiveness in the river basin structure. The first is that some entities choose deliberately to not participate in the elections and discussions process since they perceive a big imbalance in power relations between the government entities experienced in the field of water management in comparison with other organizational new entrants. The second point regarding inclusivenss is related to the election procedures and selection of civil society entities. Such procedures which are managed and administered by the DAEE (executive secretariat of the PCJ committee) is viewed by some organizations as biased since they are based on criteria developed by the central government. This has been the case in this years' elections (2005) where the criteria of selection have been modified and not all the entities have been informed by such changes. As a result, the statue of many civil society entities disqualified them from running in the elections, a situation that almost resulted in a crisis, as there was an insufficient number of civil society entities to fill up the number of seats as provided by the legislation. The last point regarding inclusivess is related to a scale problem. The fact

that a big number of micro-watersheds and municipalities that do have a big impact on the health of the water resources in the region are not represented by any local government or civil society entities because of their size should be a preoccupation for the watersheds sustainability. A point that should be seriously considered in the future since the health of the bigger watersheds are often function of the situation of the springs as well as the environmental conditions of the micro-watersheds. In the case of the Piracicamirm micro-watershed in the municipality of Piracicaba this is not the case –fortunately- as the micro-watershed is represented by the University of Sao Paulo present there as well as a number of organizations. This is due to the economic importance of the region.

⇒ *Is the PCJ committee homogeneous or does participation vary across the different sub-committees? How does the institutional setup of the water committees influence participation?*

The eleven technical committees (Camaras Tecnicas) represent an innovative institutional space for debate on issues related to water management in the studied watershed. Participation of civil society is open, in the respect that any civil society actor can express opinions about a certain problem or to present/suggest a development project. Voting power however is not granted to any of these actors inside the technical committees. It is only granted to those who have been elected to be part of the official plenaries. There are 9 members on the state committee and 10 members on the federal committee (see composition table 7.1).

⇒ *Do the constraints on their participation vary for each group? Or are there common constraints? Why do these constraints exist?*

The main challenge for the Piracicaba, Capivari and Jundiai river basin committee to function as a deliberative and discussion body is the asymmetry of decision power,

lobbying power and knowledge between the different stakeholder groups. Specifically, the civil society segment including the universities, the consortium, the unions and the environmental organizations, faces the following challenges in this new governance structure inside the PCJ watersheds and the Piracicamirim micro-watershed;

(i) There is no real tradition of organization of civil society inside the river basin institutions. Organizations are fragmented, some are new and badly structured and thus poorly institutionalized.

(ii) Water management was until very recently in the hands of very powerful technical structure (water management to the hydroelectric sector, water supply and sanitation to one firm).

(iii) Municipal economic power and population strength is very different among the 3 municipalities of the Piracicamirim micro-watershed.

Such challenges reflect on the performance of the civil society entities and consequently result in;

a- Difficulties in co-ordination and information transfer between internal bodies of the committee

b- A weaker decision autonomy of the civil society segment in comparison with representatives of large administrative and bureaucratic structures.

However, all these issues are common questions in participative bodies linked to environmental management and have been underlined in more experienced structures such as in France (Latour et al 1995; Cacquard 2001). The following section presents suggestions to address such weaknesses which can be considered proposals for future action.

8.5. Analysis

Integrated management of water resources in the state of Sao Paulo requires that stakeholders inside the PCJ committee recognize the strengths that other actors can bring to the decentralization process. The institutional setup of the PCJ committee attempts to reach through consultations and negotiation an effective and transparent development strategy for

the whole basin through the "basin plan" (plano do bacia) developed by different actors involved in the 11 technical committees and voted on in the committee plenary (state or federal). In theory, the aim of these consultations would be to coordinate the actions of the actors, in order to support the policies for decentralization. The current research concerned with the question of inclusion of the civil society in participatory environmental management in the context of the Piracicaba, Capivari and Jundiai river basin committee suggests the following elements for future action; 1-Action on the mirco-watershed level, 2-the importance of environmental education, 3-Accountability and Secure Power Transfer Matters, 4-Partnership building, 5-Support Policies: Information, Training and Organization (Role of access to information, training to avoid institutional voids and Organizational support for local actors) (FAO RED-IFO model 1997). These elements are suggested as a general framework for a more inclusive and democratic process in the design and implementation of the watershed plan and for a stronger citizenship engagement in water resources management in the PCJ watershed and the Piracicamirim micro-watershed.

8.5.1. The role of universities in environmental education and citizenship expansion

A positive point that influences the Piracicamirim micro-basin region is the presence of universities under the area of Jurisdiction of the PCJ committee (Universidade Metodista de Piracicaba (UNIMEP) and the University of Sao Paulo Escola Superior de Agricultura "Luiz de Queiroz" (ESALQ)). The presence of these institutions contributes to more understanding of the basin's problems since research is being conducted on various fronts and in a multi-disciplinary way. Universities can also contribute positively to the

question of the basin's management by increasing awareness about the role and the rights of civil society in the new management structure. Capacity building activities can ensure best outcomes if they are provided by such institutions inside the communities where they are present. Universities can further design programs which expand the sense of citizenship and ownership of the local communities and their environment through environmental education programs, such as the case of the PISCA project in the municipality of Piracicaba.

8.5.2. Action on the micro-watershed level

Development efforts using the watershed approach are an interesting way of addressing social and environmental problems in a given geographical context and within a watershed's ecological boundaries. Action on the micro-watershed level is therefore suggested as a step towards implementing a bigger watershed plan, as this is due to the fact that effective action addresses the problems that local communities face on a micro scale. The involvement of local communities on the micro-watershed scale is an imperative precondition for environmental and social sustainability of water resources and reflects a greater sense of citizenship involvement in the preservation and conservation of the watershed. The Pisca project[14] (Appendix 5.2.) in the municipality of Piracicaba is a perfect example in that respect of a project that promotes citizenship practices and awareness through environmental education programs on a small scale. Map 8.1 identifies the different micro-watersheds in the municipality of Piracicaba. In light of this map, the current research expanding the experience of the Piracicamirim micro-watershed to the

[14] The Pisca Project is an extension group of ESALQ/USP Department of Forestry Sciences that works as an inter-disciplinary program, formed by sub-projects that seek, in the whole, to promote a synergy between people and institutions searching to turn the sub-Pisca Basin into a social-environment sustainability model, integrating rural and urban environments.

other micro-watersheds of the region, the aggregate of which can help to ensure the implementation of the bigger watershed plan. The role of civil society is in that respect imperative since it is the segment containing local actors most familiar with the problems of the creeks and rivers running through their communities.

Map 8.1. Micro-watersheds in the municipality of Piracicaba

8.5.3. Accountability and Secure Power Transfer Matters

By restricting and controlling information flow (between experts and laypeople), experts remove themselves from public accountability, legitimize policy choices, and lower public competence.The transfer of powers or responsibilities from a central government to local institutions goes directly to the question of who gets to make decisions about the use of natural resources (World Resources Institute 2003). In the context of the Piracicaba, Capivari and Jundai basin committee (CBH PCJ and PCJ Federal), this question has been

researched throughout a series of interviews with personnel and entities involved within the institutional setup of the studied watershed/basin committee.

Devolution in that respect is the most advanced yet the least generalized form of decentralization in Brazil. It involves the transfer of powers to a local institution, association or committee, with broad autonomy, legal status, and which is representative (Burchi 1985, Mathew 2004). To take its full meaning, this form of decentralization has to be accompanied by mechanisms which institute popular participation in the process of decision-making[15]. This point has been addressed in the research findings and is essential if the full meaning of civil society participation is to be fully embraced. The current legislative setup and institutional mechanism allowing a multi stakeholders representation inside river basin committees in the state of Sao Paulo is just a first step towards democracy and the exercise of citizenship. An effective participation however requires a gradual and secure institutional power transfer which is usually a hard task to achieve given the fact that entities already possessing power are not willing to transfer it easily to new comers. A strong institutional mechanism for power division and accountability is therefore imperative in order to have a democratic system in place. The design of such a system is a challenge to be addressed in the coming years.

8.5.4 Partnership Building

In order to turn environmental policies into concrete actions it is necessary to have suitable planning and management bodies, which are normally very complex entities. The establishment of such bodies means generating a mixed public and private systems which should not only be financially independent, socially oriented and sensitive to environmental

[15] Understanding Decentralization Processes: The RED IFO Model and Territorality

aspects, but must also act in a democratic and participative manner (Douroujeani 1996). In a democratization process, the heterogeneity of stakeholders given their multitude of interests varying from commercial use to environmental conservation imposes the question of conflict of interests and sub-sequently addresses the power relations game within a basin committee negotiation space. Partnership building in that respect is imperative for a successful integrated management system. The Consortium is a strong example in that respect since it developed partnerships amongst the municipalities (local government), private sector (water users) and conservation entities (NGO's). More initiatives on that line bringing together a multitude of actors and views to development is necessary, not only in an institutional setup but also in the form of joint programs and projects amongst entities sharing common ecological boundaries and environmental challenges. Partnerships in that respect represent a stronger form for the mobilization of the civil society in order to express their needs and address sustainability issues within their communities and the environment.

8.5.5 Support Policies: Information, Training and Organization (IFO)

The participation of civil society is gradually being recognized by government agencies as an essential component in the implementation of watershed management[16] and development activities in inhabited upland areas. Accesses to information, training to avoid institutional voids, and organizational support for local actors, are all basic elements of capacity building for the civil society sector. In Brazil, there is an understanding that conservation and the efficient use of water resources is best ensured if local communities are directly involved in their management and receive guaranteed benefits as a result of their conservation and rational utilization across the sectors of the economy (public

[16] This also applies to other types of natural resources, also known as community based natural resources management (CBNRM)

services, industry, small producers). Such an understanding is reflected in the institutional arrangements in the state of Sao Paulo through its law no. 7.663/91.

Though the availability of information and training can halt the trend towards the capture of decentralization by local elite, that may not be sufficient if there is no strong organizational base to give stakeholders the possibility to participate in the design, the implementation, and the monitoring of watershed development policies. That is why the support policies recommended by the RED-IFO model (FAO 1997) (Information, Training and Organization), essential for the creation of an institutional framework favorable to participation, provide support for civil society organizations, recognizing them as interlocutors of the state and as an essential part of communication with local communities.

In the case of the PCJ river basin committee, the current system in place favours the elite entities involved in the development process. This is mainly due to the fact that the flow if information is concentrated to a certain segment of the society, or in another words because the flow of info has a limited outreach level. In fact, those who need to participate the most are not granted such an opportunity (despite the new legislation) because they do not have access to human, physical or financial resources. Even if the civil society is present that does not necessarily mean that they are communicating the needs of other segments of the society. This is due to a number of factors as previously addressed is section 8.4.

Chapter 9

Conclusion

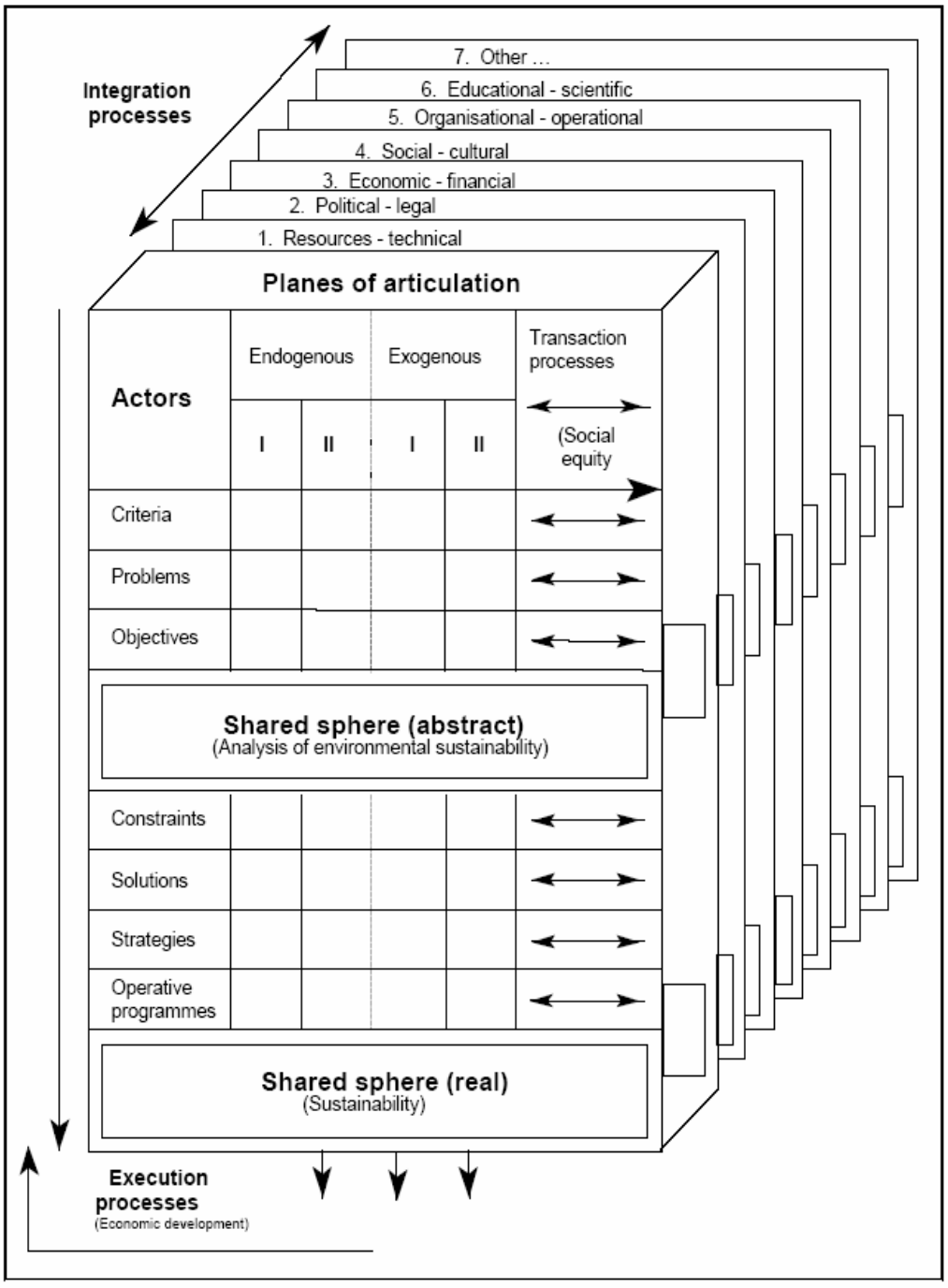
9.1. Democracy, Sustainability and River Basin Committees in a contemporary scale: The Case of Brazil

The economic and social value of water -as a basic human right- along with its environmental and political dimensions often result in conflicts of interest between different users. Research indicates that the expanding need for water –as is the case in a country like Brazil- is driven by population growth and urban development, by demand for the increased agricultural productivity derived from expanded irrigation, and by the degradation of existing supplies (World Bank 1993). The emergence of contemporary water uses such as wildlife preservation, habitat enhancement, and recreational requirements has also added to the complexity of the demand problem (Azevedo et al. 2001). The importance of negotiation processes, in the context of complex systems, involving many different stakeholders, groups of interest and institutions interacting with each other, and with the ecosystem, is therefore increasingly recognized as an essential part of ensuring the sustainability of these systems (Weber 1996).

In effective water management, concern must be shown not only for the total amounts of water needed to meet diverse demands but also for the corresponding institutional arrangements that make it fit multiple uses and users. As a result, the political participation of the various actors depending on, and benefiting from such multiple uses of water – is an essential element of democracy. Such participation -as indicated in the Brazilian management model- is extended throughout the various sectors of the economy and segments of the society- in order to work towards a sustainable and democratic water management system. In the context of Integrated Water Resources Management IWRM,

“The Magic Cube” (figure 9.1), reflects the conceptual and operational framework of sustainable development with social equity. The model identifies the multidimensional aspets of environmental sustainability as it can be applied to the water resources management context.

CONCEPTUAL AND OPERATIONAL FRAMEWORK OF INPUTS TO SUSTAINABLE DEVELOPMENT WITH SOCIAL EQUITY (THE "MAGIC CUBE")



Source: Axel Dourojeanni (2000), *Procedimientos de gestión para el desarrollo sustentable*, Economic Commission for Latin America and the Caribbean (ECLAC), LC/L.1413-P, August 2000, *Serie Manuales* N° 10, Santiago, Chile.

Figure 9.1 The Magic Cube

In the context of the current research, the central aspect of this new system is the decentralized mode of operation. The principle underlying the model is that shared responsibility is more efficient than centralized responsibility (Ostrom 1990). As a result, the main argument for the new Water Resources Management System has been the need for an alternative for the sectoral system that had dominated since the 1960's. The alternative is an integrated model, with collegial management, believed to be more efficient in the allocation of natural resources and in the alteration of the environment, considering the different uses of water as well as the needs of present and future generations (Porto 1998). This revised legislation thus promotes a more integrated management of water at the catchment (watershed) levels, with a better integration of land and water legislation and management processes, which are now based on the same tools.

The National Water Resource Policy in Brazil - reinforced by the Dublin Declaration 1992, the Rio conference on Environment and Development 1992, the Paris conference on Water and Sustainable Development 1998, the Hague Ministerial Declaration on Water Security in the 21st Century 2000, the Bonn International Conference on Fresh Water 2001, the 2002 World Summit in Johannesburg, the 2003 Japan third World Water Forum and the 2004 Dakar conference- aims therefore to integrate the social, political and institutional forces which are currently governing the country, by giving more and more value to social action in the formulation and implementation of public policies. The law has been developed and discussed among the various democratic currents of the Brazilian society and presents fundamental principles for the democratization of water management, including the active participation of the society and decentralized decision-making.

In the context of the Piracicaba, Capivari and Jundai watersheds, the new water legislation reinforced the process of decentralized management and created a tripartite water basin committee with state and federal jurisdictions (CBH PCJ and PCJ Federal). This is due to the fact that the watershed boundaries embrace more than one state (Sao Paulo and Minas Gerais). The committee is comprised of representatives from state, local government and civil society organizations and has been established, to be involved in making an emergency plan for the restoration of watersheds, and an environmental plan—including a socio-economic development plan referred to as "Plano do Bacia". The current plan in action is the one for the period of 2004-2007.

9.2. Civil Society Participation in PCJ: Findings on the level of watersheds, sub-watersheds and micro-watersheds

A limitation to the current research has been the absence of a precise indicator for participation and the extent of its effectiveness. Though the mapping process identified the voting power of civil society actors inside the PCJ basin committee, it has been unable to identify the extent to which this voting power is used and employed.

A primary conclusion of the current research reveals that the presence of the civil society segment inside the PCJ stadual and federal committees is not enough as an indicator for an active participation nor an indicator of the weight of decision-making power of the represented segment. A secondary conclusion is that the civil society segment still lacks a complete awareness and understanding of the system in place. A comprehensive understanding and a realization of the bigger picture are pre-requisites for a participation that generates change and empowers dialogue. Action on the mirco-watershed level, environmental education programs, partnership building,

accountability and secure power transfer matters, access to information, training to avoid institutional voids and organizational support for local actors have been therefore identified as essential elements for a better and a stronger participation of the civil society segment inside the PCJ basin committees (CBH PCJ and PCJ Federal).

The technical committees (Camaras Tecnicas) of the PCJ basin committee as thematically divided also represent an innovative institutional space. Such committees allowing the participation of interested entities -despite their orientations- is a push towards a greater local voice involvement in some areas such as environmental education, capacity building and information sharing. It should be noted however that such participation is limited to a consulting type of involvement as participants in such committees do not necessarily possess voting power.

9.3. Critics for the Sister Watersheds project

The Sister Watersheds project with the title "Capacity building of civil society for watershed Management in the state of Sao Paulo-Brazil" is an example of an international development[17] project on the micro-watershed scale. Given the project's objectives as indicated in section 1.3, the Sister Watersheds project operating on the level of the Piracicamirim micro-watershed (or other similar projects), can offer some capacity tools to be explored in establishing key participation techniques or methods, especially in the area of environmental education and capacity development. Those tools are essential for civil society entities and local communities in the Piracicamirim micro-watershed and could be used during the process of future project formulation, negotiation and implementation especially for the entities that would be involved in the

[17] Based on a partnership between York University and the University of Sao Paulo including its two chapters in the city of Sao Paulo and the city of Piracicaba, and funded by CIDA as established under the agreement S61268-373G June 2003

Piracicaba, Capivari and Jundiai watershed committee. The sense of ownership and citizenship are some of the positive outcomes that such project could offer through participation and public involvement and could represent –if applied properly- a first step towards democracy and the real application of citizenship on a local scale.

There are some considerations however that should be recognized and could represent suggestions for future action in some areas. The focus area of the project and its general objectives represent an interesting initiative in the city of Piracicaba, yet it is meant to be complementary for the PISCA project already functioning in the Piracicamirim micro-watershed. The project as currently in operation has a limited outreach level within the community or amongst other entities with interested in the watershed. The project is in its first years, and action so far has not passed the diagnosis and mapping phases. For the coming years of the project, it could be suggested that capacity building tools developed by the project should help not only in the evaluative process of the lessons learned and sustainability of gains, but also need to be easily understood and "owned' by the communities involved. These tools are key elements of the "*adaptive planning process for watershed management*," and could greatly serve future projects. Figure 9.2 suggests a framework for community based watershed management. Partnership building and Personnel training could be of great benefit to the sustainability of the watershed and contribute positively to building the capacities of the involved entities in the current institutional setup of the PCJ river basin committee.

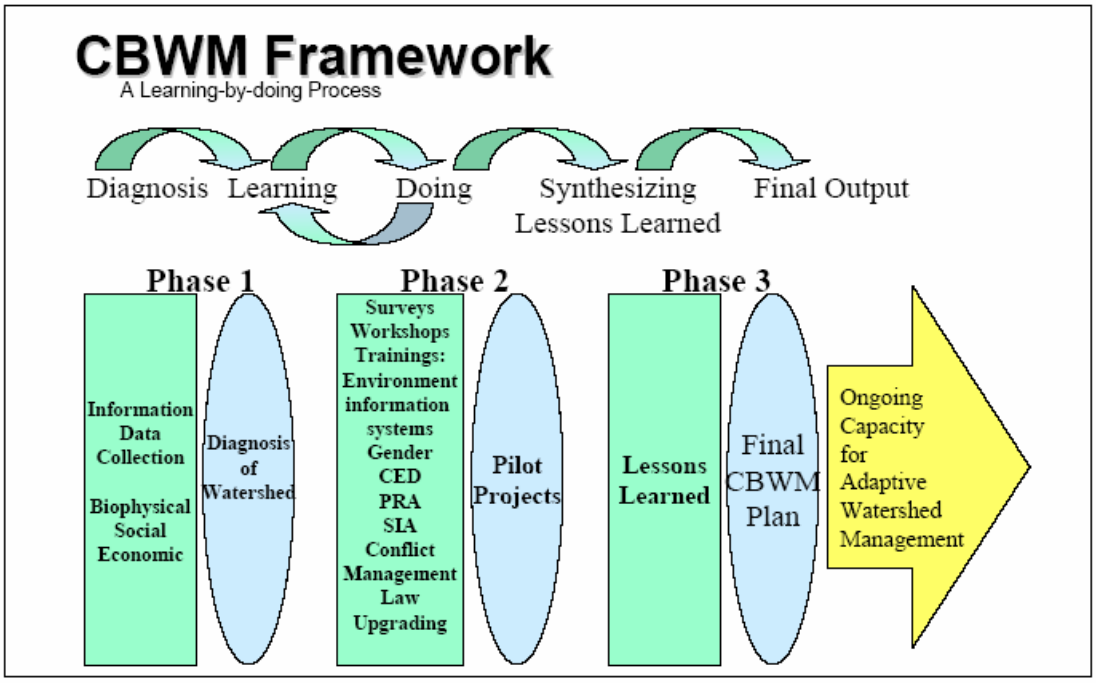


Figure 1. CBWM Framework

<u>Figure 9.2.</u> Suggested community based watershed management framework: A learning by doing model
Adopted from De Castro and McNaughton 2003

9.4. Suggestions for the Piracicamirim micro-watershed

Applying the Systems theory, the Piracicamirim micro-watershed -(municipality of Piracicaba) belonging to the PCJ watershed- has been therefore examined as a "part of the whole". In doing so, the series of interviews have helped to identify some elements necessary to be considered in future projects. Action on the micro-watershed level, training to avoid institutional voids and partnership building can be seen as essential for the participation of the civil society within the context of the PCJ watersheds as a whole and sub-sequently the Piracicamirim micro-watershed as a part. The Pisca project at the University of Sao Paulo chapter in Piracicaba (ESALQ) represents a strong model of local action on the micro-watershed level and a model that should replicated in other micro-watersheds. Yet, other projects such as the Sister

Watersheds project can still offer more action that can serve the local communities and other entities on such a scale, those can be presented through an online course or in other forms of learning material (Phase 2 of figure 9.2).

1- To Know your Rights as civil society member
2- To Know how to use your rights
3- To develop theoretical knowledge using a holistic/interdisciplinary approach with Input from the disciplines of Ecology and Environmental management
4- To develop a strong knowledge base of Particpatory Research Techniques with a special focus on Action Research
5- For some project members, Geographic Information Systems (GIS) skills are necessary in order to apply the concept of environmental management based on ecological rather than administrative boundaries
6- For project coordinators, project management and implementation skills are imperative in order to coordinate the activities of various groups of people and local communities and hence achieve the project objectives
7- Negotiation and Advocacy skills are also pre-requisites for an effective participation
8- To develop knowledge about best practices and similar successful experiences
9- To use the media and information technology as primary communication and awareness channels and as means for the dissemination of information.

9.5. Future themes for research

One particularly important question in watershed management is how to ensure that adequate financial resources are provided, and that costs and benefits are appropriately distributed among the communities and individuals that carry out the watershed management activities including those that benefit from them and those who depend on them. The current debate inside the PCJ River Basin Committee in the state of Sao Paulo, Brazil –and also in other contexts in Africa and Latin America- is about the best financial

mechanisms in the application of the water use charge (cobranca). A future theme of research in the area of the application of the water use charge including all its operational, financial and institutional mechanisms is therefore suggested as an important research area related to the institutional development of river basin committees embracing basic challenges of human rights and social equity. However, different limits will have to be dealt with such as: the difficulty to take into account subterranean water whose basin relies on different physical boundaries (Vargas-Hager, 2000). The institutional mechanism for the pricing model is also an interesting theme of research given the various vested interests and power relations amongst various actors in the water markets. Are the citizens going to be victims of the new policy in Brazil and elsewhere internationally? Is privatization of water resources a new threat to global security and to social justice? What about the rural and urban poor in light of the new cost of water use?

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List of Abbreviations

ANA Agência Nacional de Águas
BNDES Banco Nacional de Desenvolvimento Econômico e Social
CATI Coordenadoria de Assistência Técnica e Integral
CBH-PCJ Comitê das Bacias Hidrográficas dos Rios Piracicaba, Capivari e Jundiaí
CEF Caixa Econômica Federal
CETEC Centro Tecnológico da Fundação Paulista
CETESB Companhia de Tecnologia de Saneamento Ambiental do Estado de São Paulo
CNRH *Conselho Nacional de Resources Hídricos* National Water Resources Council
CODASP Companhia de Desenvolvimento Agrícola de São Paulo
COPASA Companhia de Saneamento de Minas Gerais
CTH Centro Tecnológico de Hidráulica
DAEE Departamento de Águas e Energia Elétrica do Estado de São Paulo
DBO Demanda Bioquímica de Oxigênio
DNPM Departamento Nacional de Produção Mineral
DQO Demanda Química de Oxigênio
ESALQ Escola Superior de Agricultura "Luiz De Quieroz"
FEHIDRO Fundo Estadual de Recursos Hídricos do Estado de São Paulo
GRAPROHAB Grupo de Análise de Projetos Habitacionais
IAP Índice de qualidade de água para abastecimento público
IG Instituto Geológico do Estado de São Paulo
IGAM Instituto Mineiro de Gestão das Águas
IPT Instituto de Pesquisas Tecnológicas do Estado de São Paulo
IQA Índice de qualidade das águas
ISTO Índice de Substâncias Tóxicas e Organolépticas
MMA Ministério do Meio Ambiente
MPO Ministério do Planejamento e Orçamento
NA Nível da água
OGU Orçamento Geral da União
PQA Projeto Qualidade das Águas e Controle da Poluição Hídrica
PROÁGUA Programa de Desenvolvimento de Recursos Hídricos do Brasil
RMC Região Metropolitana de Campinas
RMSP Região Metropolitana de São Paulo
SAA Secretaria de Estado da Agricultura e Abastecimento de São Paulo
SABESP Companhia de Saneamento Básico do Estado de São Paulo
SCTDE Secretaria de Ciência, Tecnologia e Desenvolvimento Econômico
SEPURB Secretaria de Política Urbana do Ministério das Cidades
SERHS Secretaria de Energia, Recursos Hídricos e Saneamento do Estado de São Paulo
SMA Secretaria de Estado do Meio Ambiente de São Paulo
SRH Secretaria de Recursos Hídricos do Ministério do Meio Ambiente
TGCA Taxa Geométrica de Crescimento Annual

Glossary of terms

Adverse environmental impacts
Those physical, biological and environmental changes which are of long-term duration, where the rate of recovery is low, where there is a high potential for direct and/or indirect effects and/or where the areas is considered to be critical habitat or of critical significance to the protection, management and enhancement of the shoreline ecosystem.

Biodegradation
Decomposition of a substance into more elementary compounds by the action of micro-organisms such as bacteria.

Discharge
The flow of surface water in a stream or canal, or the outflow of groundwater to a well, ditch or spring .

Drainage basin
The area of land, surrounded by divides, that provides runoff to a fluvial network that converges to a single channel or lake at the outlet.

Drought
Drought is a complex term that has various definitions, depending on individual perceptions. For the purposes of low water management, drought is defined as weather and low water conditions characterized by one or more of the following:
-below normal precipitation for an extended period of time (for instance three months or more), potentially combined with high rates of evaporation that result in lower lake levels, streamflows or baseflow, or reduced soil moisture or groundwater storage
-streamflows at the minimum required to sustain aquatic life while only meeting high priority demands for water, water wells becoming dry, surface water in storage allocated to maintain minimum streamflows
-socio-economic effects occurring on individual properties and extending to larger areas of a watershed or beyond. As larger areas are affected and as low water and precipitation conditions worsen, the effects usually become more severe

What is an ecosystem?
An ecosystem is a biological community of interacting organisms and their physical environment.

Environmentally sound
Refers to those principles, methods and procedures involved in addressing the protection, management and enhancement of the ecosystem which are used in disciplines such as geology, geomorphology, hydrology, botany and zoology and applied in the valid study of shoreline and fluvial processes, vegetation, wildlife and aquatic habitat resource management

Erosion

The wearing away of the land surface by running water, wind, ice or other geological agents, including such processes as gravitational creep. Geological erosion is natural occurring erosion over long periods of time.

Stream
A general term for a body of flowing water. In hydrology, the term is generally applied to the water flowing in a natural channel as distinct from a canal. More generally, it is applied to the water flowing in any channel, natural or artificial. Some types of streams are: 1. Ephemeral: A stream which flows only in direct response to precipitation , and whose channel is at all times above the water table . 2. Intermittent or seasonal: A stream which flows only at certain times of the year when it receives water from spring (s) or rainfall , or from surface sources such as melting snow. 3. Perennial: A stream which flows continuously. 4. Gaining: A stream or reach of a stream that receives water from the zone of saturation. 5. Insulated: A stream or reach of a stream that neither contributes water to the zone of saturation nor receives water from it.

Surface water
Water found over the land surface in stream (s), ponds or marshes.

Three Levels of Low Water Conditions
The Level I condition is the first indication of a potential water supply problem. Level II indicates a potentially serious problem. Level III indicates the failure of the water supply to meet the demand, resulting in progressively more severe and widespread socio-economic effects.

Water pollution
Industrial and institutional waste, and other harmful or objectionable material in sufficient quantities to result in a measurable degradation of the water quality.

Water quality
A term used to describe the chemical, physical and biological characteristics of water with respect to its suitability for a particular use.

Water supply
Any quantity of available water.

Watercourses
Depressions formed by runoff moving over the surface of the earth; any natural course that carries water.

Watershed
All land and water within the confines of a drainage basin. Area of land that catches rain and snow and drains or seeps into a marsh, stream, river, lake or groundwater. Homes, farms, cottages, forests, small towns, big cities and more can make up watersheds. Some cross municipal, provincial and even international borders. They come in all shapes and sizes and can vary from millions of acres, like the land that drains into the Great Lakes, to a few acres that drain into a pond. A watershed is defined as a geographic area bounded by topographic features and height of land that drains waters to a shared destination. Every waterway (stream, tributary, ect.) has an associated watershed; and smaller watersheds join together to become

larger watersheds. Watersheds are the preferred geographic unit to undertake environmental planning and stewardship delivery.

What is a watershed?
A watershed is the entire area of land whose water, sediments, and dissolved materials (nutrients and contaminants) drains into a lake, river, stream, creek or estuary. Its boundary can be located on the ground by connecting al the highest points of the area around the receiving body of water. It is not man- made, and it does not relate to political boundaries.

Wetland
An area (including swamp, marsh, bog, prairie pothole, or similar area) having a predominance of hydric soils that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support and that under normal circumstances supports the anaerobic condition that supports the growth and regeneration of hydrophytic vegetation.

Withdrawal
Refers to removal or taking of water from surface water bodies or groundwater sources.

Watershed management - in its simplest terms means managing wisely upstream so that downstream remains natural and healthy. The Conservation Ontario model has received worldwide recognition over its 50+ year history and the watershed is now recognized as one of the premier natural ecosystem units on which to manage resources.

Watershed Stewardship - the responsible care of our natural resources and wildlife on a watershed basis - is essential to balancing human economic needs against the needs of our natural environment.