

Downstream Pollution, Upstream Power: Rescaling Water Management in Metropolitan São Paulo

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May 31, 2005

**A Major Paper submitted to the Faculty of Environmental Studies
in partial fulfillment of the requirements for the degree of Master in Environmental
Studies (Planning), York University, Ontario, Canada**

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To Mireille, for the study breaks...

ACKNOWLEDGEMENTS

I could not have imagined that my decision to pursue graduate studies would have been so rewarding. I have been exposed to knowledge I did not know existed, encouraged to explain it from new perspectives, and inspired to challenge it with my own ideas. This process could not have taken the path it did without the dedication and inspiration of the people around me whose time, energy and motivation contributed to what I have achieved and aspire to achieve.

I would like to express my gratitude in particular to my advisor, Professor Gene Desfor, whose continuous support has been invaluable to me since the start of my program. My supervisor, Professor Ellie Perkins, also provided invaluable support in the development and supervision of my research, including constructive comments and a careful edit of this paper. Their thoughtful reflections and comments, and willingness to discuss my research and interests played a significant part in helping me develop my critical approach within environmental studies.

I am grateful also to Professor Pedro Jacobi, at the University of São Paulo, who took time to share with me his knowledge and experience in urban environmental issues of the São Paulo region, and advised me in my research while in Brazil.

There were many people in Brazil that helped me navigate through this research, particularly those involved with the Pinheiros-Pirapora Watershed Subcommittee and the Municipality of Pirapora do Bom Jesus. In particular, I would like to acknowledge Carlos Eduardo Guimarães, the Executive Secretary of the Subcommittee, and Mare Lucas, the municipal archivist in Pirapora, for their assistance in locating case study documents and information.

Finally, I would like to thank all those involved with the Sister Watersheds Project, Andrea Moraes, Fabiola Zerbini, Beth Texeira Lima and the staff at PROCAM, who answered endless questions, and arranged access to workspace and facilities at the University of São Paulo.

This research received the generous support of the Sister Watersheds Project/Projeto Bacias Irmãs, a partnership between York University, São Paulo University and the Ecoar Institute for Citizenship – a Brazilian NGO. The project is funded by the Canadian International Development Agency (CIDA).

ABSTRACT

The idea that sustainability will be dependent on the abilities of institutions to reconcile the contingent spheres of ecology, economy and society, has produced a new rhetoric of environmental decision-making based on integration and participation focused on the ecological scale of the watershed. These reformed institutional spaces, while they are physically located within the watershed, are mediums where scale is continuously reconstructed and doesn't always 'fit' within the prescribed reach of the actors within it. They are negotiated products of participating agents whose epistemologies are rooted in a different space, place and time, affecting who they represent and how they represent. The incorporation of previously 'contested spaces' into 'collaborative spaces' implies that participatory democracy will be achieved, however, the rhetoric of participation itself often limits discussion of how to increase inclusivity, becoming an exercise in institutionalizing inequalities and legitimizing hegemonic processes. This can result in exclusion of particular sociopolitical spaces and the enhancement of geographies of difference. Considering these issues are still not adequately understood or addressed within current scales of enviropolitical organization, rescaling water management to a new watershed scale can result in the redefinition of unequal power relationships where some obtain new powers at the expense of further marginalizing others. The objective of this paper is to try to understand how representation and the production of scale affect the decision-making space of participatory watershed management, a space dependent on the assumption that it will represent the public through discursive deliberation between relevant civil society groups and the state. The research in this paper applies the concepts of scale and representation to investigate participatory watershed governance – involving state, municipal and civil society actors - in the Alto Tietê watershed of the Metropolitan Region of São Paulo, focusing on the highly polluted Pinheiros-Pirapora subregion. A case study of a conflict involving water pollution in a peri-urban community is used to highlight the dominance of discursive representation and its relation to a narrow production of scale within the institutional framework.

Keywords: watershed management, participation, politics of scale, politics of representation, Brazil, São Paulo, water pollution

FOREWORD

Water is an important feature in urban studies integrated within a range of topics - from planning to economic development to environmental health. Access to safe and reliable water supplies and sanitation continues to be one of the major challenges to improving socioeconomic conditions for marginalized communities marked by poverty and lack of infrastructure. There are four most widely suggested solutions for achieving water resources sustainability: integrate management of all water uses; adopt a watershed-scale approach; include 'stakeholders' in decision-making; and recognize the importance of water by giving it economic value. Over the past two decades, almost every country has adopted at least one of these approaches and there are currently increased efforts to institutionalize this further.

The commodification of water resources, however, is highly controversial and threatens to make water resources inaccessible for those who are unable to afford it. The restructuring of urban water institutions, particularly in urban areas, has increasingly focused on introducing private sector participation for the delivery of water services, based on neoliberal arguments of economic and institutional efficiency. Even where water privatization is not pursued, the combined pressures of aging infrastructure and downloading pressures means that implementing (more) lucrative water pricing is essential to guaranteeing investments in improving water resources.

Participation in water resources decision-making by those who will most be affected by these changes is key to guaranteeing that water resources remain accessible to all. Those that are currently marginalized from decision-making and political processes, however, are limited in their abilities to participate within current social and institutional contexts. This implies that there needs to be significant effort invested in enhancing the capacities of these groups to participate, either directly or indirectly, stimulating a redistribution in access to power over local socio-environmental conditions. Without this empowerment there is a danger that restructured water management structures will institutionalize inequalities and regressive policies (such as through high prices or elimination of subsidies), further alienating already marginalized groups.

The Brazilian water resources management model is perhaps one of the most progressive in developing countries as it institutes legislated participation of civil society in watershed committees. In São Paulo state watersheds, civil society shares an equal number of positions on the committee with state and municipal representatives. As the ultimate objective of these committees is to decide on appropriate water tariffs in its watershed, identification of all groups who should be represented as well as the capacities of these groups to participate will have important implications for ensuring sustainable and accessible water. Exclusion of many groups is inevitable in an environment where there is a high proportion of the population living in high degrees of poverty and experience with democratic participation is still fairly fragile.

The Sister Watershed Project (Projeto Bacias Irmãs) is a 5-year joint capacity-building project between the Faculty of Environmental Studies at York University, the Graduate Program in Environmental Sciences (PROCAM) at the University of São Paulo, and the ECOAR Institute for Citizenship - a Brazilian NGO that works to develop civil society capacity and knowledge in environmental issues. Funded by the Canadian International Development Agency, it seeks to develop capacity-building and empowerment of local civil society to participate in water resources management in two subwatersheds – Pirajussara in the Metropolitan Region of São Paulo, and Piracica-mirim in Piracicaba. Both of these subwatersheds are part of larger watersheds that serve as the scale at which the management committees organize.

This research was intended to serve as a basis for understanding how the watershed committees work, and explore the potentials and challenges for local civil society to participate in or with the institutional setting. Although the case study presented is not within the Sister Watersheds Project area (it is in the adjacent sub-watershed), the results have strong comparable relevance for Pirajussara and general applicability in Piracicaba.

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ACRONYMS¹

APRM	<i>Area de Proteção e Recuperação das Mananciais</i> Water Source Protection and Recuperation Area
CBH	<i>Comitê da Bacia Hidrográfica</i> Watershed Committee
CBH-AT	<i>Comitê da Bacia Hidrográfica Alto Tietê</i> Alto Tietê Watershed Committee
CEAM	<i>Coordenadoria Estadual de Educação Ambiental</i> State Environmental Education Coordinator
CETESB	<i>Companhia de Tecnologia de Saneamento Ambiental</i> Environmental Sanitation Technology Company
CORHI	<i>Comitê Coordenador do Plano Estadual de Recursos Hídricos</i> State Water Resources Plan Coordinating Committee
CPLA	<i>Coordenadoria de Planejamento e Legislação Ambiental</i> Environmental Planning and Legal Coordinator
CRH	<i>Conselho Estadual de Recursos Hídricos</i> State Council of Water Resources
CT	<i>Câmara Técnica</i> Technical Committee
DAEE	<i>Departamento de Água e Energia Elétrica</i> Department of Water and Electric Energy
DIEESE	
EMAE	<i>Empresa Metropolitana de Aguas e Energia</i> Metropolitan Water and Energy Enterprise
EMPLASA	<i>Empresa de Planejamento da Grande São Paulo</i> Greater São Paulo Planning Enterprise
ETA	<i>Estação de Tratamento da Água</i> Water Treatment Station

¹ I have chosen to refer to institutions, organizations and documents by their Portuguese language acronyms rather than their English translated counterparts. This facilitates the abilities of readers to pursue further information as many of the case documents are available only in Portuguese.

ETE	<i>Estação de Tratamento de Esgotos</i> Sewage Treatment Plant
FEHIDRO	<i>Fundação Estadual de Recursos Hídricos</i> State Water Resources Fund
FIPE	<i>Fundação Instituto de Pesquisas Econômicas</i> Economic Research Foundation Institute
FUSP	<i>Fundação da Universidade de São Paulo</i> São Paulo University Foundation
GE	<i>Grupo Executivo</i> Executive Group
GT	<i>Grupo de Trabalho</i> Workgroup
IBGE	<i>Instituto Brasileiro da Geografia e Estatística</i> Brazilian Institute of Geography and Statistics
IDB	Inter-American Development Bank
MMA/SRH	<i>Ministério de Meio Ambiente / Secretaria de Recursos Hídricos</i> Ministry of the Environment / Secretary of Water Resources
MSP	<i>Município de São Paulo</i> Municipality of São Paulo
NGO	Non-Governmental Organization
PDPA	<i>Plano de Desenvolvimento e Proteção Ambiental</i> Environmental Development & Protection Plan
PBJ	Pirapora do Bom Jesus
RMSP	<i>Região Metropolitana de São Paulo</i> Metropolitan Region of São Paulo
SABESP	<i>Companhia de Saneamento Básico do Estado de São Paulo</i> São Paulo State Basic Sanitation Company
SCBH-PP	<i>Sub-Comitê da Bacia Hidrográfica do Alto Tietê – Pinheiros Pirapora</i> Pinheiros-Pirapora Subcommittee of the Alto Tietê Watershed

SEADE	<i>Fundação Sistema Estadual de Análise de Dados</i> State System of Data Analysis Foundation
SEHAB	<i>Secretaria Municipal de Habitação</i> Municipal Housing Department
SIGRH	<i>Sistema Integrado de Gerenciamento de Recursos Hídricos</i> Integrated Water Resources Management System
SRPP	<i>Sub-região Pinheiros-Pirapora</i> Pinheiros-Pirapora Subregion
UGRHI	<i>Unidade de Gerenciamento de Recursos Hídricos Integrado</i> Integrated Water Resources Management Unit

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May 2005²

CHAPTER 1: INTRODUCTION

Current institutional structures for water governance have proven to be incapable of and a major constraint to achieving sustainable water management (Gleick 2000). The 1992 UNCED Earth Summit in Rio produced Agenda 21, in which ‘integrated water resources development and management’ is listed as a major component and principles regarding sustainable water management are laid out. These principles involve the integration of quality and quantity concerns, coordination among the various uses of water resources, and the application of economic value to the use of water resources. The characteristics of a watershed make it a natural unit for management and is advocated as a means of achieving sustainability (Newson 1997; Barrow 1998). Water users are often in conflict within watershed boundaries, rather than political boundaries, thus management at the watershed scale is necessary in order both to quantify and qualify the sustainable use of water - upstream uses need to consider downstream uses, increases in water-takings need to consider the aggregate amount already being extracted, etc. Sustainability objectives can be single purpose issues such as pollution reduction, dam development and flood control, or multi-purpose issues such as coordinating land and water use; they can be focused on a single resource such as water or integrate multiple resource uses such as forests, water, agriculture, land development and wildlife. In any case, effective water sustainability requires a coordination of management efforts across administrative and political boundaries. Progressing towards a watershed framework for water resources management requires the redefinition of institutional arrangements and, in some cases, developing entirely new institutions, bringing with it a set of new challenges.

² I would like to express my gratitude to Ellie Perkins, Gene Desfor and Pedro Jacobi for their thoughtful comments on an earlier draft of this paper.

There have been numerous institutional efforts in improving watershed governance across the globe since the 1980s but there has been limited success in achieving comparable and positive results. One issue is the variety of definitional and methodological approaches to watershed-based management (Dourojeanni 2001). Another major issue is that research on watershed approaches has been fairly “monodimensional” focusing on issues of water quality or quantity, or integrated land use and water policies (Wagner *et al.* 2002). Less research attention has been focused on the political and institutional issues, and the mechanisms for public participation - governance factors that are arguably the most significant components of an effective watershed strategy.

There is no doubt that in most parts of the world the institutional arrangements that have existed for managing water resources – either through a heavily centralized approach with no flexibility to deal with local heterogeneity or through fragmented and sectoralized bureaucracies lacking policy harmonization – have resulted in local conditions of scarcity affecting human health and social development. While ‘scarcity’ can be, and often is, based on a rational, reductionist interpretation of absolute water availability, analyses based on an understanding of the mutually constitutive relationship between nature and society interprets scarcity as a *produced* condition symbolic of hegemonic political and economic dynamics resulting in uneven geographies of access and power.³ Thus, the framing of water as a ‘common good’ becomes not only a priority for managing multiple uses within a science of the ‘limits of nature’, but implies the redistribution of power across geographical and social space in order to promote the quest for ‘sustainability’.

It is within this discourse that the concept of ‘participatory watershed governance’ has become so popular from the local community level to international agreements such as Agenda 21. The idea that sustainability will be dependent on the abilities of new forms of institutions to reconcile the contingent spheres of ecology, economy and society, has produced a new rhetoric of environmental decision-making based on *integration* and *participation* focused on the ecological scale of the watershed. It is not difficult to find evidence that these concepts have already been adopted into formal institutional settings.

³ For example see the work of Bakker (2003c), Castro *et al.* (2003), Kaika (2003), Swyngedouw (1995).

Regional watershed-based authorities have been present in industrialized countries for a significant time with various levels of authority, and public and private control (Bongaerts 2002 & 2002b; Burchi 1985; Castro et al. 2003; Newson 1997). The restructuring of Latin American, African and Asian water sectors are taking place within this framework (Dawei & Jingsheng 2001; Dourojeanni 2001; Wester *et al.* 2003; Brannstrom 2004), based on the assumption that within these new institutional arrangements processes of exclusion will be transformed into processes of inclusion whether through direct participation or representation. Yet, there is a tendency for these institutions to become overly comfortable in the rhetoric of participation resulting in a lack of reflection and redefinition of whom they are actually benefiting (or not benefiting). The incorporation of previously ‘contested spaces’ into ‘collaborative spaces’ implies that inclusivity will be achieved through membership and networks, and results in marginalizing analyses of inequality through the rhetoric of participation. The focus tends to be on “how we are participating” rather than “is everyone who should be participating actually participating”. There may even be internal resistance to expanding and redefining legitimate groups by actors who have only recently gained access to the participatory space, and are reluctant to risk the power they have struggled to achieve. Without this reflection, however, there is a strong chance of enhancing exclusion of certain groups who are not initially identified as legitimate ‘stakeholders’ or are excluded from the networks – or social capital – that might give them some representation.

The extreme heterogeneity in legislative powers, administrative functions, definitions of legitimate actors and processes of implementation and decision-making makes these transformations difficult to compare and requires context-sensitive analyses dependent on scale and representation to understand whether and the extent to which these models can resolve the hegemonic dynamics that mediate the construction of sociopolitical space. These institutional spaces, while they are physically located within these new watershed scales, are mediums where ‘scale’ is continuously reconstructed and doesn’t always ‘fit’ within the prescribed scale of these institutions. They are negotiated products of participating agents whose epistemologies are rooted in different spaces, places and times, affecting who and how they ‘represent’. The result is a narrow production of scale where the intended ‘reach’ of representation does not exactly fit with

the actual ‘reach’ of the actors or processes involved. Thus, it is likely that groups and even geographies are excluded from the benefits of the participatory institution.

Smith (1992) asks, “how do we conceptually construct localities and geographical differences as foci of research, and how are they related to other scales of geographical difference?” The research in this paper attempts to apply the concept of scale and associated representation to explore its role in participatory watershed governance in the Alto Tietê watershed of the Metropolitan Region of São Paulo. It focuses on the Pinheiros-Pirapora Subcommittee, one of the five subcommittees within the Alto Tietê watershed, involving state, municipal and civil society actors in participatory watershed management. A case study of a conflict involving water pollution in a small town on the edge of the subregion’s territorial space is used to highlight the dominance of discursive representation as opposed to constituent representation, and how this relates to a narrow production of scale.

The following chapter overviews theoretical concepts of scale and representation, attempting to demonstrate how they can be applied to watershed governance. Chapter three provides an introduction to the case study and gives details about the methodological approach of the paper. I then introduce the participatory watershed management policy of Brazil and the State of São Paulo, highlighting some institutional and organizational issues that create differences within and between states. Chapter four presents the hydrosocial environmental contexts of the Metropolitan Region of São Paulo and the Pineiros-Pirapora Subregion, as well as the watershed committees. An analysis of the Alto Tietê Committee is based on a literature review, while institutional processes within the Pinheiros-Pirapora Subcommittee are explored based on field research with particular reference to how the concept of representation is applied in the subcommittee system. In chapter six I present a political ecology of the town of Pirapora do Bom Jesus, where toxic foam overflowing from the river has plagued the town for almost thirty years as a result of poor water resource decisions in an era of hydroelectricity generation. Finally, I analyze the role of the Pinheiros-Pirapora Subcommittee in addressing this issue, reflecting on how discursive representation and limited perception of scale may be impacting the subcommittee’s actions.

CHAPTER 2: PARTICIPATORY WATERSHED GOVERNANCE: CONCEPTS OF SCALE AND REPRESENTATION

Watershed governance can best be defined as “the range of political, organizational and administrative processes through which communities articulate their interests, their input is absorbed, decisions are made and implemented, and decision makers are held accountable in the development and management of water[shed] resources” (Bakker 2003b). Depending on the scale at which these decisions about water resources are applied, they can result in very different outcomes depending on the social, environmental and economic context, which are inherently place-specific. Advocates of participatory watershed-scale governance argue that stakeholders – those that are or could be affected by decisions – are able to contribute local knowledge to the process of decision-making ensuring that the policies and actions taken are appropriate. While watershed management may be an objective of a particular governance regime, the rhetoric of inclusion - particularly when it is claimed for traditionally marginalized groups - implies that governance success should be assessed not only through end results, but also through the process of achieving them. This chapter provides a theoretical outline of the principles of watershed governance and discusses inclusion (exclusion) in terms of the reproduction of scale and representation.

2.1 Principles of Watershed Governance

Environmental and conservationist discourses have long been focusing on the watershed as the most appropriate scale for water management based on its ecological conceptualization as a bio-geographical physical area defined by the hydrological flow of water (Newson 1997; Barrow 1998). It can be visualized as the entire land area that ‘sheds’ water to a specific point in a river or tributary; the limits become the highest peaks on the periphery forming a ‘closed’ unit wherein most environmental interactions can be said to be contained. But there is also a recognized relationship between this naturally produced scale and the sociopolitical interactions it mediates; society is linked by its dependence on water within a watershed and the historical evolution of human

organization has been based significantly, though not entirely, based on these hydro-geographical qualities (Barham 2001). The social and hydrological processes within the watershed can be conceptualized as a “hydrosocial cycle” (Swyngedouw 1996) – they have a mutually constitutive relationship so that changes in one can create significant implications for the other. Thus, watersheds present appropriate units for analysis and management as hydrosocial processes tend to be mediated within this scale.

There have been various attempts to categorize the different types of institutions that have arisen out this watershed-scale framework; however, there is so much heterogeneity in form and function - as well as an indiscriminate use of terminology - that this proves to be impossible.⁴ In its most common form ‘integrated watershed management’ is defined by Easter & Dixon [1991, in Dawei & Jingsheng (2001)] as:

the process of planning, guiding and implementing a course of action involving natural, human and other resource uses in a watershed, taking into account the social, political, economic and institutional factors operating within the watershed and other relevant regions to achieve specific social objectives.

This implies that the multiple and competing uses of water should and can be mediated within an institutional framework of sector integration that transgresses political and social boundaries, often manifested through a decentralization of power from state levels of organization to local administrations, particularly in Latin America where heavily centralized state governments have been implicated in the failure of institutions to appropriately respond to local conditions and conflicts (Tortajada 2001).

Decentralization has become the ‘solution’ to corrupt government and inefficiency, and has often been used as a means of facilitating private sector investment in the utilities sectors.

Decentralization can be administrative (deconcentration of management units), political (devolution of power to local units) or democratic (devolution of power to local units with community participation); it is the latter that is advocated in watershed governance as the only approach inducing downward accountability and protecting the public interest (Blair 2000; Brannstrom 2004). Democratic decentralization based on public participation in environmental decision-making is essential for managing water

⁴ For examples of the variety of terms used and efforts at classification see Barrow (1998), Dourojeanni (2001), Lundqvist et al. (1985) and Newson (1997).

resources where “information is both dispersed and central to decision-making, there are high levels of uncertainty, problems often have more than one cause, and their resolution usually requires collaboration among public and private sectors” (Keck 2004:44). Silva & Machada (2001) note that democratization in public services provision is even more important in periphery countries where there are still significant sectors of the population lacking access to basic services and structural social inequalities create distortions in perceived demand. These marginalized groups often lack access or experience with democratic participation, limiting their abilities to influence policy change. The idea is that by building participation and accountability at local levels, local governments will become more responsive to civil society demands, and ‘stakeholders’ will be more inclined to cooperate in negotiating conflict over resource use.

The transformation to participatory watershed governance ideally results in the production of new social and political spaces for previously marginalized groups. Decentralization of decision-making to local spaces on the watershed scale can increase accessibility to resources and responsiveness to local needs. It suggests that geographic spaces marginalized through capitalist accumulation processes of uneven development - for example, downstream communities subjected to upstream urban pollution - now have opportunities to challenge these hegemonic dynamics. In addition, these newly democratized spaces can provide an opportunity for political emancipation through ‘social learning,’ leading to a potential redistribution of socioeconomic inequalities and power (Blair 2000; Habermas 1996; Johnson & Wilson 2000). All of these benefits depend on opportunities for direct participation or representation requiring an informed and delicate selection of ‘identity’ groups. They also depend on a dedicated transfer of power to these democratic institutions, legitimizing the participatory process and creating tangible local benefits.

These normative ideals are difficult to achieve in practice without an understanding of hegemonic relations of power and a commitment to ensuring its redistribution to the traditionally marginalized. Empirical research has pointed to limits to participation in water resources management for socioeconomic reasons (Brannstrom 2004; Fletcher 2003), procedural reasons such as difficulties in the identification and number of legitimate groups (Johnson & Wilson 2000; Koontz & Johnson 2004;

Tompkins *et al.* 2002; Tortajada 2001), and because of limited access to knowledge (Jacobi 2004a).⁵ The rhetoric of participation itself often limits discussion of *how* to increase ‘inclusivity’, becoming an exercise in institutionalizing inequalities and legitimizing elite domination (Fraser 1992; Kujinga & Manzungu 2004). Considering that these issues are still not adequately understood or addressed within current scales of enviropolitical organization, rescaling water management to a new watershed scale certainly has the potential to result in the creation of new unequal relationships of power.

2.2 Discursive Representation and the Politics of Scale

Consider the following case of a small town on the peri-urban hinterland of a large metropolitan city. Within the town, there is a locally produced scale of contested struggle for social and political power creating powerful and marginalized actors, most likely manifested across geographical space (Harvey 1996). Its position relative to the ‘city’ aggravates these conditions further as it absorbs and contributes to processes of accumulation and growth, creating contingent reproductions of local space - itself mediated through interactions at higher scales such as national regulation modes (Lauria 1997) – and transforming relationships of power. Where at the local scale the dominant elite may control political and economic power, on the scale of the metropolitan region, this elite now struggles for control with a whole new set of actors and political conditions. Those marginalized may now find new spaces with which to gain political control, or become further marginalized by processes of exclusion, particularly if opportunities are mediated only through the local elite. Depending on the outcome of these processes, the town may find itself further marginalized from political and social space relative to the scale of interaction.

Although a crude example, this narrative illustrates the likely implications of creating new institutions on a scale such as the watershed. The political construction of scale – “the changing scales on which political processes are organized and the concomitant struggles of social actors, movements, and institutions to influence the

⁵ For case study evidence of limits to participation in Brazil’s watershed management institutions, see Johnson & Lopes (2003).

locational structure, territorial extension, and qualitative organization of those scales” (Brenner 1998: 460) – becomes an important factor influencing the potentials and limitations of watershed institutions. Political organization on a watershed scale is unprecedented in human history until recently (Barham 2001). The sociopolitical implications of this level of organization are not very well understood; in fact, although there are many claims of greater inclusion, as well as warnings against institutionalizing social inequalities, there is very little research on exclusivity and its relationship to these processes of change.

The fundamental aspect of scale is that although it may administratively appear to be a function of physical territory, it really is a function of the production of space. The processes of articulation within and outside institutions determine the actual ‘reach’ these new scales will have and also depends on the scale-dependent positions – ‘place’ - of the actors involved (MacLead & Goodwin 1999; Swyngedouw & Heynen 2003). Cox (1998) conceptualizes this through distinguishing between ‘spaces of dependence’ and ‘spaces of engagement’. Spaces of dependence are the localized social relations that are essential for securing interests, such as the home and the workplace. The degree to which people can secure their interests depends on interactions with social powers at other scales – spaces of engagement – and might require ‘jumping scales’ or ‘downscaling’. So, for example, in the case of a watershed management institution we might say that these spaces of dependence are the legal frameworks, plans, offices and territorial space in which the watershed management institution operates (Tompkins *et al.* 2002). In order to ensure the institution achieves its objectives, it needs to gain legitimacy through creating a space of engagement at different scales – e.g. state actors, municipal administrations, civil society organization, media and international discourses - each of which has its own spaces of dependence and engagement. Thus, the production of scale is influenced by its “networks of interaction” (Cox 1998) and the extent to which the institution is able to define its scale of action will depend on the ‘reach’ of its network.

The adoption of the watershed as a unit of management, although it is a ‘naturally’ produced scale, does not imply that decisions made within the relevant institutions will be reflective of its physical area. Decisions are not made by rules and regulations, these merely define process; it is actors operating from within subjective

positions of dependence and engagement that define how these processes will be used to make decisions. As Keck (2004:46) asserts, “actors are *situated individuals* whose networks of individual and institutional linkages categorize them in others’ eyes and are constitutive of their self-understanding, jointly with their ideas and their interests.” Thus, actors within a participatory space each have set ‘locations’ from which they ‘map’ the world and, depending on their ability to articulate and the relative power that space affords them, the net decisions become aggregates of discursive positions (Smith 1992; Keck 2004). These decisions are then applied concretely where they are translated into outcomes depending on the sociopolitical dynamics of that contextual space.

Discourse is a key element of this process. Participatory democracy is generally based on the theory of deliberative democracy developed by Jurgen Habermas (1989, 1996) who believed that democracy could best be achieved in a public sphere where communicative rationality – through discussion and argument – would lead to consensus based on articulation of autonomous political positions (i.e. without cooptation). There are many critics of Habermas’ theories, particularly on the conception of a deliberative space without power (Benhabib 1996; Calhoun 1992), however its normative ideals have remained the central framework for advocates of stakeholder representation, alternative dispute resolution and environmental democracy (Mason 1999). Fraser (1992:120) questions:

...whether it is possible even in principle for interlocutors to deliberate as if they were social peers in specially designated discursive arenas when these discursive arenas are situated in a larger societal context that is pervaded by structural relations of dominance and subordination.

It is reasonable to expect that actors, who are situated individuals, would be unable to “leave their differences at the door,” (and perhaps should not be expected to). Thus, participation within a “democratic” space is mediated by intersubjective relations that create power and affect individual or group dynamics, and, ultimately, the *effectiveness* of participation as a legitimate tool in sustainable governance. Indeed, power also influences the process of identifying ‘stakeholder’ groups or representatives; within each identified group there exists power, influencing the abilities of the most marginalized to gain direct access to participatory processes.

Considering that representation of stakeholder groups is the most common form of participatory watershed governance (as opposed to direct participation by all interested), the relevant question is whether the democratic institutional space and the associated reproduction of scale actually *represents* the watershed. Agents that are ‘selected’ to represent their stakeholder groups articulate ideas that may partly be a result of consultation with their constituents but are largely informed by their position within their spaces of dependence and engagement. They are individuals with ‘ideas’, not institutions or constituents, engaged in discursive representation (Keck 2004). Their ability to articulate positions is a result of their intersubjective position with other representatives. How these agents came to be in that space is the result of struggle on other scales. And the identification of relevant stakeholder groups is the product of another dynamic, which, as Fraser (1992) indicates, can be representative of hegemonic forces. Thus, who has a legitimate right to participate or to ‘represent’ is a direct function of the sociopolitical contexts from which these institutions evolved.

Networks – spaces of engagement – are thought to be important tools for extending the ‘reach’ of social power and for legitimizing representation. The social capital literature asserts that these networks enhance circulation and extension of trust and knowledge, precursors for collaborative planning, and recent research demonstrates that this relationship may be directly constitutive of institutional performance (da Cunha 2004; Healey 1998; Ostrom 1990, 1996). Tompkins *et al.* (2002) suggest that the development of networks through and outside institutions contributes to ensuring inclusive processes, and that the potential for empowering more participation might be a benefit, which is greater than the realized outcome. However, as Mayer (2003) points out, these discourses can still serve to obscure exclusivity by focusing on the potentials of social capital to ‘mobilize’ without addressing the traditional categories of power, domination and exploitation. Thus, the difficulty presented by having only one representative per stakeholder groups is legitimized by the assumption that accountability will be achieved through networks, where marginalized groups can ‘participate’ through their connections to representatives and other groups, facilitating collaboration (or contestation). Yet, the scale of these networks may not necessarily reach all who should be included and within them there continues to exist power relationships, which may

directly exclude some groups from participating. Without addressing these processes of exclusion and reevaluating representation of heterogeneous identity groups, the benefits of social capital - in terms of redistributing access and power over policy process - is limited.

The urban contexts of many developing countries also complicates efforts to create representative and decentralized democratic institutions. According to the United Nations, an estimated one billion people live in urban slums concentrated in Africa, Asia and Latin America (United Nations 2003). Urban areas continue to experience rapid population growth, spilling over into peri-urban areas and transforming local socioeconomic dynamics. Metropolitan regions comprise multiple local jurisdictions - large agglomerations of shifting capital and people – where the importance of the urban centre is changing vis-à-vis its periphery. However, even though the scale of social and economic transformation may be shared, there is rarely a common governance structure to mediate these exchanges (Aguilar & Ward 2003). Thus, peri-urban areas are often in direct competition with each other as they attempt to attract capital investment and facilitate local growth. Without coordinated (or shared) governance structures, however, the transformations continue to be mediated by hegemonic processes operating from the urban core.

Decentralization efforts in these environments can be dangerous as there is a lack of research into the relationships between peri-urban areas with their metropolitan core, resulting in a “disjuncture between these spaces and the opportunities for representative and participative democratic structures to emerge within and between them” (Aguilar & Ward 2003:5). In Latin America there is very little research into the development of periurban areas, despite the region having a 77% urban population (United Nations 2003). Most urban research in these countries is dedicated to suburban development or urban restructuring, using metropolitan-wide data that fail to distinguish periphery-core differences, and lack analyses of how peri-urban transformations are undermining rather than enhancing human development (Aguilar & Ward 2003). Cross-jurisdictional participatory institutions, such as the watershed committees described in this paper, that fail to address these shifting power dynamics will also fail to be effectively democratic and inclusive.

The Alto Tietê Watershed Committee in the Metropolitan Region of São Paulo attempts to act as participatory democratic space to coordinate water resources management between regions and municipalities. Due to the immensity of the metropolitan region and the differences both in uses and conditions of water resources, the Alto Tietê Watershed Committee has created subcommittees where ‘local’ water resource issues can be more effectively addressed. In these subregional committees, peri-urban municipalities each share the same amount of power with the central core, and there are expanded opportunities for ‘local’ civil society participation. The objective of this paper is to try to understand how representation and scale can affect the decision-making space - a space dependent on the assumption that the public will be ‘represented’ through discursive deliberation between relevant civil society groups and the state - of one of these subcommittees.

CHAPTER 3: RESEARCH FRAMEWORK

Political ecology has gained popularity as a theoretical lens through which to analyze the political, social and economic dimensions of ecological issues. Deriving from the political economy tradition of tracing the relationships between the economy and society, political ecology goes further by asserting the “mutually constitutive interrelationships between the discursive, social and material dimensions of environmental change and socioeconomic restructuring” (Bakker 2003:52). Water is an essential human need intrinsically tied to processes of social reproduction, which contingently redefine and rescale the construction of water as nature. Swyngedouw (1996) conceptualizes this contingent relationship as the *hydrosocial* cycle – the circulation of water through social and political space where every decision comes to reflect contested sites of struggle manifested through power relations. The role of the urban scale as the source of hydrosocial transformation is highlighted as a key to understanding these sites of struggle (Swyngedouw & Heynen 2003; Swyngedouw *et al.* 2002). Through using the urban as a scale of reference Swyngedouw argues that:

...we can reconstruct – and hence theorize – the urbanization process as a political-ecological process with water as the entry point; water that embodies, simultaneously and inseparably, bio-chemical and physical properties, cultural and symbolic meanings, and socio-economic characteristics. These multiple metabolisms of water are structured and organized through relations of power, socio-natural power, that is, relations of domination and subordination, of access and exclusion, of emancipation and repression. The social power relations become embedded in the flow and metabolism of circulating water (1996:76).

The struggle for access to water supply services on the urban periphery, for example, is constitutive of uneven geographies of development reflecting processes of economic regulation (Lauria 1997; Harvey 1996). The urban environment, as the prime mediator of processes of capital accumulation, becomes an important site from which to understand the hydrosocial cycle, and an urban political ecology would focus on this scale as a site of contestation for control of water resulting in processes of social reproduction.

Although political ecology has not yet developed a unified methodological tradition, there are numerous recent empirical studies that focus on water in

deconstructing power relations inherent in the hydrosocial cycle.⁶ This approach, by its nature, focuses on processes of exclusion and relationships of power that produce marginal geographies. There are three basic streams of inquiry: contextual sources of environmental change – highly dependent on scale; conflicts over access - resulting in social, political and scalar reproductions; and, political ramifications of environmental change, which are reflections of social processes as much as ecological (Bryant 1992). In the tradition of critical research, political ecology questions the effects of economic and social development through the appropriation of nature on marginalized communities and its role in the production of uneven geographies (Swyngedouw & Heynen 2003). Exploring urban socio-environmental issues from this perspective, though less an active effort to propose solutions than describe the problems, can contribute to the emancipatory knowledge needed for marginalized groups to challenge hegemonic processes.

This research paper explores the power transformations that have been and are occurring with the reconstruction of water management from traditional political scales to the watershed scale, and with the production of new institutional arrangements to control decision-making about water. In particular, I question: *who* has (or does not have) access to these new political spaces and what are the implications for the redistribution of power over water decision-making across geographic scales? I have attempted to answer these questions based on an exploratory case study of a watershed committee in the Metropolitan Region of São Paulo (RMSP) in Brazil where watershed management has been based on a model of deliberative democracy between representatives of ‘stakeholder’ groups for over a decade. As it is a legislated institution with decision-making powers, rather than solely forming a consultative body, and it is considerably more progressive through its inclusion of a wider group of stakeholders, the RMSP watershed committee is an appropriate case from which to explore the effects of scale in participatory watershed management, particularly in terms of redistributing power. Although the context within Brazil and the highly uneven geography of the RMSP may make the experience of the committee place-specific (certainly the water issue described is both unique and place-specific), the exploratory nature of the research can uncover

⁶ See Bakker (2003b); Johnston (2003); Loftus & McDonald (2001); Swyngedouw (1995); Swyngedouw *et al.* (2002).

wider lessons or considerations that may be relevant to understanding dynamics within other participatory urban institutions.

3.1 Methodological Approaches to Scale

Most research on power relations in participatory watershed governance focuses either on analyses of participation or on decision-making processes within the institutional space. There are few concrete studies that assess participation of outside actors – ‘excluded’ groups – and the effects of non-representation, as I attempt to do here. There exists so much heterogeneity within and between groups and scales that simply identifying stakeholders would fail to include all possible legitimate groups that could be affected by water decisions.⁷ Thus, research that attempts to explore processes of exclusion rather than just inclusion is relevant for continuing to challenge and redefine who these groups are that should be represented. My approach is loosely based on a ‘thick’ analysis of decision-making that draws from a variety of disciplines for research methodology in order to assess institutional processes based on four factors: efficiency, equity, effectiveness and legitimacy (Adger *et al.* 2003). While my analysis below is not structurally based on these factors, they formed integral functions in my process of conducting field research.

Scale is approached as an ontological construction, which, as well as being the subject of research, I use descriptively to structure the paper. Jones (1998) suggests that scale may be better thought of as epistemology - it is not a ‘real’ thing but an abstract way of knowing about the world - using an example of how maps shape our perception of location. I agree in some respect that the way we perceive scale shapes our knowledge and view of the world, yet I have to also agree with Cox (1998) that scale does exist in some ‘real’ form. Although the negotiation of political scale is dependent on the interactions of actors within the watershed committee – its spaces of dependence and engagement – political geographic scales are points of reference from which institutions organize, so that a watershed committee would most likely include stakeholders that are

⁷ For example, it has often been noted in feminist research that there are very different constructions of identities. The identity of being “female” may be too simplistic and can be disempowering to marginalized female groups, such as women of colour (Barett 1987).

within its territorial scale. In essence, scale is mutually constitutive of the institutional space.

Institutions, discourse and place-specific actors become important factors in this analysis. The meanings given to nature in particular contexts are framed and articulated by socially discursive constructions giving rise to hegemonic power dynamics (Adger *et al.* 2003; Escobar 1999; Swyngedouw 1996). Decisions made in the watershed committees are the aggregate products of the ideas, positions and networks of the agents that have the opportunity to participate in these spaces where “deliberation is used to develop reasons for creating priorities and making compromises” (Adger *et al.* 2003:1098). How popular movements ‘frame’ issues can potentially influence policy outcomes by attracting support from other groups, often through ‘jumping scale,’ defining solutions and directing discourse, and has been found to be effective in Brazil (Lemos 1998; Branstromm 2004). As the participation of civil society groups, traditionally thought of as marginalized from decision-making, is an important feature of these committees, understanding which issues they focus on and how they are framed provides important clues to understanding how participation of these groups affects the production of scale within the institution.

The concepts of networks and social actors are aspects of the actor-oriented approach that are useful here to analyze the watershed committee (Long 1998). As members of the committee engaged in the production of sociopolitical space, actors are considered situated individuals where representation of their respective constituents or agencies is less a feature directing their actions than their position within their spaces of dependence and engagement. This is particularly evident as actors within one ‘group’ can also be members of another group – e.g. through associations or volunteering.⁸ Institutions are also considered social actors whose characters become an aggregate function of the actors within them. Research in the São Paulo area regarding water resources demonstrates that networks of social actors within and between various institutions and civil society have instigated important initiatives for water sector reform and collaborative strategies (Lemos 1998; Keck 2002). The analysis below is organized

⁸ In the RMSP, for example, a municipal representative in the Pinheiros-Pirapora Subcommittee is also a civil society representative in the Alto Tietê Watershed Committee.

as a narrative, providing historical descriptions of the institutional arrangements and social actors involved, tracing discourse and power relations across scale.

3.2 The Case Study

The objective of the research was to analyze representation of the watershed within the institutional setting of the watershed management committee in the Metropolitan Region of São Paulo (RMSP), which is virtually synonymous with the Alto Tietê watershed (Figure 1). Owing to the heterogeneity of water and social issues, the committee has been further subdivided into five subcommittees, each covering a portion of the city and extending into the periphery, to deal with localized issues, while the Alto Tietê Watershed Committee (CBH-AT) is responsible for actions pertaining to the entire watershed (Figure 2). Previous research in the watershed has demonstrated that most debate and significant actions occur at the level of the subcommittees where there is greater interaction and participation of local municipal and civil society actors (Alvim 2003; Jacobi 2004; Keck & Jacobi 2001). Given the growth character of the RMSP, where the urban poor are being constantly being pushed further outside of the city, each subcommittee then represents an interesting case study in the production and representation of scale.

The principal approach was to use a case study of a community-scale water issue and investigate the process and role of a watershed subcommittee in addressing the issue. The Pinheiros-Pirapora Subcommittee (SCBH-PP) makes a good case study because it is the only one of the five subcommittees that does not have a significant amount of territory dedicated to water source protection and restricted from urban development, a polemic issue that has dominated discursive space in most of the subcommittees (Alvim 2003). It was assumed that there would be more opportunity for community-scale issues to have access to the political space of the SCBH-PP. Being the only downstream region receiving all of the pollution from the RMSP, its potential to resolve water pollution problems is highly dependent on its interaction with the rest of the RMSP. Thus, not only is the case study exploratory regarding representation of scale within the committee, it

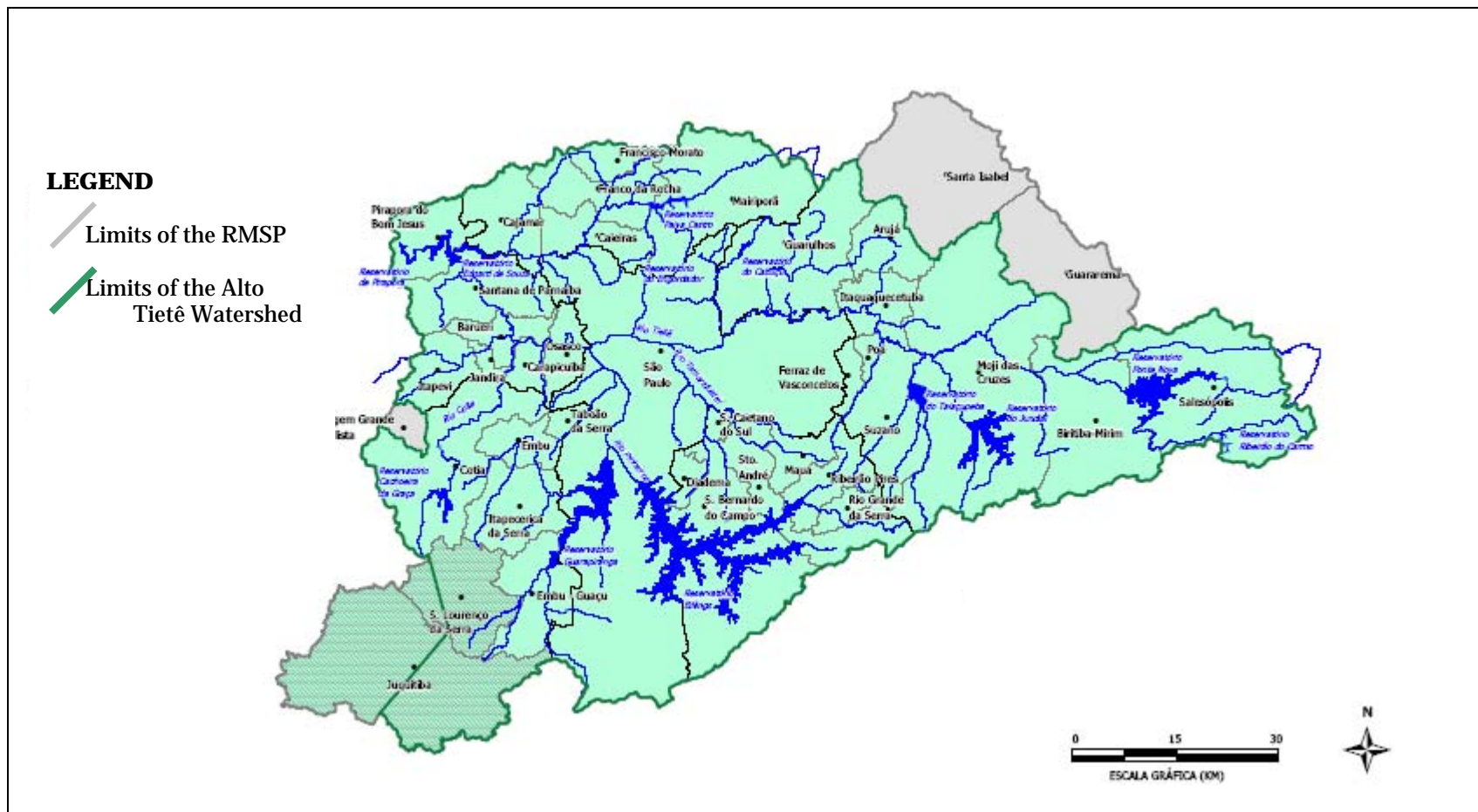
also presents a unique opportunity to research the interaction of produced scales in the whole Alto Tietê region.

To highlight the relevant factors in the main case study I used an embedded case study of a polemic conflict within the subregion. The embedded study focused on the SCBH-PP's role in addressing conflict in Pirapora do Bom Jesus, the smallest town in the subregion area, which has been suffering from an extreme manifestation of water pollution for almost 30 years in that toxic, sudsy foam builds up at a nearby dam and overflows from the river onto the city streets. The most recent serious incident was in 2003 when the foam reached heights as high as five metres and persisted for several months, resulting in international media coverage and local demonstrations. As the pollution source is the untreated sewage and industrial effluents from all of the RMSP municipalities upstream from Pirapora, it was expected that, assuming representation of the region is high, not only would the SCBH-PP be responsible for addressing the Pirapora issue but it would also play an advocate role at the larger scale of the Alto Tietê region.

Case studies are most often criticized for their lack of generalizability; however, advocates of case study research argue that finding patterns through “concrete, context-dependent knowledge” is more valuable than developing universal theories (Flyvbjerg 2004; Yin 2003). Flyvbjerg (2004) adds that case study research is particularly important for the development of research skills and experience that lead to ‘expert’ knowledge. Considering the watershed committees as sociopolitical spaces which are highly dependent on intersubjective positions and discursive articulation of place-specific social actors, it would be difficult to generalize results for participatory watershed governance from one case study; the goal of the research is more to identify how scale plays a factor in the watershed committee's performance and contribute to the literature on representative democratic environmental governance.

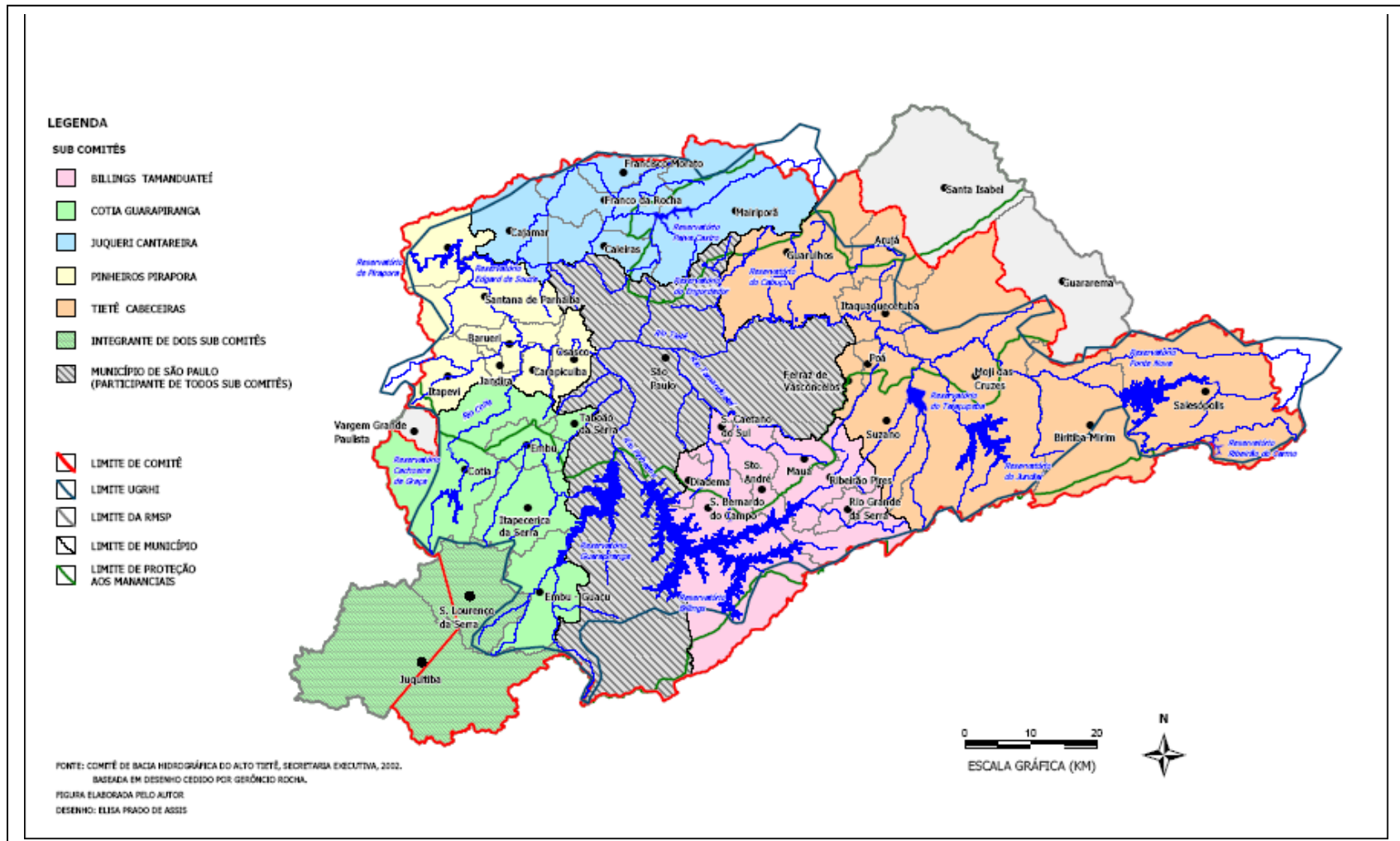
My field research was undertaken between May and October 2004 in the city of São Paulo with frequent field visits to Pirapora do Bom Jesus, which lies about 50 kilometres away. Much of the research is based on twenty semi-structured audiotaped interviews with actors both within and outside the subcommittee who were involved in

Figure 1. Map of the Metropolitan Region of São Paulo and Alto Tietê Watershed



Source: Alvim (2003).

Figure 2. Map of the Subcommittees of the Alto Tietê Watershed, São Paulo



Source: Alvim (2003).

the Pirapora do Bom Jesus case, as well as actors outside of the Pirapora case that were intimately familiar with the subcommittee. A list of the participants can be found in Table 1. Although the formats were semi-structured, some interviews evolved into conversations where there was more of a two-way interaction. Fontana & Frey (1994) suggest that this is more “morally sound and reliable” as it reduces the power relationship between the interviewer and interviewee, and provides greater understanding. There were occasions where these discussions led me to develop new perspectives and where the nature of my questions led the interviewee to consider new issues related to participation.

Table 1. List of Interview Participants

	Sector	Location of Interview	Name (if available)	Title, Affiliation	
Internal SCBH-PP Members	1 State	São Paulo	Carlos Eduardo Guimaraes do Nascimento	Executive Secretary, SCBH-PP EMAE	
	2 State	São Paulo			
	3 State	São Paulo			
	4 State	São Paulo			
	5 Municipal	Pirapora			
	6 Municipal	Carapicuíba			
	7 Civil Society	Osasco	Meire Garcia Pizelli	Vice President, SCBH-PP Order of Brazilian Lawyers (OAB)	
	8 Civil Society	Carapicuíba			
	9 Civil Society	Lapa			
External to SCBH-PP, Knowledgeable of Pirapora foam issue or of SCBH-PP	10 State	São Paulo	Geroncio Rocha	Director of Water Resources, DAEE	
	11 Civil Society	São Paulo		Community Organization Leader	
	12 Civil Society	Pirapora		Resident	
	13 Civil Society	Pirapora		Community Organization Leader	
	14 Civil Society	São Paulo	Paulo Brito Felipe	Environmental Organization	
	15 Municipal	Pirapora		Executive Assistant to the Mayor, PBJ Prefecture	
	16 Municipal	Pirapora		PBJ Prefecture	
	17 Municipal	Pirapora		PBJ Prefecture	
	18 State	Barueri		Marcos Mendes Lyra	District Attorney, Barueri
	19 State	Osasco			Sabesp
20 State	São Paulo	Sabesp			
SCBH-PP Members that participated in USP Seminar	State	São Paulo	Carlos Eduardo Guimaraes do Nascimento	EMAE	
	State	São Paulo	Maria de Lourdes Gandra	CEPAM	
	Municipal	São Paulo	Maria del Carmen Adsuara	Municipality of Santana de Paraíba Municipality of Pirapora do Bom Jesus	
	Municipal	São Paulo	Luiz Nobumasa Sano	Jesus	

Note: Not all SCBH-PP members interviewed are listed as the permanent *active* members in Appendix A. Quite often, official members will send others in their place thus these were the “members” interviewed for this case study.

Interviewees were selected semi-strategically to ensure that there was a balance of each of the municipal, state and civil society sectors. Selection of subcommittee interviewees – 9 interviewees - was based on their presence at relevant meetings as well as their representation of institutions involved in the Pirapora case. I was unable to obtain more than two interviews with municipal representatives, or their substitutes, due to the elections process at the time. Interviews focused on the actions of the subcommittee, participation by different actors/sectors, interaction with constituents and networks, and perspectives on the role of the subcommittee in water resources management, particularly with regards to Pirapora. There were eleven interviews with ‘outside’ actors, most of which were relevant to the Pirapora case with a few key interviews providing an external informed perspective on the subcommittee. These participants were selected using the ‘snowball’ technique where interviewees would indicate possible participants for further interviews (Creswell 1994). As most of the interviews involved opinions and perceptions, almost all of the interviewees are not formally identified in this paper, except for those who were interviewed only in their professional capacities.

Effort was taken to maintain a database of all research and documents consulted to ensure validity and reliability (Yin 2003). I was able to gain access to archival data for the SCBH-PP stored in boxes at the São Paulo State Basic Sanitation Company (SABESP), which included meeting minutes, reports, funding proposals, an elections database, and events documents. Except for the year 2000, most of the committee’s meeting minutes were available, however, minutes of the Technical Committees were not as consistent; as well, there were many meetings where attendance was not recorded, making it difficult to assess participation quantitatively. Data sources included local newspapers, particularly in Pirapora, over the years 2003-2004, access to which was facilitated by the archival department of Pirapora City Hall. Documents and research by state agencies such as the Environmental Sanitation Technology Company (CETESB) and the Metropolitan Water and Energy Company (EMAE) on the Pirapora issue provided a rich historical narrative of the foam issue. As well, field visits included informal conversations with many residents in the town’s center, contributing to a

‘contextual picture’ of Pirapora. Throughout the research triangulation was used as a method of corroborating interview statements as well as media reports (Creswell 1994).

At the end of my field study, I made a presentation of my initial findings at the University of São Paulo (USP), where four SCBH-PP members attended and participated in the discussion afterwards. The feedback provided valuable perspectives on the research, particularly since I had not interviewed them all, and assisted in my final analysis. These participants did not include civil society members.

There are a few limitations to this study that might affect the results. The mayor of Pirapora did not respond to my requests for an interview, although I was able to interview key people in his administration. This is significant considering he was the President of the SCBH-PP during the 2003-2004 term, and also the key actor in the Pirapora foam case. His reluctance may be partly due to the fact that my field study coincided with the few months prior to state-wide municipal elections; it certainly impacted on the availability of other subcommittee members who were involved in campaigns. As well, because of this, the SCBH-PP was temporarily stalled and I was not able to attend and directly observe meetings; I did attend a CBH-AT meeting, providing an idea of how they worked and some of the interactions among the sectors. Interviews and archival data provided information to fill in the ‘gaps.’

The research is presented as a series of rich narratives told on different scales. I hope that in this way I can bridge the links between history and geography, actors and institutions, between discourse and sociopolitical space, in order to understand the role of representation and scale in participatory watershed management in the Pinheiros-Pirapora region.

CHAPTER 4: INSTITUTIONAL FRAMEWORK FOR WATER MANAGEMENT IN BRAZIL

Brazil's 1997 *National Water Resources Policy* is the product of almost two decades of discussions at national and state levels on the most effective model for integrating water management, which until then had taken a strongly sectoral, centralized approach (Abers & Dino 2004). With the end of authoritarian rule and the shift to a democratic regime in 1982, the discursive space was widened for more progressive and participatory models of governance that would direct the transformation of Brazil's institutions to reflect its new social and political framework. The 1988 Federal Constitution declared water to be a public good that should be managed under a national system, and introduced key principles of participation, decentralization and integration as essential to public policy (Porto 1998). Within this context, the water resources sector was able to gain a platform for proposed reforms that had been developing amongst technical water specialists since the beginning of the 1980s, particularly in São Paulo State (Keck 2002). By the time the national law was approved in 1997, the participatory watershed framework had already been institutionalized by many Brazilian states with the approval of new water laws.

São Paulo was the first state to pass a State Water Law in 1991, and its framework served as a model for other water sector reforms in the country. The policy is based on democratic decentralization with integration of various sectors and shared water decision-making powers with municipalities and civil society. The principal incentive for participation was seen to be the implementation of water use charges – the watershed committees would be the forums for deliberating appropriate prices and for determining investment priorities. At the time of writing, only one watershed had begun to implement water charges – Rio Paraíba do Sul – yet there are many watershed committees functioning throughout the country despite the lack of formally derived funds. In São Paulo, the state has created committees in each watershed, a top-down approach contrary to other states, which require local actors to request that a committee be formed. This section provides a general understanding of the institutional arrangements and principal

issues that exist in Brazil and São Paulo State legislation, drawing out implications for participation.

4.1 Brazil's *National Water Resources Policy*

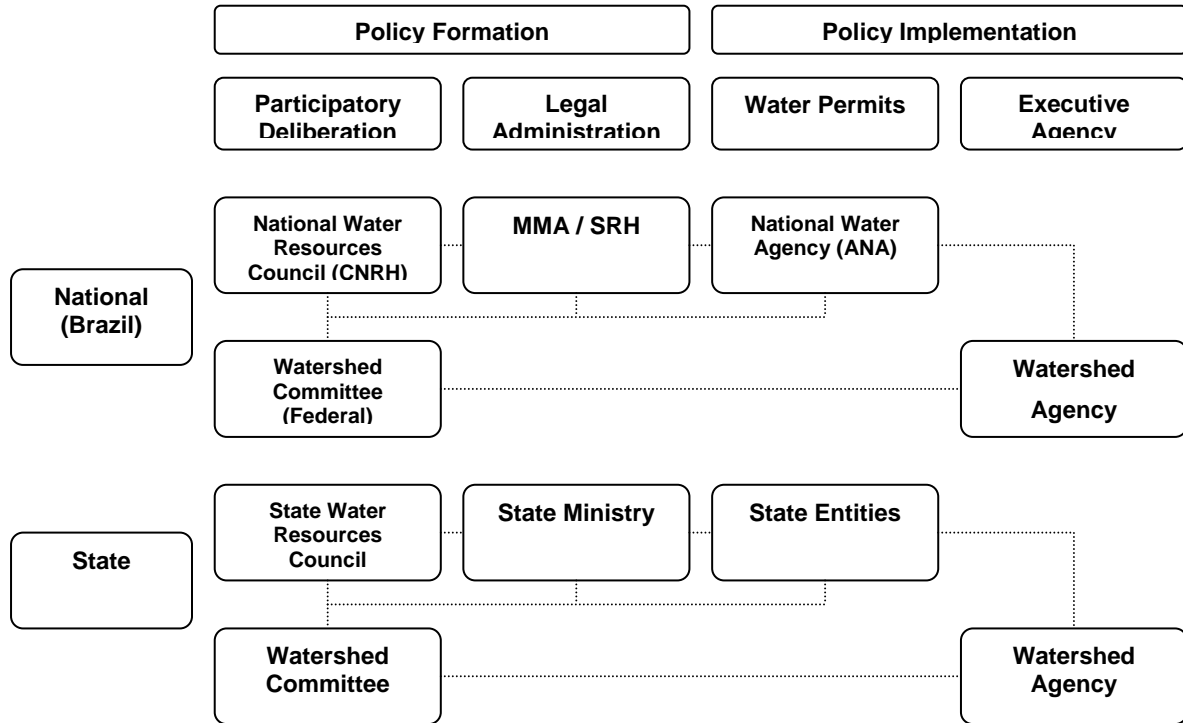
The *National Water Resources Act* (Law No. 9433/97) describes the institutional arrangements and instruments that can be used to guide water management and policy. The law clearly states that water is a public good with economic value that should be managed for multiple uses at the watershed scale. It establishes Watershed Committees, requiring participation of “the Governments, users, and the communities” and Watershed Agencies as the executive arm to administer water charges. These committees, assisted by technical councils, are where most of the decisions and plans regarding water resources are made, having the following responsibilities:

- promote and coordinate cooperation over water resources at the basin level;
- arbitrate water disputes;
- develop and monitor a Water Resources Plan for the basin;
- compile information for State and National Water Councils on water bodies and water users for the purposes of determining the necessity of water-use permits;
- suggest appropriate charges and develop a framework for implementing water use fees; and,
- manage the distribution of funds related to water projects and initiatives in the public interest.

The State and Federal Water Councils⁹ maintain managerial responsibilities over other aspects, such as the administration of water-use permits, and also become sites of appeal for committee decisions or to resolve conflicts between watershed committees.

⁹ According to the Constitution, surface water bodies that are fully within a state's territories are considered properties of the state while those that fall within the territories of two or more states become federal property. Depending on this classification, a watershed committee may be responsible to a State Water Council or a Federal Water Council.

Figure 3. Federal and State Watershed Management System



Source: Adapted from da Cunha (2004).

There are three points related to the goal of participatory water governance that need to be pointed out in order to understand how this legislation functions in practice. First, the watershed committees serve a *deliberative* and *consultative* role but do not actually have any executive powers. They are designed to bring together all stakeholders – local and state governments, technical agencies, water users and communities – to debate over water resource plans and policies, resolve conflicts, and encourage cooperation between various sectors. Policies and plans developed within these committees have to be approved by State Legislative Assemblies before they are binding (Alvim 2003). Presumably the State Executive Power would approve the recommendations of the committee rather than risk delegitimizing the entire democratic decentralization foundation of the watershed management system.¹⁰ Thus, the *real power* of these committees lies in their being perceived as legitimate forums of participation and deliberation, dependent on the actions of the actors involved.

¹⁰ In São Paulo, there are cases where the State government has failed to follow the decisions made by the CBH-AT, effectively challenging the participatory process and legitimacy of the watershed institution. This will be discussed in Section 5.1.2 on the institutional characteristics of the CBH-AT.

Centralized state agencies have to be willing to share information and decision-making, municipalities have to be willing to integrate water resources management with land use planning, and civil society has to be well represented and demonstrate capability in understanding and influencing process.

Second, although the law stipulates that water users and civil society organizations should take part in the watershed committees, the actual internal composition and regulation is left open for each committee to define based on its own criteria. Regulation of the committees depends on whether the watershed is within federal or state property; in the case of the latter, it is then subject to the respective state's framework of water laws and policies. This was meant to support the theoretical application of decentralization and account for regional political, social and environmental differences, allowing each watershed to be responsive to local conditions (Alvim 2003). Throughout Brazil, watershed committees are highly heterogeneous in form and function with varying levels of success in terms of process and participation (Brannstrom *et al.* 2004; Dourojeanni 2001; Johnsson & Lopes 2003; Magalhães 2001). The ambiguity in defining structure can result in arguably exclusionary committees based on varied definitions of who constitutes a legitimate “water user” or “civil water-resources agency”, and how much voting power these groups should have

All watershed committees pertaining to federally-owned areas, for example, can have no more than 40% of their members representing the *podér público* (the federal, state and municipal governments), with water users and the community¹¹ occupying the remaining seats (Chandra *et al.* 2004). In contrast, the State of São Paulo requires its watershed committees to have equal representation by state agencies, municipalities and civil society, including water users, leaving the *podér público* with two-thirds of the votes. Brannstrom *et al.* (2004) found that although civil society organizations have representation in the State of Paraná's watershed committees, they are required to show documented proof of having existed for three years and are ineligible for membership in its Water Agencies where most of the power actually lies. These examples demonstrate

¹¹ Community is defined by the national law to be “civil water resources organizations” that are nationally constituted, and include the following: intermunicipal consortia and water-related associations; regional, local or sectoral water user association; technical and research organizations; NGOs committed to defending broad collective interests of society; and, other organizations recognized by the National or State Councils.

various conceptual applications of participation in terms of defining which identity groups are granted power and where.

It is clear that the most controversial and perhaps most significant issue for the committees is impending water use charges, based on the adoption of the principle that water is an economic good whose full cost should be borne by the users. This last point merits special attention as the sustainability of the watershed governance system will be dependent on the revenue generated for investment as the watershed committees and agencies are not officially funded until they can begin collecting fees.¹² The implementation of this controversial provision along with the stipulation that the revenue will be spent or invested within the same watershed, provides a strong incentive for participation. Paying water users will be industries, irrigators, electric and sanitation companies, and municipalities, who will be some of the biggest water users as many operate their own water supply utilities (Alvim 2003). Although households and small-scale water consumers will not be charged directly as the charges are laid on bulk water consumption, they will most likely absorb the increased marginal costs on their water suppliers, making their participation and knowledge of the process important in the long run. According to the law, watershed committees are responsible for suggesting appropriate water fees and for developing policies that will direct where the collected fees will be applied within the watershed; each committee will create an executive Watershed Agency that will be responsible for collecting the fee and implementing proposed improvements or actions.

Representative and democratic participation in the committee, along with the stipulation that the fees be *reinvested* within the same watershed, should ensure that all impacted stakeholders, particularly the water users, will be supportive of the new program and have some power in determining priority areas, “add[ing] muscle to the democratic influence that these bodies were intended to have” (Keck & Abers 2004: 30). At the time of writing, of the more than 100 committees implemented throughout Brazil, the only watershed to have implemented water use charges is the Rio Paraíba do Sul.

¹² In the interim, many committees have been operating with a variety of funding sources, particularly international sources (Abers & Dino 2004). São Paulo State has actually implemented an official annual source of funds, although it is quite minimal compared to the amount that would be needed to invest in capital improvements.

The slow implementation is attributed to political resistance by powerful lobbyists, which in turn have slowed down the momentum of the watershed management system over the past decade.

4.2 Water Sector Reform in the State of São Paulo

As noted above, the State of São Paulo approved its water law setting up the *Integrated Water Resources Management System* (SIGRH) in 1991, pioneering the implementation of participatory watershed management in Brazil and serving as a model for national and state water reforms throughout the country. Starting in the 1970s, a generation of reform-minded state water technicians and administrators, particularly in the State Department of Water and Electrical Energy (DAEE), frustrated with the existing ‘energy logic’ and fragmented horizontal policies that had dominated the water resources sector since the start of the 20th century and had resulted in heavily polluted rivers with little or no control over industrial and residential effluents, initiated a discourse on integrated water management (Keck 2002; Keck & Jacobi 2001). It wasn’t until the 1980s, however, with the end of authoritarian rule and shift to a democratic state, that the status quo was sufficiently disrupted to create discursive space for new processes of formulating public policy. Although there were significant contributions made by social movements particularly in the Alto Tietê and Piracicaba regions organizing around water pollution,¹³ the water sector reform in São Paulo was driven by embedded state actors who understood that, in addition to being a technical issue, water was intrinsically political and its sustainable management could only be accomplished with municipal and civil society participation (Keck 2002).

According to Keck (2002), there were three factors that contributed to the idea of water reform: the pressure to democratize all levels of government, even within state agencies; the economic crisis of the 1980s, which reduced agency budgets, prompting focus on economic and sector efficiency; and, the shift in loan policies of multilateral agencies away from large capital projects such as dams. In 1983, an international water conference in Brasília recommended the adoption of integrated watershed management,

¹³ See Chapter 5.

prompting federal and agencies to develop the legislative frameworks.¹⁴ The groundwork in São Paulo was laid between 1983 and 1986 when the São Paulo government under Franco Montoro, decentralized DAEE to seven regional watershed areas and in 1987, approved the State Constitution defining popular participation as essential to planning processes (Alvim 2003). The State Council on Water Resources (CRH) was created the same year, composed entirely of representatives of state institutions, to develop a management plan. Finally, State Law 7,663/91 was passed outlining SIRGH and creating two watershed committees in the most critical areas of the state: Piracicaba-Jundiaí-Capivari, implemented in November 1993, and Alto Tietê in December 1994 (Keck & Jacobi 2002).¹⁵ By 1997, twenty committees had been established to manage all of the state's 22 watersheds.

Although very similar to the *National Policy* framework described above – emphasizing decentralization, participation and the implementation of water charges – the state law is distinct in its definition of participation. In contrast to federal watershed committees, which allocate a maximum of 40% of votes to government institutions collectively, São Paulo's policy isolates state and municipal governments, requiring equal participation of each as well as civil society. Thus each sector – state, municipal and civil society – is awarded one-third of the voting power in each committee. This is an important distinction as the politics between municipal and state governments are often highly conflictual; one of the major reasons for creating a participatory framework was so that there could be better integration and communication on water resources management and land use planning (Alvim 2003; Silva 2000b; Silva 2000c).¹⁶

The SIGRH has three institutional functions: deliberative, technical and financial. The State Council on Water Resources (CRH) sets guidelines for management in the State Water Resources Plan, manages conflict between watershed committees and represents the state on the National Water Council. The watershed committees (CBHs) are responsible for developing and approving watershed plans, debating and resolving

¹⁴ Although the federal government had begun to discuss reform, with the restructuring of the new democratic state, the water policy plan was delayed for several years (Keck 2002).

¹⁵ The two areas were considered critical based on the high degree of pollution and growth rates resulting in low water availability.

¹⁶ The Water Source Protection Laws in the RMSP are an excellent example of this conflict, discussed in chapter 5.

water resource issues, promoting state sector integration as well as municipal and civil society participation, and allocating financial resources for investment in the watershed. Both forums are deliberative and require equal representation of state agencies, municipal governments and organized civil society entities.

Technical committees (CTs) and work groups (GTs) are established to provide technical support and advice to the CBHs; State Water Resources Plan Coordinating Committee (CORHI) is the technical committee to the State CRH. Although the CTs require civil society participation, most often this involves representatives of technical or research institutions that are capable of discussing highly specialized and scientific issues; for example CORHI has eleven seats reserved for civil society, six of which are occupied by technical organizations (da Cunha 2004). In general, the CTs meet more often than their respective committees, and it is well known that these are the forums where most of the debate and planning occur, whereas the CBHs have more of a political atmosphere where the plans and projects receive final approval.¹⁷ In the interests of ensuring that municipal and civil society sectors have power to influence water policy, their representation in the CTs, where most of the action occurs, is as important as in the watershed committees.

The State Water Resources Fund (FEHIDRO) represents the financial arm of the SIGRH and is a feature unique to São Paulo as this is the only state to have an institutionalized funding source to support the committees' watershed management activities in the absence of a functioning water charging system. FEHIDRO is funded by eleven sources - primarily state and municipal budgets, hydroelectricity royalties, and national and international loans. FEHIDRO funding is allocated to projects that meet priority criteria of the respective watershed plans and State Water Resources Plan. Entities from all three sectors, including outside the watershed committee, are eligible to apply for funds for infrastructure or technical projects, research and development, or environmental education. Every year each watershed committee meets to deliberate and approve applications, which are then forwarded to FEHIDRO technical agents for final review and arrangement of the funding contracts. The group that originally applied for

¹⁷ A number of interviewees confirmed this, as well as recent empirical research studies, for example: Alvim (2003), Brannstrom et al. (2004), da Cunha (2004), Johnsson & Lopes (2003), and Keck & Jacobi (2001).

the funds is then responsible for working with FEHIDRO agents to make the necessary adjustments to the application and follow the terms of the contract. The watershed committees ideally would accompany these developments to ensure that funds are applied effectively, however, at least in the case of the CBH-AT and its subcommittees, the level of accompaniment varies.¹⁸

CETESB and DAEE are, by law, the technical agents responsible for final review and approval of the funded projects, however, FEHIDRO sometimes involves Environmental Planning and Legal Coordinator (CPLA), State Environmental Education Coordinator (CEAM) and Instituto Fundação Florestal (an agency of the State Environment Department) to review applications involving environmental planning, environmental education and applied ecology, respectively (Alvim 2003). The centralization of FEHIDRO in state agencies has met with criticism for favouring state and municipal projects at the expense of civil society. In general, the process is slow and more than half of the projects approved by the committees are subsequently cancelled by FEHIDRO, mostly for lacking “technical viability” (Keck & Jacobi 2001).

Between 1995 and 2001, 1192 contracts were awarded throughout the state totaling more than R\$112 million (CAD\$50 million)¹⁹, an average of about R\$94,500 (CAD\$42,000) per contract (Alvim 2003). The Alto Tietê and Piracicaba-Jundiá-Capivari watersheds have received 9% and 12% of the total funds, respectively, higher than any of the watersheds in the state. Until the water charging system is implemented, these funds are not nearly enough to address the water issues that require attention in the region, particularly in the Alto Tietê and Piracicaba watersheds where investments in wastewater treatment, erosion control, flooding and water source protection are critical priorities. In 1999, FEHIDRO decided to disallow civil society from accessing FEHIDRO funds, claiming there were legal barriers disqualifying non-profit organizations (Alvim 2003). After two years of debate and mobilization by various watershed committees, a law was passed guaranteeing civil society entities access to

¹⁸ This is made difficult as there are no requirements for final reports or evaluations of the project.

¹⁹ All Canadian values reported are approximate based on the average 2004 exchange rate reported by www.Oanda.com: 1Brazilian Real = 0.4452 Canadian dollars.

FEHIDRO resources.²⁰ Although the initial decision was made without consulting the watershed committees, this case demonstrated that civil society was participating and able to mobilize to change policies within the system, particularly in the Alto Tietê region.

In the future, water tariffs collected within the watershed will provide the bulk of resources for FEHIDRO funding. It has been estimated that more than three times the current funding available will most likely be collected in the CBH-AT through water tariffs (Granja 2000). The watershed committee will be responsible for establishing the investment plan, while the Agency will be responsible for collecting tariffs and executing the plan. FEHIDRO will retain fiduciary control acting virtually as the ‘bank’ for each watershed.

The São Paulo water legislation was a key product of contested politics from within state institutions and civil society. It set the stage for the establishment of new watershed institutions that would depend on providing an open, deliberative space where state agencies would have to share power with municipal governments and ‘legitimate’ civil society representatives. Compared with other states, São Paulo’s could be considered one of the most progressive and participatory water governance structures in the country thus far (Brannstrom *et al.* 2004). The implementation of water charges creates deep implications in terms of economic access to water resources and provides strong reasons for ensuring that these forums are decentralized and democratic. In a country suffering from high levels of socioeconomic inequalities, particularly in the urban areas such as the RMSP where this geographic distribution of poverty is highly associated with differential access to urban services (Silva 2000, 2000b), the selection of legitimate ‘stakeholders’ and processes of participatory and representative governance could have extreme repercussions for marginalized communities and has the potential to create new powerful actors who find voice within the committees. Access to information and opportunities are key to ensuring that participation is as wide and inclusive as possible.

²⁰ Law 10,843 was passed on July 10, 2001, making Law 7,663/91 clearer with respect to who had access to funds and defining eligible civil society entities as those that had at least four years of action in the watershed (Alvim 2003).

CHAPTER 5: WATERSHED GOVERNANCE IN THE PINHEIROS-PIRAPORA SUBREGION: DOWNSTREAM FROM THE METROPOLIS

The Alto Tietê Watershed Committee (CBH-AT) was implemented in 1994 giving it a decade of experience as a watershed management unit. Its territorial area virtually coincides with the RMSP and the two can be considered synonymous – it covers a truly metropolitan watershed. The Municipality of São Paulo (MSP) and its neighbouring 38 municipalities were grouped into a metropolitan region as early as the 1960s during Brazil’s ‘economic miracle’ when the state government became preoccupied with strengthening “development poles” (Alvim 2003). Since then, there have been various modifications to the metropolitan structure, with responsibility for its organization bouncing from federal to state levels; yet, despite many proposals, a metropolitan-wide system of urban governance has not yet been implemented.²¹ Alvim (2003:5) concluded that:

...in the absence of this metropolitan body, the Alto Tietê Watershed Committee [...] is turning into a privileged forum that, further to aggregating diverse sectors and actors with the objective of balancing conflicts directly related to water resources, is discussing region-wide problems that present strong interfaces with [water], but whose solutions don’t necessarily depend on its actions.

What she suggests is that the CBH-AT is proving to be successful in contributing to the only instance of regional organization in the RMSP, making up for the ‘black hole’ in metropolitan administration.

This sounds positive and perhaps could be true for some significant issues; however, while Alvim concentrated on the scale of the CBH-AT, most of the real planning and debates occur in its five subcommittees, which were set up in 1997 and 1998. The subregional decentralization was considered necessary due to the extreme heterogeneity in water resource issues, land uses and municipal priorities, and it was hoped that these forums would provide greater opportunities to resolve ‘local’ issues, while the CBH-AT concentrated on the larger scale of the metropolitan region. There are

²¹ In February 2005, the state government published a proposal announcing its intention to set up the Metropolitan Region administration (Emplasa 2005). The proposal is going through a process of public consultation before it is presented in the Legislative Assembly.

significant differences between the subregions, however, in terms of urban growth patterns, land use, socioeconomic opportunities and popular organizations. The Pinheiros-Pirapora subregion, for example, is one of the most polluted and degraded due to high rates of urbanization on unsuitable land and its relative position downstream from the RMSP. Thus the experiences of the subcommittees are and have been quite different in terms of various factors including participation, issues and effectiveness.

In a study of the metropolitan region of Mexico City, which has very similar growth patterns to the RMSP, Aguilar and Ward (2003) concluded that aggregate regional data does not reflect the drastic changes that are occurring in peri-urban development compared to central city growth, and that these changes are highly uneven. Without adequate research into these socioeconomic differences, decentralization efforts within metropolitan-wide administrations will most likely not result in very democratic and representative institutions. Considering that the production of scale is contingent upon discursive representation, these heterogeneous subregions within the larger watershed area pose an interesting challenge considering they each have a different set of priorities and needs, as well as socioeconomic power relative to the metropolitan region. To what extent are the subregions represented in the CBH-AT? And, to what extent does representation within the subregion affect its representation outside the subregion? This chapter focuses on the Pinheiros-Pirapora subregion in the context of the Alto Tietê watershed, introducing some perspectives on representation both within and outside the Pinheiros-Pirapora Watershed Subcommittee.

5.1 The Alto Tietê Watershed

The Alto Tietê region forms the most urbanized and complex watershed in the State of São Paulo facing conditions of critical water availability and high erosion. The region contains the headwaters of the Tietê River as it flows 1,150 kilometres west through São Paulo State, eventually emptying into the Paraná River in the State of Mato Grosso do Sul, crossing through several tributary watersheds along the way. Since it is one of the most polluted watersheds in São Paulo due to a high concentration of untreated urban and industrial effluent discharges, good management in this region could

potentially have significant benefits downstream. One of the most pressing issues, however, is the development of water source protection plans, a highly polemic issue that has dominated debates within the committee and its subcommittees.

5.1.1 Hydrosocial Characteristics

Within the Alto Tietê Watershed, the Tietê River and its major tributaries – the Pinheiros, Tamanduateí, Cotia and Juquerí rivers - drain an area of 5,985 km², 37% of which is urbanized (FUSP 2002). The watershed includes all or partial territories of 40 municipalities, however only 36 are participating members.²² All are part of the RMSP territory, which includes a total of 39 municipalities; the three remaining municipalities make up only 0.45% of the total population (IGBE 2000). Since the RMSP can be considered virtually synonymous with the Alto Tietê watershed, data will be presented for the entire RMSP.

Pierre Monbeig, a French historian and cartographer, described the geography of the Alto Tietê eloquently:

São Paulo is a city [...] installed in an open basin in the heart of high “arqueanas” lands of tropical Atlantic Brazil. On all sides, the hills and peaks close the horizon. To the North, the Serra da Cantareira, 1,000 m high and much more, severely limits the urban landscape. To the West, the solid Jaraguá Peak, the “montanha cara” to the Paulista heart, appears to bar the route to Campinas. To the South, the confusing topography of the Serra do Mar smoothly rises to 850 and 900 m. It is only to the East that the Tietê valley opens a wider channel: born in the folds of the Serra do Mar, it frees itself of the granite and of the gneisses at the slope of Mogi das Cruzes, running lazily at 725 m, in the clay and sand, in an East-West direction [...]. It is the Tietê basin, in the immovable deposits of the era, in the mountainous painting of old massifs, that locks the paulista capital (Monbeig 1953: 11).

Certainly the geography has changed and the city has grown since Monbeig first wrote about it, yet the challenges presented by the Tietê River and the mountainous regions

²² The 1995/1996 State Water Resources Plan attempted to resolve the problem of reconciling municipal and watershed limits by defining the Alto Tietê to be composed of 34 municipalities and excluding the six municipalities whose urban centers were outside the watershed; since then, two of these municipalities have decided to be involved in the CBH-AT as well. Juquitiba and São Lourenço da Serra are member municipalities of the CBH-Ribeira do Iguape/Litoral Sul. Municipalities that fall within two or more watersheds can choose to be involved in more than one (Alvim 2003).

around it have served key roles directing the development and growth of São Paulo, which will be discussed in chapter six.

The most important region in the country in terms of industrial production and urbanization - contributing 18% (US\$147 billion) to the nation's GDP and concentrating about 10.5% of its population (IBGE 2000), the RMSP is a site of contradictory politics, socioeconomic inequalities and geographic unevenness. A diagnosis of the Alto Tietê highlighted four socioeconomic patterns shaping the region's development: 1. the last few decades have seen a concentration of urban growth in the periphery areas of the region, particularly in the protected water source areas; 2. these new developments are primarily characterized by a low socioeconomic profile; 3. congestion in these areas is high even though average density is low suggesting crowded, favela-type conditions in relatively natural areas; and, 4. there are huge inequalities in public services connectivity (FUSP 2002).²³ Based on data produced by FIPE/SEHAB (the Favela Census), the estimated proportion of São Paulo's population living in favelas rose from 9% in 1987 to 19.3% in 1993, mostly located on the edge of the city or in neighbouring municipalities [Taschner 1997 (in FUSP 2002)].²⁴ There is a direct correlation between distribution of income and jobs, with a higher concentration of employment opportunities in areas of medium to high income, aggravating even further disparities in socioeconomic development (Silva 2000).²⁵ These conditions also create adverse environmental conditions as access to basic infrastructure, such as sewers and solid waste collection, is minimal and development on inadequate land results in high rates of erosion.

The Alto Tietê Watershed Plan (FUSP 2002) points to six critical water resource management issues that should take priority in investment decisions:

²³ See Silva (2000a) for an excellent analysis of services connectivity in relation to water, energy and phone services. His study shows a correlation between income distribution and networked utilities as well as with the availability of jobs.

²⁴ The 1996 IBGE Population Count estimated that 7.61% of São Paulo City's population was living in favelas, however, it defines favelas as conglomerations of more than 50 units of subnormal housing. The data from FIPE/SEHAB, which defines favelas as being more than 2 units, suggests that the IBGE might be grossly underestimated.

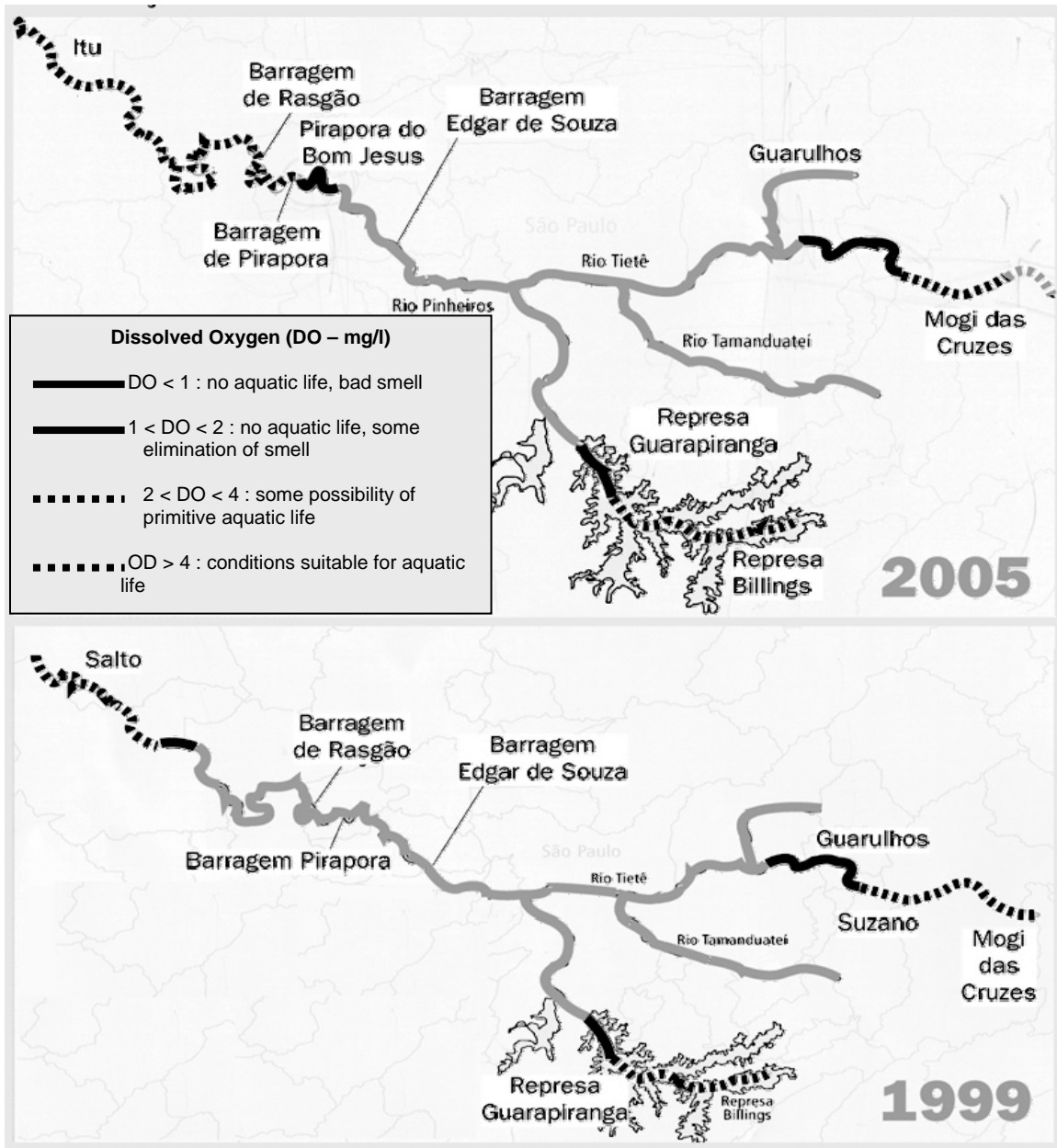
²⁵ The increase in poverty can be attributed to a reduction in real wages since the 1980s, an inadequate schooling structure, relocation of industry to other areas of the state accompanied with increased rural to urban migration, and overall, a lack of public policy dealing with popular housing and socioeconomic planning (Silva & Machada 2001).

- *Water supply* – Water demand is currently nearing productive capacity and by 2010, with an estimated population of 20 million (an increase of 22% from 2000), demand is projected to exceed supply at current rates. Already, almost 50% of the RMSP water supply is imported from the Piracicaba basin; in 2000, total average demand in the RMSP was 64.08 m³/s. The principal measure being taken is to apply water source protection plans in the large reservoirs to the north, east, south and southwest of the city.
- *Water source protection* – Ill-conceived water policies and urban land use (often illegal) have created serious threats to water catchment areas, particularly in the southern regions. This is discussed later in this chapter.
- *Groundwater sources* – An estimated additional 7.9 m³/s is extracted from more than 6000 unregulated artesian wells. There are currently no comprehensive studies of underground aquifers or cumulative effects of water extraction.
- *Water quality* – The Tietê River is essentially ‘dead’ in the Alto Tietê region with almost no oxygen detected until it reaches Santana de Paraíba (Figure 4).
- *Solid Waste Disposal* – A critical problem related to social health is the 11,000 tonnes/day of solid waste created, most of which have inadequate disposal (Alvim 2003). In 1990, an estimated 3 million cubic metres of sediment and rubbish were withdrawn from the Tietê and Pinheiros Rivers.
- *Flooding* – Urban development along river margins creating impermeable soil conditions continues to lead to flooding issues, which are usually addressed by canalizing the rivers and streams leading to even greater levels of impermeability.

Of the 34 municipalities in the Alto Tietê watershed, 28 have their water and sanitation services operated under concession by SABESP, the State-owned water company; the rest operate them autonomously as municipal services (Alvim 2003). SABESP operates 5 wastewater treatment stations (ETEs), which, in 2000, collected sewage from 67.4% of households in the RMSP (FUSP 2002). Projeto Tietê is a huge sanitation project – US\$1.1 billion in Phase I and US\$400 million in Phase II with almost half funded by the International Development Bank - that has built or enhanced 5 wastewater treatment stations in the RMSP since 1992. Now in Phase II, projected to be

completed by 2006, it has increased sewage collection by 70% of the population to 79% in 2001, and sewage treatment from 24% of the population to 65% (SABESP 2004b). By 2006, there will be a capacity to treat sewage from 70% of the population.

Figure 4. Pollution in the Tietê River in 1999 and Estimates for 2005



Source: SABESP, as reported in the *Diário de São Paulo*, 2003.

Note: The 2005 estimates for the condition of the river are based on projections of Projeto Tietê and are not necessarily reflective of the actual observed conditions in the watershed.

The Alto Tietê Water Resources Plan (FUSP 2002) states that a principal limitation for the prospects of sewage treatment in the RMSP is the municipalities operating their own water services. Under the authoritarian regime, water services provision had become highly centralized, however, since the late 1980s there has been a “remunicipalization” of urban water services as more powers have been transferred to municipalities (Granja 2000). Although almost all of the RMSP’s 39 municipalities opted to retain their concessions with SABESP, 7 have opted to retain control as autonomous municipal services - Diadema, Guarulhos, Mauá, Mogi das Cruzes, Santo André, Sao Bernardo do Campo, Sao Caetano do Sul (mainly from the ABC region). These municipalities are responsible for linking their sewage lines to the main trunk line that goes to the sewage treatment plants, however, there has been a minimal attempt to do so resulting in the treatment plants, particularly the ETE ABC operating at below capacity. SABESP (2004b) estimates that these municipalities are responsible for about 25% of the total organic pollution load in the Tietê River.

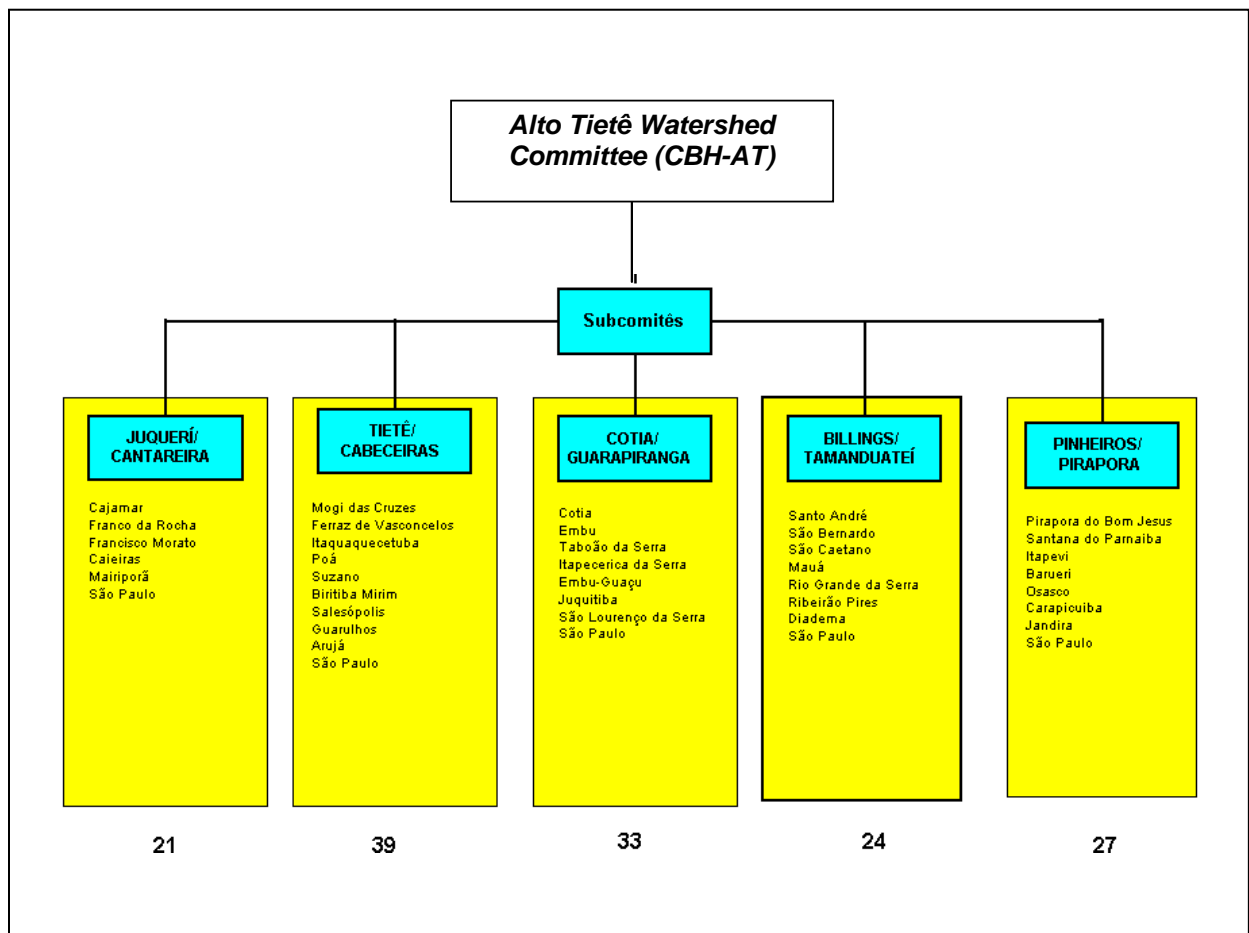
5.1.2 Institutional Characteristics of the Watershed Committee

After a state-led institutional organizing process involving municipal consultations and civil society mobilization with the help of environmental groups, the CBH-AT was implemented in 1994. It featured 48 representatives: 16 state secretaries and agencies, 16 municipalities representing the various subregions, and 16 elected civil society members organized by stakeholder group (Figure 5). In 1997, five technical committees were formed to focus on various water resources issues. At the same time, the implementation of five subcommittees was approved in an effort to complement regional heterogeneity in water management, all of which were fully organized by the end of 1998.

The executive positions are distributed in a way which has been described as “symbolic” of the new policy: the President is a municipal representative, the Vice-President is from the civil society sector, and the Executive Secretary is a representative of one of the state agencies, most often DAEE; these positions symbolize decentralization, public participation and integration (da Cunha 2004). Even though this

is not a written regulation, it has become a tradition in almost all of the São Paulo's watershed committees and has been justified according to the following argument: mayors can provide meeting sites and use their power to encourage participation by other municipal leaders; civil society acts as a “check” on municipal activities; and, state water agencies are already adapted to handling the administrative and organizational tasks of the committee (Brannstrom 2004). There have been few periods where this tradition was broken and for the most part it has been adopted with little dispute or debate.²⁶

Figure 5. Organization of the Alto Tietê Watershed Committee



Source: Adapted from CBH-AT, www.ComitêaltoTietê.sp.gov.br [cited May 11, 2005].

²⁶ One issue, noted by Keck & Jacobi (2001), is the contentious practice of electing these positions by sector – the members of each sector meets to elect their representative for the respective position. Some members of civil society argue that the directorship positions should be elected collectively rather than by sector making the committees a truly democratic space.

Although the first few years were problematic owing to resistance by state agencies, and lack of leadership and mobilization of funds, over the past decade, the committee has made important contributions to water resources management in the RMSP (Keck & Jacobi 2001). A comprehensive diagnostic of water resources in the watershed, *Relatório Zero*, was published followed by the Alto Tietê Watershed Plan for 2000-2005 (FUSP 2002). In addition, the Alto Tietê Watershed Agency has been established, and will be responsible for executing the water charging system, which is estimated to contribute as much as R\$147 million (CAD\$65 million) to FEHIDRO funds annually when it is finally implemented (Granja 2000).

Two-thirds of FEHIDRO funds are distributed evenly among the subcommittees with one-third used to fund projects of regional interest. Up to the end of 2002, investments in the region have totaled R\$14 million (CAD\$6.4 million) (Alvim 2003). Water Source Protection laws have been created for the Guarapiranga reservoir and are in the process of being created for Billings, Alto Tietê, Cotia and Cantareira. The CBH-AT has been criticized for its focus on debating financial issues rather than making substantive improvements in watershed management. Of the committee's deliberations between 1996 and 2000, 52% were focused on financial matters, 32% on internal management, and 16% on plans and programs (Keck & Jacobi 2001). Although this may have improved since the publication of *Relatório Zero* and the Watershed Plan, it is well known that most of the substantive debate and planning occur in the CTs and the regional subcommittees.

Participation of civil society has made important contributions through introducing agenda items, forcing debate on contentious issues, and mobilizing protest in response to state or municipal actions. Chandra *et al.* (2004) point to four examples that have initiated a strong mobilization, demonstrating the capacity of civil society to promote debate within the watershed committees and become informed in highly technical issues: the Emergency Plan for Water Source Protection in 1998, FEHIDRO revisions restricting civil society access to funds in 1999, the Flotation Project in 2001 and the construction of an education building in Juquery State Park. State agencies were responsible for each of these cases and their failure to use the CBH-AT as a forum for decision-making based on the principles of decentralization and participation demonstrate

the state-centralist logic that still dominates, weakening the power and legitimacy of the SIGRH. While actions from within the CBH-AT succeeded in contesting the first two plans, the Flotation Project is still being debated, and the state completely disregarded the CBH-AT opposition, continuing with construction in the environmental park.²⁷ Without support of the State Executive Power, the deliberative space of the watershed committee becomes restricted to rhetoric and discourse lacking legitimacy as a truly participatory and democratic space.

There are also important institutional and political barriers limiting the potential of the CBH-AT to be an integrated and coordinating body for participatory decision-making. Municipal representation, important for integrating water and land use planning, has not been very proactive and has mainly been limited to criticizing the state; the state criticizes the political nature of the CBH-AT and the capacity of civil society to participate in technical debates; and civil society criticizes the state for resisting democratic participation by continuing to centralize information and ‘steamroll’ decision-making (Chandra *et al.* 2004; Jacobi 2004; Keck & Jacobi 2001). In addition, the lack of cohesion within each sector has been noted, particularly within civil society where concerns of environmentalists and industrial or commercial concerns are rarely in agreement and it is unclear to what extent members ‘represent’ their constituencies.

The subcommittees were envisioned early on in the creation of the CBH-AT as forums where local water resource issues could be debated while the CBH-AT focused on general metropolitan-wide water planning issues. Implementation of the subcommittees began in 1997. Five subregions were defined pertaining roughly to sub-basins in the Alto Tietê, however, their jurisdictional limits were defined according to municipalities rather than geohydrology to facilitate coordination of the municipalities that should be represented. The Municipality of São Paulo (MSP) is decentralized into regional administrations and each of the subcommittees includes a portion of the MSP peri-urban areas. This was implemented to provide incentives for the most hegemonically powerful municipality to participate in regional development and coordination (Gerônimo Rocha, personal communication). The central area of the MSP

²⁷ Refer to Alvim (2003) for more information.

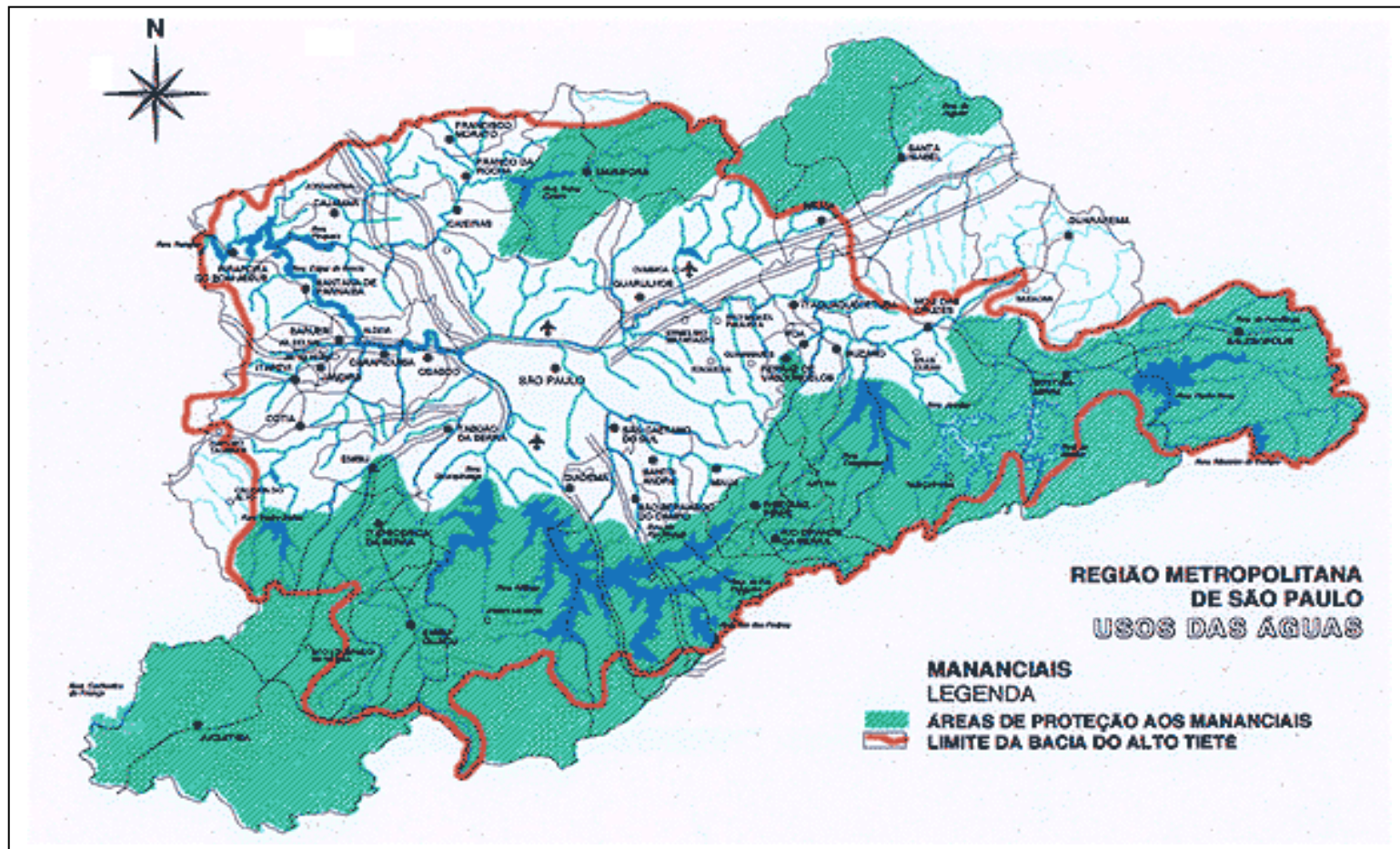
is not geographically represented in any of the subcommittees, and is theoretically intended to be represented in the CBH-AT.

Each subregion has distinct interests and challenges in terms of water resources management and intersectoral cooperation, creating very diverse experiences and outcomes. The principal contribution of the subcommittees has been towards developing plans for Water Source Protection and Recuperation Areas (APRM) for each water catchment area (*mananciais*) as per the Water Source Protection Law (Figure 6). These debates have become “instrument[s] of articulation between water resources management and territorial management within the subcommittees” (Alvim 2003:326), and have really been the backbone of the subcommittees, facilitating their legitimacy as water management units and supporting democratization through mobilizing participation. There is some evidence that without the water source protection laws occupying a principal role in the subcommittee, participation will decrease as it has in Cotia-Guarapiranga, where business interests in the subcommittee have faded since the APRM Guarapiranga was approved.

5.2 The Pinheiros-Pirapora Subregion

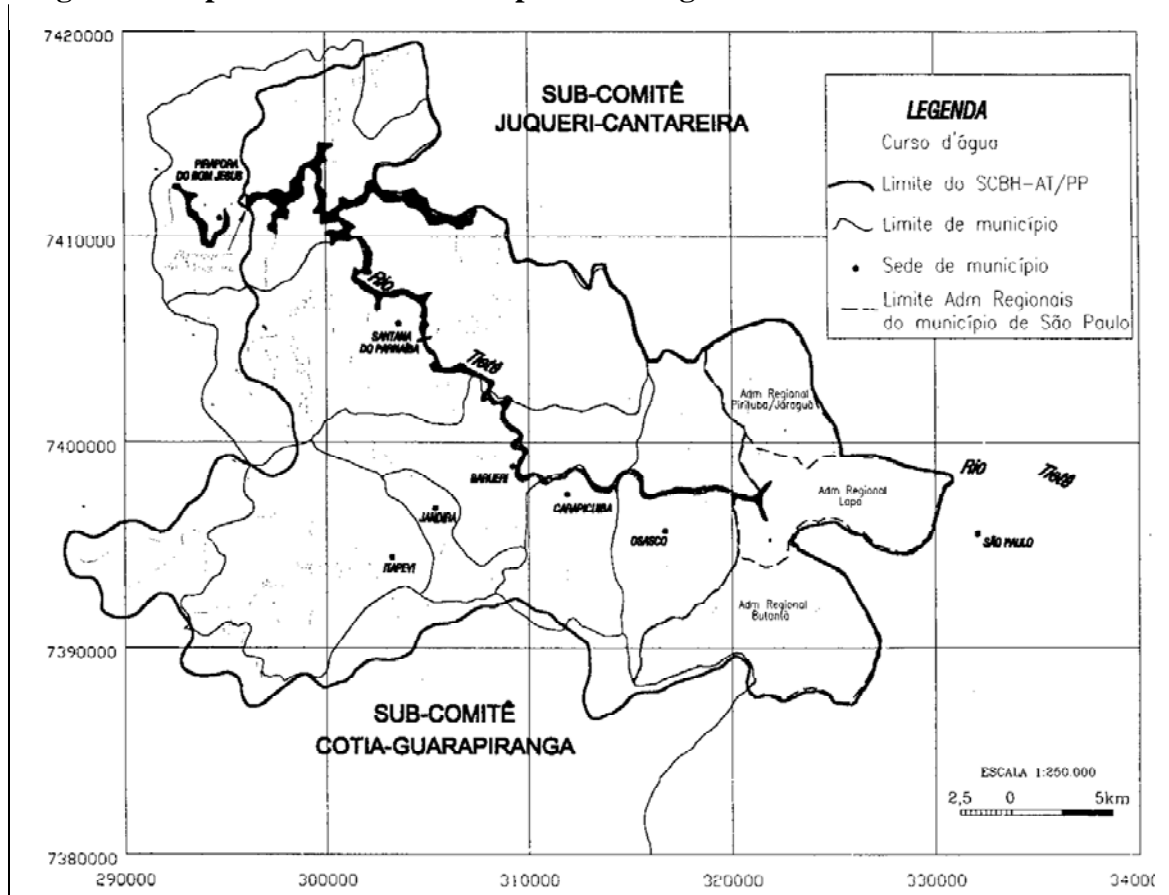
The only subregion that has been relatively isolated from the debates on water source protection is Pinheiros-Pirapora. Until recently, it did not include any territories that were priorities for water source protection planning (Figure 7), indicating that alternative “instruments of articulation” would be needed to create discursive space and facilitate coordination. In addition, its location as the western-most region in São Paulo where the polluted Tietê River leaves the Alto Tietê watershed, effectively makes it the *only* subregion to be downstream from the rest of the RMSP, absorbing the ecological externalities of the capital accumulation process from all subregions. Thus the geography of this region already implies that its experience with participatory watershed management will be motivated by different issues and faced with formidable challenges intimately related to scale. The Pinheiros-Pirapora Subcommittee (SCBH-PP) was the last to be implemented, most likely due to the initial lack of envisioned water source

Figure 6. Map of the water source protection areas in the RMSP



areas, however, the Baixo Cotia, part of which is in the SCBH-PP territory, has become a priority area for water source protection planning and this responsibility has now been taken on by the subcommittee.

Figure 7. Map of the Pinheiros-Pirapora Sub-region



Source: IPT, SCBH-PP Archives.

5.2.1 Hydrosocial Characteristics

The Pinheiros-Pirapora subregion (SRPP) virtually coincides with the entire Jusante-Pinheiros sub-watershed beginning near the border of São Paulo and Osasco, at the mouth of the Pinheiros River (Figure 7). The Tietê River passes through all eight municipalities in the region, traveling west to Barueri where it begins a meandering path northwest to Pirapora do Bom Jesús and enters the Sorocaba-Middle Tietê Watershed (Emplasa 2003). There are eight municipalities within the subregion: Osasco, Carapicuíba, Barueri, Itapevi, Jandira, Santana de Parnaíba, Pirapora do Bom Jesús and the

western districts of São Paulo – Lapa, Butantã and Pirituba – with a total territorial area of 692 km². Although the Alto Tietê Committee is bounded by the watershed's geohydrological features, it was decided that the Subcommittees should be bounded by political administration limits. Thus, Pirapora and Santana together have about 30% (96.8 km²) of their territories within the Sorocaba-Middle Tietê watershed although neither municipality participate in that committee (Emplasa 2003).

Although all of the SRPP is considered to be urbanized land, urban development is concentrated on an estimated 1/3 of the entire territory spreading from the MSP in what is referred to as the *mancha urbana* – or urban sprawl (Emplasa 2003). Slow to absorb the industrial and economic benefits of the mid-1900s, only Osasco and the areas along the railroad had achieved significant economic development until recently. Population decreases dramatically along the radius from São Paulo showing a direct inverse relationship with the rate of growth over the last decade (Table 2). The region can be divided into three groups according to land use patterns and urban development as described below (see Figure 7 for reference):

- *Western São Paulo to the eastern limits of Carapicuíba* (Group 1) - The MSP districts of Lapa, Pirituba and Butantã, and municipalities of Osasco and Carapicuíba are almost completely consolidated urban space providing continuity to the outward expansion of urban development from São Paulo. Characterized by extremely high average densities and low socioeconomic profiles, these districts concentrate 79% of the region's population on just over one-third of the total land area. The only significant natural areas are the University of São Paulo campus in the northwestern area of Butantã and the Lagoa de Carapicuíba. Although the region has had a low growth rate, it is still consistently higher than the MSP led by Carapicuíba (2.26% per year) and Pirituba (3.93%), where the previously underdeveloped neighbourhood of Jaraguá has been expanding. The Pinheiros and Tietê Rivers are both canalized leaving open floodplains on either side; Phase I of Projeto Tietê (discussed in chapter six) has resulted in an increased depth and width along 16.5 km to the Edgard de Souza Dam (Emplasa 2003). The sluggish, black waters of the Tietê, already heavily polluted from

their journey through the RMSP, assimilate the sewage discharged by the Pinheiros River (bringing water from the southwest regions) and various open pipes along its length as the river travels west to Barueri.

- *Barueri to the Edgard de Souza Reservoir (Group 2)* - Urban sprawl extends into the municipalities of Barueri, Jandira and Itapevi, facilitated by access provided by the train and the Castelo Branco Highway. Characterized by urban centers separated by areas of natural vegetation, this region contributes 17.5% to the SRPP population and has been growing at rates of 5 to 6% per year over the past two decades. Barueri is an important economic centre in the western periphery region attracting the neighbouring regions with jobs, commerce and services, and also hosts some of the wealthiest neighbourhoods in the SRPP (Emplasa 2003). The Cotia and Barueri River, both major tributaries of the Tietê, empty here from the south. The Tietê River begins its journey northwest after it passes Barueri until it reaches the Edgard de Souza dam on the edge of Santana de Paraíba.
- *Edgard de Souza Reservoir to the western limits of the SRPP (Group 3)* - Santana de Paraíba and Pirapora do Bom Jesús, two important historical cities of the region, are predominantly natural areas with their urban centers isolated from the São Paulo 'mancha urbana' by mountainous topography and narrow valleys. The Tietê River provides little floodplain for development as it nears the Pirapora do Bom Jesus Reservoir and dam and enters the Sorocoba-Middle Tietê watershed. Due to the difficulty of access – lack of railways and poor roads due to steep and rocky terrain – this region was excluded from the rapid industrial growth and urban development – the 'economic miracle' - that hit most of the RMSP throughout the 1960s and 1970s (Emplasa 2003). The regions' major sources of income is based on tourism from religious pilgrimages which bring thousands to Pirapora every weekend where a statue of Jesus was found floating in the river in the 1700s. Since the 1980s, however, the population has been increasing at rates as high as 13% and the two municipalities now lead the SRPP region in terms of rate of growth, principally attributed to economic diversification in Pirapora and

lot development in Santana. Despite the similar geographical features, their socioeconomic profiles completely contrast – Santana has the wealthiest neighbourhoods in the subregion while Pirapora is one of the poorest.

Table 2. Demographic Characteristics of the Pinheiros-Pirapora Subregion, 2000

	<i>Territorial Area (km²)</i>	<i>Population</i>	<i>Proportion of RMSP Population (%)</i>	<i>Population Density (hab/km²)</i>	<i>Annual Geometric Growth Rate 1980 - 1991</i>	<i>Annual Geometric Growth Rate 1991 - 2000</i>
<i>SRPP Group 1</i>	255	2,092,450	11.7	8,209	1.73	1.52
<i>SRPP Group 2</i>	162	462,521	2.6	2,855	5.63	5.00
<i>SRPP Group 3</i>	275	87,223	0.5	317	10.69	7.70
<i>SRPP</i>	692	2,642,194	14.8	3,819	2.29	2.22
<i>MSP (a)</i>	1,509	10,434,252	58.4	6,915	1.15	0.91
<i>RMSP</i>	8,051	17,878,703	100.0	2,221	1.86	1.69

Source: Based on data from IBGE (2000).

(a) The data for the Municipality of São Paulo includes the districts Lapa, Butantã, and Pirituba, which are also part of Group 1.

The two dams in the region – Edgard de Souza and Pirapora do Bom Jesus - are part of an integrated system of energy production and flood prevention – the Sistema Tietê/Billings, developed by the São Paulo Light & Power Company throughout the 1900s, and now operated by EMAE. The system serves to relieve the most flooding-susceptible areas in the highly urbanized riparian zones of Osasco, Carapicuíba, Itapevi and Barueri, as well as areas along the length of the Pinheiros River to Guarapiranga (Emplasa 2003). During periods of heavy rain, the doors of the Edgard de Souza dam are completely open with the Pirapora Dam Reservoir serving as a collector to prevent floods further downstream. The turbulence caused by the falling water results in the production of toxic foam, particularly in Pirapora, due to the oxygen-depleted, highly polluted waters of the Tietê (discussed in chapter six).

Although the rest of this analysis does not include the western districts of São Paulo, the fact that western São Paulo is part of the SRPP area is important in terms of socioeconomic challenges and related environmental degradation associated with the high proportion of its population living in favelas and under poor living conditions. Based on a conservative estimate in the 1996 Census, the favela population was about 80,000, 57% of which lived in Butantã where average density can be as high as 10,000

habitants per km² (Table 3). Considering that these sociogeographic spaces (and their socioenvironmental problems) tend to spill over into neighbouring municipalities (i.e. Osasco) and the inexistence of intermunicipal planning, representation of the peripheral São Paulo neighbourhoods within the watershed subcommittee would provide an important location for coordination between local and regional planning, possibly providing real and tangible benefits for these disadvantaged communities. In practice, however, regional administrations of the MSP have not participated directly in the SCBH-PP.

Table 3. Population Living in Favelas in the western districts of the Municipality of São Paulo, 1996

	<i>Territorial Area (km²)</i>	<i>% of Population in Favelas</i>	<i>Population in Favelas</i>
<i>Butantã</i>	56.1	12.84	45,973
<i>Lapa</i>	40.1	5.13	13,830
<i>Pirituba</i>	54.7	6.1	20,657
<i>Western São Paulo</i>	150.9	8.33	80,460
<i>MSP</i>	1,509	7.61	748,781

Source: Secretaria Municipal de Planejamento Urbano (MSP 2004), based on IBGE (1996).

Note: The IBGE considers favelas and similar housing types (“assemelhados”) as Subnormal Agglomerations, which is an ensemble consisting of more than 50 housing units located on alien property (public or particular), with disordered and dense occupation and, in general, a lack of essential public services. Recall that based on the study by Tascher (1997) this definition most likely presents a gross underestimate of the actual proportion of the population living in substandard housing.

Fairly small in population and size within the RMSP, compared with the periphery municipalities, the SRPP has the highest density, concentrating 20% of the population on only 8.3% of the periphery area (Table 4).²⁸ Except for Osasco and Carapicuíba, the entire region is growing at rates much higher than the average rates for São Paulo, the RMSP and the other periphery regions, and this trend will most likely

²⁸ I have chosen to use, when possible, the RMSP periphery municipalities – the RMSP excluding the Municipality of São Paulo – as the most appropriate unit of comparison as these are the areas that are currently experiencing the most environmental, social and economic transformation due to expulsion of the urban poor farther outside the city, expansion of elite suburban development, and investment in infrastructure (Aguilar & Ward 2003; Jacobi 2004a). A comparison of the SRPP within the periphery provides an important point of analysis to understand its position relative to the periphery region.

continue, particularly with the high rate of land development and improved access offered by the construction of the Rodoanel highway.²⁹

Table 4. Demographic Characteristics of the Pinheiros-Pirapora Subregion, 2000

	Territorial Area (km ²)	Population	Average Population Density (hab/km ²)	Rate of Annual Geometric Growth 1980 - 1991	Rate of Annual Geometric Growth 1991 - 2000
Osasco	68	652,593	9,597	1.63	1.60
Carapicuíba	36	344,596	9,572	3.92	2.26
Jandira	22	91,807	4,173	5.14	4.45
Barueri	61	208,281	3,414	5.11	5.44
Itapevi	79	162,433	2,056	6.6	4.76
Santana de Paraiba	176	74,828	425	12.71	8.19
Pirapora do Bom Jesus	99	12,395	125	4.7	5.12
<i>SRPP</i>	541	1,546,933	2,859	3.27	2.95
<i>RMSP Periphery (a)</i>	6,542	7,444,451	1,138	3.18	2.96
<i>MSP</i>	1,509	10,434,252	6,915	1.15	0.91
<i>RMSP</i>	8,051	17,878,703	2,221	1.86	1.69

Source: Based on IBGE (2000), SEADE (2002).

(a) The RMSP Periphery includes all of the municipalities in the RMSP except for the MSP.

In 2000, the subregion contributed to 10% of the GDP of the RMSP with Barueri and Osasco together accounting for 57% and 27% of the subregion total, respectively; the rest of the municipalities were comparative low; significantly, Pirapora made only a 0.6% contribution (Emplasa 2003). In terms of GDP per inhabitant, Barueri was significantly higher with US\$27,243 per habitant, while the rest were in the US\$3,500 to US\$4,500 range, except for Carapicuíba, which only had a ratio of US\$853. Employment in the region is mainly in the services sector, except for Pirapora and Jandira where the industrial sectors accounted for about 60% of jobs in 2002 (SEADE 2002). The average income per head of household was R\$1,068 (CAD\$475) in 2000 indicating the region is

²⁹ The Rodoanel Project is being implemented by the State Highways Department in an effort to reduce traffic in the urban center by interconnecting 10 highways around in the RMSP in a 174 km ring road. In addition to crossing various ecologically sensitive areas in the watershed, particularly protected water sources in Guarapiranga, its construction threatens to increase unplanned growth in these regions. The 32-kilometre stretch through the western region obtained an Environmental License in 1997 and began construction in 2002 (Alvim 2003: 275). Currently, this project is being contested and reviewed within the CBH-AT system.

relatively poor compared with the RMSP average of R\$1,265 (CAD\$563) (Figure 8). Only Barueri and Santana de Para ba have average monthly incomes higher than S o Paulo or the RMSP owing to the presence of wealthy elite neighbourhoods such as Alphaville, Tambore and Aldeia de Serra; 25% of household heads in Santana made more than 10 minimum salaries in 2000 (Table 5). The rest of the region is characterized by low-income families where the head of the family makes less than 5 minimum salaries. Considering that in 2000 a *cesta basica*³⁰ cost R\$109.44 (CAD\$49) and the estimated monthly income for a worker to support a family of four was estimated to be about R\$919 (CAD\$409), or 6 minimum salaries (DIEESE 2000), it is evident that almost   of household heads in the region are not making enough to meet the minimum standards for family survival.

Table 5. Average Monthly Income in the Pinheiros-Pirapora Subregion, 2000

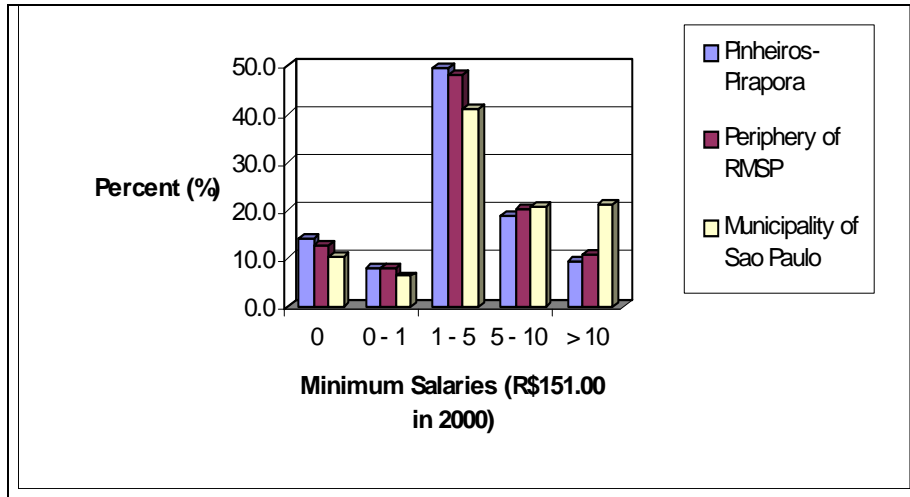
	Average Monthly Income Per Capita (R\$ in July 2000)	Average Monthly Income of Household Head (R\$ in July 2000)	Average Monthly Salary of Head of Household				
			Without Income (%)	Up to 1 Minimum Salary (%)	Between 1 and 5 Minimum Salaries (%)	Between 5 and 10 Minimum Salaries (%)	Greater than 10 Minimum Salaries (%)
Santana de Para�ba	762.05	2,583.57	14.8	7.2	42.5	10.6	24.9
Barueri	494.29	1,254.04	15.7	6.9	50.6	16.6	10.2
Osasco	390.45	934.26	12.7	7.4	46.4	21.7	11.8
Jandira	290.48	775.72	11.6	7.6	56.4	17.8	6.6
Carapic�ba	275.56	729.72	14.4	7.7	52.3	20.2	5.5
Pirapora do Bom Jesus	237.8	598.30	14.3	13.5	55.6	11.9	4.7
Itapevi	207.18	602.44	18.5	11.7	53.3	13.1	3.5
SRPP	379.69	1,068.29	14.1	7.9	49.4	19.0	9.6
RMSP Periphery	n/a	1,259.45	12.8	8.1	48.1	20.1	10.9
MSP	610.04	1,479.69	10.4	6.4	41.1	21.0	21.1
RMSP	n/a	1,265.10	11.4	7.1	43.9	20.6	17.0

Source: Based on IBGE (2000)

Note: In July 2000, the minimum salary was R\$151.00 (CAD\$67) (DIEESE 2000).

³⁰ The Cesta Basica, or food basket, consists of 13 basic staple food products and is calculated every month for the major cities in the country as a means of tracking the average cost of living.

Figure 8. Monthly Salaries of Heads of Households, 2000



Source: IBGE 2000.

The Human Development Index (HDI) measures three aspects considered constitutive of human development – life expectancy, education and standard of living – and is calculated for all the municipalities in the State of São Paulo (Table 6). Santana de Paraíba is ranked second in the RMSP and seventh in the State indicating it would be a desirable place to live, perhaps one of the reasons why its rate of growth is so high. Barueri and Osasco are not far behind, both within the top 25%, while Itapevi and Pirapora are in the bottom 25% of the RMSP and rank much lower within the State compared with the rest of the SRPP municipalities.

The direct relationship between human development and economic opportunity becomes apparent when we compare the fact that illiteracy rates in Pirapora and Itapevi are the highest in the region while their average incomes are also the lowest. Surprisingly, despite the high average incomes and HDI in Santana there is also an extremely high illiteracy rate indicating high polarity with respect to socioeconomic opportunity, a fact that can be confirmed by Table 5 showing income distribution – about a quarter of household heads make less than one minimum salary while an equal proportion make some of the highest incomes in the RMSP. Compared to the rate of growth it could be hypothesized that a large proportion of the urban poor marginalized further into the periphery over the last few decades have been attracted to these municipalities where jobs in the growing third sector have provided new opportunities.

Rates of decrease in illiteracy have been particularly significant for Pirapora, Jandira and Itapevi indicating real improvements in education and/or migration of more literate populations from central municipalities, the opposite of which can be concluded for Itapevi where the rate of literacy increase is much slower than the rest of the RMSP.

Table 6. Social Development Indicators of the Pinheiros-Pirapora Subregion, 2000

	Human Development Index, HDI 2000	HDI Ranking in State of São Paulo (out of 645) 2000	HDI Ranking in RMSP (out of 39) 2000	Illiterate Population over 15 years 1981 (%)	Illiterate Population over 15 years 2000 (%)
<i>Santana de Paraíba</i>	0.853	7	2	14.4	7.9
<i>Barueri</i>	0.826	44	6	11.3	6.6
<i>Osasco</i>	0.818	73	8	9.0	5.8
<i>Jandira</i>	0.801	165	16	13.1	6.6
<i>Carapicuíba</i>	0.793	218	20	10.3	6.3
<i>Pirapora do Bom Jesus</i>	0.767	421	31	18.1	10.4
<i>Itapevi</i>	0.759	481	33	12.3	8.8
<i>SRPP</i>	0.802	-	-	11.0	6.7
<i>RMSP Periphery</i>	0.795	-	-	10.7	6.6
<i>MSP</i>	0.841	18	3	7.5	4.9
<i>RMSP</i>	0.796	-	-	8.5	5.6

Source: Based on & IBGE (2000). HDI for RMSP and RMSP Periphery is calculated by the author based on an average distributed evenly among the 39 municipalities.

Note: HDI measures average achievements in three basic dimensions of human development - long and healthy life, knowledge and a decent standard of living (UNDP Human Development Reports, available at www.hdr.undp.org)

The pace of urban growth in the region creates challenges for environmental and social health without similar rates of infrastructure development in utilities, access and services. All of the municipalities in the subregion have their water and wastewater services operated through a concession with SABESP. In general, there is almost full coverage of water supply and solid waste services, noting that the most peripheral municipalities - Itapevi, Santana de Paraíba and Pirapora do Bom Jesus – are also significantly reliant on artesian wells most likely due to the difficulty and expense involved in connecting to the water supply network in such remote areas (Table 7). Sewage collection is much less evenly distributed with a relative correlation to distance from Barueri, where the nearest treatment plant is located. Figures show that approximately 98% of homes are serviced by solid waste collection, however due to the

number of illegal settlements and favelas in poorly accessible areas these figures are most likely grossly overestimated (Emplasa 2003). In addition, none of the final destinations for solid waste in the region are operating under conditions considered to be adequate, resulting in risks for human health, and water and groundwater pollution, as almost all the landfills and waste destination sites are located near water sources (CETESB 2004; Emplasa 2003).

Table 7. Accessibility of Urban Infrastructure the the Pinheiros-Pirapora Subregion, 2000

	Access to Urban Services by Housing Units, 2000					
	Permanent Housing Units 2000	Water Supplied by Pipes (%)	Water Supplied by Wells (%)	Wastewater Collection in Pipes (%)	Solid Waste Collection (%)	Transportation Access (hab/vehicle) 2002
<i>Carapicuíba</i>	90,935	99.0	0.5	73.6	98.7	8.6
<i>Osasco</i>	181,012	98.6	0.3	70.7	98.8	5.1
<i>Barueri</i>	55,395	97.6	1.0	79.3	99.3	5.5
<i>Jandira</i>	24,443	96.3	3.1	77.1	99.5	7.8
<i>Itapevi</i>	41,778	90.7	7.3	51.5	95.5	9.6
<i>Pirapora do Bom Jesus</i>	3,250	82.3	12.7	61.8	90.0	10.7
<i>Santana de Paraíba</i>	18,598	77.4	17.9	33.7	96.3	5.0
<i>SRPP</i>	415,411	97.0	1.9	71.9	98.3	7.5
<i>RMSP Periphery</i>	2,008,956	93.6	5.2	73.5	99.8	3.2
<i>MSP</i>	2,985,977	98.6	0.7	89.0	99.2	2.5
<i>RMSP</i>	4,994,933	96.6	2.5	82.8	98.8	3.2

Source: IGBE (2000), SEADE (2002)

Silva (2000a) warns against using coverage as a measure of access to public service utilities arguing that this often masks differences in *quantity* and *quality* of service. Maps of the RMSP showing the main water supply and sewage networks demonstrate that there are high networks of arterial distribution in the São Paulo, and south and southeastern periphery areas where most of the industrial and elite growth occurred during the 60s and 70s. Most of the periphery, including the SRPP, is serviced by a single branch of the main water mains indicating three service issues: 1. less water is able to be pumped through to these areas; 2. where there is high coverage there is more likely to be water shortages as there are more users and less supply; and 3. these factors combined contribute to low pressure conditions, which can result in human health

impacts due to backflow, and limit growth of economic sectors dependent on a continuous water supply (Silva 2000). Although difficult to quantify, local newspapers often have reports of water shortages in local neighbourhoods, confirming this prediction.³¹

SABESP holds concessions with each of the SRPP municipalities to operate and build water and wastewater services. Except for Pirapora do Bom Jesus, water is supplied from the Integrated Water Supply System involving treated water from the Cantareira (30.99 m³/s) and Baixo Cotia (0.88 m³/s) systems (FUSP 2002). Pirapora do Bom Jesus, Santana do Paraiba, Barueri and Itapevi also receive water from isolated systems consisting of superficial stream sources and subterranean wells (at an estimated rate of 0.25 m³/s). In Santana do Paraiba a new ETA (water treatment plant) is projected to serve 100% of the municipality's population by 2020 (Emplasa 2003). In general, however, the SRPP is virtually dependent on neighbouring subregions for its water supply and has comparatively few areas considered to be of significance for water source protection laws.

Although the SRPP generates only about 9% of the region's total potential liquid organic pollution load³² it is estimated that 99% of this is directly discharged into the Tietê River as there is almost no wastewater treatment in the SRPP (CETESB 2004). The SRPP contributes about 13% of the total pollution discharged directly into the Alto Tietê's rivers – a significant figure if one considers that the region consists of only 9% of the total RMSP population. Although ETE Barueri, the largest water treatment station (ETE) in the RMSP, is centrally located in the Pinheiros-Pirapora region, more than 2/3 of the wastewater it collects comes from outside the SRPP, from the MSP or from southwestern municipalities (Emplasa 2003 based on 2001 SABESP data). Thus, most the SRPP has virtually no water treatment.³³ SABESP has recently constructed a small ETE in Pirapora do Bom Jesus, which is projected to treat 100% of the sewage collected

³¹ I came across these reports repeatedly in newspapers from Osasco, Barueri and Pirapora.

³² This is measured as the tones of Biological Oxygen Demand (BOD) per day of wastewater from residential and industrial sources.

³³ With the recent work on Projeto Tietê these figures might have changed to reflect new sewage transfers to the ETE Barueri, however, data was not available at the time of writing.

in that municipality.³⁴ Projeto Tietê plans improvements in the sewage network and capacity of ETE Barueri that should contribute to the SRPP being better served (FUSP 2002).

There are four significant issues related to water resources in the SRPP, all of which the SCBH-PP can potentially play an important role depending on the technical and political will within the committee:

- *Urban Development Plans* - A recent study by Emplasa (2003) concluded that only about 28% of the SRPPs territorial area is geophysically favourable for urban settlement, more than half of which has already been occupied. In the last decade, new urban growth has mostly occupied lands considered to have serious or severe restrictions and is greatly contributing to erosive processes, particularly in the municipalities of Carapicuíba, Itapevi and Santana do Paraíba, and the subwatershed of São João do Barueri. These erosive processes, mainly attributed to subdivision developments and highly inadequate solid waste disposal, result in the accumulation of sediment in streams and rivers, and contribute significantly to the occurrence of floods in the SRPP.

Almost 10% of the subregion is protected by federal, state or municipal environmental legislation; of the 23 sub-watersheds in the region only 9 are relatively preserved with little or no urbanization, all of which are in the municipalities of Pirapora do Bom Jesus or Santana do Paraíba (Emplasa 2003). Although all the municipalities have legislations for land use and occupation, these are generally outdated and seriously out of synch with the actual zoning being practiced; for example, Jandira applies a 1969 zoning law that is impractical and inconsistent with current socioeconomic realities. As of 2002, Barueri, Itapevi and Pirapora do Bom Jesus had not yet developed a Master Plan, although Pirapora is currently in the process of developing a proposal. The synchronization of current zoning and development practices with objectives for land degradation and environmental protection need to be priorities especially

³⁴ This project was implemented as part of the resolution for Pirapora's foam problem, discussed in Chapter 6.

considering the high rates of growth in the region. Municipal coordination with SABESP is important to ensure that the rate of growth and control of new development will be matched with complementary infrastructural development.

- *Water Supply & Source Protection* - The only area in the subregion being considered for a Development and Environmental Protection Plan (PDPA) and Water Source Protection Plan (APRM) is the Baixo Cotia watershed, which is shared with the Cotia-Guarapiranga Subregion. A large proportion of the subregion is projected to be dependent on the enhanced supply of this relatively small source in the future and the SRPP has taken responsibility for developing the necessary legislation. The rapid growth in Barueri near the Baixo Cotia is a principal concern. There are also several other water sources in that area that are used for isolated public supply systems, particularly the rivers Sapiatã and Itapevi in the São Joao de Barueri sub-watershed.
- *Water Pollution from the Entire RMSP* - Regardless of the level of water treatment in the SRPP, its position downstream from the rest of the RMSP results in an extremely disadvantaged urban geography. The SRPP receives all of the industrial, domestic and non-point source effluents that are discharged into the Tietê River and its tributaries virtually ‘in natura’. Recent research on the subregion concluded that the “absence of dissolved oxygen in [the region’s] waters through the last decades demonstrates that the discharges exceeded, by various degrees, [the river’s] capacity to assimilate the pollution load” (Emplasa 2003:29). Almost all of the major tributaries in the subregion are classified as ‘unacceptable’ based on a water quality standard for public supply (IQA); only the Cotia River has an IQA considered to be ‘acceptable’ – but not ‘good’ (CETESB 2004). It is well known that the current solution is to implement wastewater treatment throughout the RMSP, which is what the Projeto Tietê claims it will achieve by 2020. In the short term, however, FUSP (2002) has estimated that by 2010, the conditions of the Tietê will barely have improved if the only strategy taken is to enhance wastewater treatment. Sedimentation is also

contributing in large part to the poor water quality and an integrated program of wastewater treatment and erosion control – including solid waste management to prevent litter from clogging the rivers and streams – is necessary for the Tietê River to achieve desired qualitative conditions.

- *Cooperation with Neighbouring Watershed Regions* – There are three main tributaries emptying into the Tietê River within the SRPP, each having their source in another region - the Cotia River from the Cotia-Guarapiranga Subregion, São João do Barueri River from the Middle Tietê-Sorocaba watershed, and Juquerí River from the Juqueri-Cantareira Subregion. Almost all the piped water supply comes from outside the SRPP. Considering that many water resources are shared with neighbouring regions and the SRPP appears to be downstream in almost all cases, cooperation with neighbouring basins is an important step in reducing local pollution and finding solutions for reducing water demand. In addition, as the Baixo Cotia supply source is shared between Cotia-Guarapiranga and the SCBH-PP, cooperation for water source protection plans is essential. At the moment, there is only cross-regional cooperation in the CBH-AT and within SABESP, which operates in almost all of the RMSP.

Explaining the root causes of current challenges in the SRPP is complex, but highly related to socioeconomic development patterns that characterize the RMSP. The SRPP is experiencing what Aguilar and Ward (2003) call “region-based urbanization” where there are consistently lower average rates of metropolitan growth disguising the increased circulation of commodities, people and capital between the center and periphery. The result is a working class social reproduction shifting outwards while the core city still concentrates the productive urban population. While the MSP is close to reaching zero growth (in fact, some areas are already experiencing negative growth), the SRPP is increasing at high rates, particularly the peripheral municipalities of Barueri, Santana and Pirapora. Barueri and Santana appear to be transforming into the authors’ definition of ‘urban subcentres,’ where there is a concentration of cheap labour, services and dormitory communities. In contrast to what may be found on the Mexico City

periphery, however, the SRPP municipalities are also attracting very wealthy urbanites, quite possibly creating local and ‘cross-scale’ conditions of inequality. Considering income and human development indicators, for instance, Pirapora and Itapevi appear to be quite marginalized relative to the rest of the RMSB and the SRPP, although Pirapora appears to be improving much more rapidly. Thus, the experiences within the subregion, although they share a common feature of being marginalized outside of the periphery, are highly stratified geographically, with some communities and municipalities having higher levels of power and opportunities than others.

5.2.2 The Pinheiros-Pirapora Watershed Subcommittee

The Pinheiros-Pirapora Watershed Subcommittee (SCBH-PP) was the last subcommittee to be created - on September 15, 1998 - through the initiative of state organizers – mainly from DAEE, the mayor of Osasco, and community environmental leaders in the region. At the time of writing, the SCBH-PP was entering its fourth term having completed just over six years as a regional watershed management unit. Despite not initially having any sites considered for water source protection and the accompanying polemic that appeared to have initiated and sustained other Alto Tietê subcommittees (Alvim 2003), the SCBH-PP has been meeting regularly and can be said to be making a positive contribution to water resources management and planning in the region.

The subcommittee is composed of 27 members and their respective substitutes – 9 from each of the state, municipal and civil society sectors (Table 8) – with elections occurring every two years just prior to the elections for the CBH-AT. On election day, representatives of all civil society organizations eligible for membership in the SCBH-PP meet according to their respective sectors (neighbourhood associations, industrial associations, etc.) to vote for their representatives. Its structural organization consists of an Executive Group (GE) made up of two members from each segment who is responsible for organizing meetings and agendas, and a Technical Planning Committee (CT), requiring a minimum of two representatives from each segment who are either members of the subcommittee or are indicated by a committee member. In general many

of the civil society members have opted to be members of the CT while municipalities usually second a public employee working in the planning, environment or works departments. The complete list of SCBH-PP members for the 2003 to 2004 cycle is identified in Appendix A.

Table 8. Sector Representatives in the Pinheiros-Pirapora Subcommittee

	State	Municipalities	Civil Society
1	<i>DAEE (water & electricity)</i>	<i>Jandira</i>	
2	<i>SABESP (water & sanitation)</i>	<i>Carapicuíba</i>	<i>Domestic Use (2)</i>
3	<i>State Secretary of Housing</i>	<i>Barueri</i>	
4	<i>EMAE (water & energy; dams)</i>	<i>Itapevi</i>	<i>Environmental Defense (2)</i>
5	<i>CPLA (environmental planning)</i>	<i>Pirapora do Bom Jesus</i>	<i>Industrial, Commercial, Leisure, Services and Agriculture Activities Association (1)</i>
6	<i>CETESB (pollution control)</i>	<i>Osasco</i>	<i>Unions (1)</i>
7	<i>State Secretary of Health</i>	<i>Santana de Paraíba</i>	<i>Technical Entities (1)</i>
8	<i>IPT (technical research; land management)</i>	<i>Sao Paulo Municipal Secretary of Public Roads (Titular)</i> <i>Municipal Secretary of Submunicipality Implementation (Alternate)</i>	<i>Diffuse Citizen Interests (1)</i>
9	<i>CEPAM</i>	<i>Municipal Secretary of the Environment (Titular)</i> <i>Municipal Secretary of Urban Planning (Alternate)</i>	<i>Universities and Research Institutions (1)</i>

The level of organization of the SCPP has varied considerably between each election cycle and has been extremely dependent on the initiatives of the GE and the Executive Secretary. Only in 2002 do the archives show evidence of effort to maintain a strong record of institutional memory; in other years there were varying quantities and qualities of minutes and reports. In the first term (1998/2000), the mayor of Osasco was elected President and had one of his employees fulfill this function. During the first part of the next election cycle (2001/2002) there was a distinct reduction in organization – for example, at one meeting in 2002 the plenary approved 6 sets of minutes from the year before - until the GE, composed of five of the most active members, began to take initiative through developing norms and “discussion methodologies.”

The SCBH-PP has met at least four times per year in plenary since 1999, and the agenda has mainly been directed towards approving FEHIDRO projects and institutional issues involved with organization and keeping up with projects. From the files available, only in the 2001/2002 term did there appear to be problems reaching quorum where the

most absences were noted in the municipal sector. The previous executive secretary, the western regional superintendent of SABESP, was able to provide some administrative support from his office in western Lapa, as well as make it a regional headquarters for meetings and archives. He no longer participates in this committee, but the site is still used for meetings and storage. Although subcommittees have access to small funds from the CBH-AT (through FEHIDRO) for administrative expenses such as postage and supplies, due to the complex bureaucratic process involved in having requests approved the executive secretaries prefer to use email or borrow services from their own workplaces (Carlos Eduardo de Guimarães, personal communication). Despite the change in leadership of the executive secretary, SABESP continues to provide space at its office for meetings. Initially meetings were rotated throughout the region in an effort to increase accessibility and to expand members' knowledge about the region. The past year this practice has somewhat resumed with assemblies in Osasco and meetings of the CT in Carapicuíba.

According to its Statute, the main tasks of the SCBH-PP are to facilitate integration of regional and municipal-level policy, develop regional watershed and water source protection plans, and promote participation of all three sectors, particularly through helping create water user associations and intermunicipal consortia. Although there are differing opinions as to how well the SCBH-PP has performed as a participatory watershed management unit, some significant achievements have been noted since its inception:

- *Communication* - Three newsletters were produced in the first year outlining the subcommittee's activities and membership and promoting knowledge of water resources issues in the region. Since then, however, there has been a lack of enthusiasm and initiative in pursuing the same level of outreach with the community, and only one newsletter has been produced, in 2002, due to the effort of the GE and the SABESP media group. The underdeveloped CBH-AT website has not been used to post information; however, during the last term there has been an effort to post events, minutes and deliberations on the SIGRH website.

- *Cooperation with other subcomitês* - The SCBH-PP hosted an encounter in 2001 with its neighbouring subregions – Juqueri-Cantareira and Cotia-Guarapiranga – in an attempt to foster integration of experiences in watershed management and promote cooperation in areas of common interest (SCBH-PP 2002). Although many felt it had potential to develop into continued dialogue there has not yet been any further interaction.
- *Capacity-building* – The second term featured a small dedicated group committed to improving the quality of participation in the subcommittee. The representative of CPLA, a pedagogist, led workshops and exercises intended to develop a “methodology of decision-making” and an understanding of common goals and objectives. In 2002, a capacity-building course was developed together with an USP professor for which there were 55 participants – 20 from civil society, 19 municipal and 13 from the State. As well as developing technical knowledge of water resource issues, the participants debated current programs in the Alto Tietê, improving their relative participations within the subcommittee.
- *Research* – Until recently, there was very little research available focused on the region and its water resource issues, environmental impacts and geographic references. EMPLASA was solicited to do a study and in 2003 produced the “Guidelines and Measures for the Recuperation of Degraded Areas in the Pinheiros-Pirapora Subregion”, a comprehensive report consisting of detailed maps and data, and proposals for preventing erosion and recuperating degraded areas. This document provides the baseline data needed to develop regional and municipal plans, and improve socioenvironmental understanding of the region.
- *Challenging the State* – One of the first actions envisioned by some members of civil society was to protect the Carapicuíba Lagoon from being completely polluted, and develop it into an environmental park. DAEE had been filling the lake with sludge resulting from the Projeto Tietê dredging projects and it quickly became a polemic issue as environmentalists interested in protecting the lagoon,

and community activists interested in protecting the squatters (favelas) that lived nearby, pushed debate within the SCBH-PP, challenging the State agencies that were involved – primarily DAEE and SABESP. In April 2004, the Technical Group, involving representatives of the SCBH-PP state, municipal and civil society sectors, succeeded in developing a plan for the area. This was the subcommittee's first experience dealing with conflict through collective action.

- *FEHIDRO* – Between 1997 and 2003, the SCBH-PP had already invested about R\$647,000 (CAD\$288,000) of FEHIDRO funds in the watershed and was expecting another R\$1.02 million (CAD\$454,000) worth of projects to be completed, in total representing about 13% of total investments in the Alto Tietê.³⁵ A large proportion of projects initially approved are cancelled by FEHIDRO agents for not meeting technical criteria or for expiring after grantees fail to sign contracts and implement projects. Considering there is a high level of project cancellations throughout the Alto Tietê committees, the SCBH-PP is doing fairly well as it is one of only two committees that have made use of at least half its available funding. Of the 28 proposals that the subcommittee has approved, ten have been for technical and service works, six for the development of projects and plans, and twelve for environmental education. Recently, in 2004, all nine approved projects were focused on education and SCBH-PP program development.

Other issues that have frequently been discussed in the CT include the development of a Regional Master Plan and a PDPA for the Cotia River watershed (Baixo Cotia water supply), municipal compensation and environmental licensing of the Rodoanel highway construction, and pollution in Pirapora and the Tietê River cleanup. Initially, as noted, the subregion did not include any areas considered priority areas for water source protection. Since it shared the area of the Baixo Cotia subwatershed, however, it was decided that the SCBH-PP would be responsible for developing a water

³⁵ *This information is based on data compiled by engineers in the Water Resources Division, DAEE, in 2004, and provided to me on request.*

source protection plan, relieving pressure from the Cotia-Guarapiranga Subcommittee, which was embroiled in debate over the much larger Guarapiranga Reservoir (Geroncio Rocha, personal communication). The decision was likely fueled by a desire to be part of such an important piece of legislation that some felt, based on experiences in other subcommittees, created the necessary conditions to encourage participation.

Until the end of 2002, there were at least 16 members of the subcommittee or technical advisory committee who had been participating regularly at meetings. This appears to present a significant achievement in terms of developing relationships of trust and synergy necessary for the development of social capital and for encouraging collective action (Ostrom 1996). With the start of the 2003/2004 term, however, six of the most active participants from previous years, particularly the environmental activists, were no longer participating, for a variety of reasons including disillusionment with the process.³⁶ This represented not only a loss of accumulated interpersonal relationships but also of the ‘knowledge’ that had been developed through capacity-building and program development. Both municipal and state representatives expressed frustration with having to “start all over again” with participants who lacked the technical background to effectively participate, particularly since four of the members that moved on were civil society representatives.

Perhaps an indicator of the relationship between civil society organizations and municipal and state sectors in the region was evident at the initial meeting of the SCBH-PP where some civil society representatives who had been active in coordinating the subcommittee were not given credit for this leading role by state leaders; only when Celso Mota, an environmental activist, brought attention to the oversight did the discourse begin to include civil society. Participation, particularly of environmental organizations, neighbourhood associations in Osasco and the Order of Brazilian Lawyers (OAB), has been fairly strong in terms of frequency from all civil society sectors except for industry and commerce, and universities. They have been instrumental in planning and implementing activities of the SCBH-PP, and for introducing discussion and challenging the subcommittee on a number of issues. Almost all interviewees expressed

³⁶ A significant loss was Walter Carneiro Rios, a neighbourhood association representative and member since the SCBH-PP’s inception, one of the most active participants in both the plenary and Technical Committee, who passed away on October 2, 2003.

some level of disappointment or frustration with the virtual absence of the USP indicating that its privilege as a unit of centralized academic knowledge should be applied to improving participatory watershed management, especially as its territories are within the subregion.

Participation from state representatives can be described as being the most consistent in terms of participating individuals and attendance at meetings. Whereas most other subcommittees have traditionally had DAEE representatives responsible for the Executive Secretary position, the SCBH-PP was administered by SABESP in the first two terms, and EMAE in the current term. Despite being one of the poorest and densest subregions with some of the worst indicators of health in the RMSP, the absence of the State Secretaries of Health and Habitation, and to some extent CETESB, are significant and perhaps a strong indicator of continued state resistance.

The lack of participation by municipalities has been the most disappointing, although this is not unusual in committees throughout the Alto Tietê basin (Jacobi 2004; Alvim 2003; da Cunha 2004). The municipalities of Osasco, Itapevi, Santana de Paraíba and the São Paulo Municipal Secretary for Urban Planning have been participating actively since the first term. Mayors have contributed very little to discussions within the plenary or technical committees, generally appointing municipal secretaries or planners to represent them. These traditions have recently been challenged by the increased participation of the Pirapora, Carapicuíba and Jandira municipal administrations. Many of the interviewees noted the participation of the Pirapora mayor, who had been elected President, as one of the biggest improvements in the last term. Barueri, one of the wealthiest and fastest growing municipalities, has been conspicuously absent even though its territories include areas that are sources of conflict such as the Baixo Cotia watershed, where continuing pressures of lot development threaten the future of this water source that the municipality depends on.

In terms of the 'places' represented by the SCBH-PP members, there is not a wide regional representation. All of the state agency representatives are centralized in offices in São Paulo and Osasco. The civil society organizations directly involved in the SCBH-PP are mostly rooted in the areas of the MSP and Osasco, except for the OAB in Barueri representing 'diffuse citizen interests'. One organization from Jandira gained the

industrial representative position (with Itapevi as substitute), however there was a distinct lack of interest in this category. The 2003/2004 elections resulted in one representative from Carapicuíba and one from Barueri. Of the 198 civil society organizations registered in the database for the last election, 157 are in the domestic user category, mainly neighbourhood associations, and 17 are environmental groups; only 35 are from municipalities west of Osasco.

There are a few civil society members that were identified as being willing to discuss regional issues and be active in working with the state on projects, however, for the most part there appeared to be a general frustration by state and municipal representatives related to working with civil society sectors whose interests were seen to be narrow – more than a few times these organizations were described as INGs - for non-governmental “individual” - rather than ONGs – for “organization.” Two members expressed concern about the fine line between government and civil society as many of the latter were actively participating in politics (there have been city councilor representatives in the civil society sector) although the reasons about why the line should be drawn were not so clearly expressed. For its part, civil society representatives appear to be highly heterogeneous and disconnected from each other, making it difficult to draw make generalizations about their actions. All the interviewees from that sector had highly different perceptions about the participation of themselves and other members, knowledge of the subcommittee’s activities and concerns regarding its future.

The progress of the SCBH-PP has been slow in terms of collective strategies for regional watershed management. Interviewed members state various reasons for this: the lack of continuity in membership; very narrow interests focusing on ‘local’ neighbourhood-scale issues and preventing the development of a regional vision; civil society lacks the technical knowledge to participate effectively; very low representation of municipalities making the coordination of urban and environmental planning difficult; and, particularly in the last term, there were complaints about the lack of civil society participation, attributed to the sector’s active participation in municipal elections, as representatives or campaigners.

The principal issues that many feel need to be focused on are the development of water source protection planning for Baixo Cotia – a feature that is considered to be one

of the prime motives for the subcommittee's creation; addressing the issues evolving from the Rodoanel project regarding municipal compensation for appropriated lands; and, taking the next steps in the land recuperation plan developed by Emplasa. There also appears to be concern with FEHIDRO projects as state representatives felt they should be more regionally-focused and technically-oriented. There have been efforts to establish a system of follow-up but it has not been very successful so far.

Generally, the SCBH-PP, despite not focusing on water source protection planning issues that have appeared to sustain other subcommittees, has made important contributions to regional management; however, these activities appear to be possible mainly through the commitment of state sectors. Without more active participation of municipalities and willingness to adopt recommendations in urban development planning, these projects will be difficult to bring into action.

5.3 Representation Issues Arising from the CBH-AT System

The subcommittees replicate the institutional structure of the CBH-AT with tripartite representation, technical committees and similar election structures, with some regional differences regarding definition of civil society groups. They do not have independent deliberating powers; all decisions have to be forwarded to the CBH-AT for final deliberation in the plenary, including allocation of FEHIDRO funding. In comparing the statutes of the CBH-AT and subcommittees, it also becomes clear that the latter are really where direct articulation between municipal planning and state water management is expected to occur while the CBH-AT has more of a coordinating role in terms of watershed plans and directing investment priorities of common concern to the watershed. One issue of concern is what type of accountability the subcommittees has to the CBH-AT and vice versa.

The decentralization of the Alto Tietê basin into subcommittees was intended to facilitate 'local' planning and communication, while the CBH-AT focused on developing wider plans of interest to the whole watershed. Interaction between the subcommittee and the CBH-AT occurs in three ways: through the executive secretaries, generally by forwarding communication and deliberations; through direct representation of

subcommittee/subregion members, who would then be responsible for bringing matters to the attention of the subcommittee; or, through communication in networks. In terms of the first, there is not very much communication between the committees and little indication that the CBH-AT spends much time debating issues in the region.

Regional representation is a legitimate issue particularly where geographic inequalities and sociopolitical heterogeneity are distinct features defining different regions. Formally structured representation of the subregions in the CBH-AT is only given to municipalities, for which there are three municipal seats available per subregion, regardless of how many municipalities there are. It is important to note that this is not based on proportional representation; thus the MSP only has one vote on the CBH-AT event though its population represents about 58% of its area (although it may have more than one vote in some of the subcommittees). State representation includes almost the same agencies as those involved in the subcommittees. Civil society representation, on the other hand, is based on 'stakeholder groups' not 'regional' identity.

The organization of representation in this way is based on several assumptions. The first is that the appropriate stakeholder groups have been selected and that, since representatives are selected in elections of peer groups, they will be accountable to and 'represent' the group in question. On election day, all groups that are considered eligible to participate in the committee, according to criteria set out in the CBH-AT legislation, are organized into their respective sectors to select their representatives. The election committee, made up of members of the respective watershed committee, invite organizations to attend through invitation based on a registration list and through public radio and media. In some categories, such as domestic users and environmental organizations, the elections are highly contested, while in others, such as industrial users, there are only one or two candidates (Keck & Jacobi 2001). There are no guidelines or 'rules' about selected representatives maintaining communication with constituencies to foster accountability. Evidence in the SCBH-PP suggests that once the elections are complete, there is very little effort to communicate with groups registered within each category – the members tend to act on their own basing their representation on their particular spaces of dependence and engagement. This suggests that there is a low possibility that an environmental group in Pirapora, for example, will be 'represented.'

This anomaly is addressed by another assumption: that elected political leaders ‘represent’ their communities and subregions. Thus, if an organization failed to be represented by an identified stakeholder group or its representative, at the least it would be represented by its mayor. In research on participatory budgeting in Brazil, Posner (2003) argues that municipal mayors in Brazil, who tend to have significant resources and power granted through federal initiatives in administrative decentralization, can play significant roles in enhancing public participation and downward accountability. This depends, however, on the commitment of such mayors to grassroots mobilization and transparency. Where political leaders win elections by narrow majorities, it might be unrealistic to assume that they are representative of their communities. The other problem is that often the mayors do not attend the meetings, sending a technical expert from the planning or environment departments, whose degree of accountability to the citizens depends on the local political and administrative environment.

State representatives are the most likely to be accountable to their agencies (in theory acting in protection of the public interest) and be represented on several committees. Interviews with state members in the SCBH-PP revealed, however, that this might be overoptimistic. None of the interviewees reported consulting within their agency before they made decisions on issues debated. One interviewee revealed that although the agency had had many people participating in several committees since 1997, it had only recently held an internal meeting with all its representatives to exchange experiences.

It is evident from observations of the SCBH-PP that the participatory space of the subcommittees within the Alto Tietê watershed are sites where representation, particularly of civil society, can be said to be more *discursive* (Keck 2004) than constituent. Each of the actors in the subcommittee is participating in debates without direction from their networks or organizations on decisions to take. This is not to say that the actions or ideas of these representatives are not positive, but that there does not appear to be any mechanisms for downward accountability. Accountability appears to depend on ‘trust’ by other representatives as well as by associated networks that a CBH-AT member is legitimately able to ‘speak’ in the interests of that stakeholder group, *without consultation*. Thus, outside of appearing to elect their representatives, civil

society groups within the watershed that are not able to obtain positions in the SCBH-PP have limited means for participation in the decision-making processes. The extent to which topics of interest to groups outside the SCBH-PP depends on whether or not they have access to (and influence over) representative members.

CHAPTER 6: A POLITICAL ECOLOGY OF WATER POLLUTION IN PIRAPORA DO BOM JESUS

As noted, the most extreme form of pollution in the SRPP is found in Pirapora do Bom Jesus. Here, the Tietê River, loaded with raw sewage and industrial effluents from its passage through the RMSP, falls 35 metres at the Pirapora Dam where the turbulence from the fall results in the production of foam due to the detergents in the water. Although the detergent is biodegradeable, it is unable to break down due to the lack of dissolved oxygen in the river, which, in turn, is due to the pollution overload representing an estimated 633 thousand tonnes of biological oxygen demand per day (CETESB 2004). Since 1975, the foam has been systematically present ranging in height from a few inches to five metres. Although foam also occurs at the Edgard de Souza Dam, where the height is 19 metres, the effects are much more dramatic in Pirapora, particularly because the historic center of the town is located right on the water's edge within 500 metres of the dam.

This chapter outlines the history of water pollution in Pirapora in terms of the scale of the RMSP, where the political ecology of water over the past century is intricately linked to the present conditions in Pirapora. The concept of water management in São Paulo has been synonymous with the logic of energy production and disjunctured from priorities of sanitation and health, leading to a series of political struggles that would lead to the development of the present politique of watershed committees, and would continue to affect the subregion up to the present. The manufactured 'hydroscape' fuelled economic growth and urban development, while the small fringe community of Pirapora has suffered under toxic foam and noxious smells for over thirty years, receiving few of the benefits of São Paulo's wealth.

6.1 The Peri-Urban Community of Pirapora do Bom Jesus

Pirapora do Bom Jesus is the smallest municipality in the SRPP, making up just 0.8% of the region's population. It is situated at the edge of the Alto Tietê watershed nestled in between high rolling peaks with an area of 99 km², most of which is natural

green space. Its population is concentrated in three principal areas, one of which is the historical center of the town built in the deep valley along the river. The town was founded in the 1500s when farmers ‘miraculously’ found a statue of Jesus floating in the river and a church was set up, drawing a small community. Since then the town has become a destination for religious pilgrimages bringing hundreds to thousands of people each weekend for leisure and to attend mass. Numerous families used to operate boating excursions for tourists, however, that economic activity has been unviable for almost twenty years due to the pollution and foam. The center of town is dedicated to tourism and during the week is fairly barren of activity except outside City Hall. There is a particular pride by residents in the historical patrimony of the town and recently it has been “rediscovered” as the birthplace of Paulista samba. This has led to the renovation of the old cultural center into a new site of community culture and expression.

The foam creates extremely noxious smells, particularly on Mondays when the dam is opened again after closing during the weekend in the interests of tourism. Foam passes under the two main bridges of the city often in summer and almost daily in winter, where it can reach heights of up to five metres depending on climatic conditions. Wind often blows the foam into open windows and onto children’s playgrounds. Bacterial studies in 1983 demonstrated that the foam samples collected in front of the dam had fecal coliform concentrations more than 100 times the concentration in the river water (de Castro & Martins 1984). It also showed high concentration ratios of oils and greases, and heavy metals (aluminum and iron), ranging from 71 to 86 times more concentrated than the river water. There are reportedly much higher rates of respiratory illnesses in the town center, although systematic health studies have not been undertaken. The toxins in the air lead to oxidation of statues in the town center and leaves black stains on houses facing the river so that they have to be cleaned and painted frequently.

Pirapora and Barueri are the only two municipalities in the SRPP whose rate of growth has increased from the previous decade. Although it is high in Pirapora (5.12% per year), most of the growth is occurring in areas away from the traditional center where industrial growth has also been strong. There have been areas along the margins of the river, where the impacts of the foam are the worst, settled by urban poor looking for better opportunities in the periphery. The town has some of the lowest social and

economic indicators in the region where illiteracy rates are about 10% and about one-third of heads of households made less than one minimum salary (R\$151) in 2000 (IBGE 2000). The municipality has been gradually changing in the past few decades with a significant shift in centrality from the traditional center to the higher region of Parque Payol where the effects of the water pollution are virtually invisible. Yet the strong ties to religion and the tourists it brings is still a dominant feature in the center.

6.2 Manufacturing the Hydroscape: Water and History in Alto Tietê

The symbiotic relationship between water and society – the hydrosocial cycle – is an important feature defining the historical urban landscape of São Paulo. At the beginning of the 20th century, when the coffee industry was booming and the railways were bringing new wealth and opportunities to São Paulo, the São Paulo Tramway Light & Power Co., a Canadian company, built the Paraíba Hydroelectric Station in 1901, the first one to be installed in the city. Then, in 1907, in response to increased flooding along the Pinheiros River, the Guarapiranga dam was built, creating São Paulo’s first water reservoir. With this project “Light defined the first step of a long plan looking to appropriate all the hydraulic potential of the São Paulo region to produce electric energy” (Rolnick *et al.* 1990:75). The Tietê River and its major tributaries became important sites of contestation as its waters were harnessed to fuel industrial development and the increasing demand for electricity, and Light’s actions became intricately related to the flooding and sanitation problems that defined social space in the city.

The central hydraulic design of São Paulo was shaped by the development of the Sistema Tietê/Billings – a system of dams for hydroelectric generation and flood control, which primarily impacted the Pinheiros River and the western region of the Tietê River. In 1925, Light signed a contract with the Governor of São Paulo to initiate “Projeto Serra do Light” a hydroelectricity project designed to take advantage of the potential energy that could be created if the Pinheiros River were to be reversed to fall 700 metres through the Serra do Mar to the east coast in Cubatão. By this time, Light had become a multi-utility with a monopoly on the city’s water, energy, public lighting, street car system and

real estate (Silva 2000b). Victorino (2002) suggests that although the state was reluctant to give the company more power, the politics of water supply at the time - favouring an esthetic of naturally sourced water rather than treated river water - made the Guarapiranga Reservoirs the choice as a water supply source. Thus, the Sistema Tietê/Billings was born out of an exchange of favours – Light obtained the concession it needed for energy production and the city received a constant supply of spring water.

In the 1950s, Light began pumping the Pinheiros River from where it emptied into the Tietê River in the opposite direction towards the Guarapiranga Reservoir. From there it was forced to descend the Serra do Mar creating a huge amount of energy in the form of hydroelectric potential. The Pirapora Dam and Reservoir was constructed at this time to supplement the Edgard de Souza Dam, which had been built earlier, in controlling water flow along the entire system so that a minimal amount of energy would be needed to reverse the Pinheiros River. Flooding was a common feature of the São Paulo landscape and was mitigated through canalizing large sections of both the Pinheiros and Tietê rivers. As the floodplains were freed from the impact of rising river water, they became sites of increased urban development; the land, however, was highly susceptible to erosion and with the impact of sedimentation, as well as runoff from urban areas, floods continued to occur, creating problems of erosion and human health along the river's margins (Corrêa & Alvim 2000). During the next two decades, the city continued to expand in increasingly unsuitable areas susceptible to erosion and without addressing the lack of control on pollution. By the 1970s, the results of the lack of sanitation in the city had become extremely apparent.

By the 1970s, the Tietê and Pinheiros Rivers were heavily polluted - the wasteland of a regime of urban capital accumulation focused on energy production and industrial development. The RMSP had a population of 11 million with 35,000 industries, discharging an estimated 25 m³/s of sewage virtually 'in natura' into the Tietê River, which represented half of its average flow (de Castro *et al.* 1979). The infant mortality rate, which had decreased in the 1940s, began to rise steadily with the increased pollution. By 1974 it had surpassed the average of the early 1900s (Keck 2002). In 1975, the phenomenon of foam reaching up to five metres began to appear on the Tietê River in Santana de Parnaíba and Pirapora do Bom Jesus, as well as a few communities

further downstream. Although there were some efforts to control pollution and clean up the river, by 1992, the situation had still not improved with the Tietê, Pinheiros and Tamanduateí virtually devoid of oxygen, considered to be 'dead' rivers.

Victorino (2002) believes that the issues facing the São Paulo waterscape today would have been entirely different if the decisions made in the early 1900s had included public debate on sanitation. During that time, city water technicians were embroiled in a polemic debate over the long-term water supply. One side was impressed with the technological capacities of water treatment and proposed that the Tietê River itself be treated, simultaneously ensuring an unlimited supply and leaving cleaner rivers in the city, arguing that this would be cheaper than the infrastructure that would be needed to bring water from the mountains. The other side of the debate was focused on an ideological argument, more aesthetic than scientific, that water quality only had value if it came from nature. Together with the disbelief in the power of technology to guarantee water protection, the 'sanitarist' ideology was adopted without any tests of water treatment and the fate of the city was sealed with Light. The influence of Light's hydroelectric schemes and the lack of any concept of water management created a contradictory modern city - dependent on a manufactured hydroscape that had been stripped of its ecology and transformed into concrete channels of sewage and potential energy, leading directly into what had been one of the city's most important 'natural' water sources.

In a study of the evolution of water and wastewater services in São Paulo during the 1970s, Keck (2002) concludes that the failure to provide sanitation infrastructure was not the result of a lack of technical capacity or alternative ideas, but a symptom of the political environment at the time. The military regime that took control of the state in 1968 began a process of centralizing water and sanitation services, previously run by municipalities, into state and federal autarkic agencies. The National Sanitation Plan (PLANASA) was published in 1971 providing funding for infrastructure development through state and federal water concessions, and municipalities that refused to sign contracts were denied access to these funds (Vargas 2000). SABESP was created in 1973, which became responsible for bulk supply and sanitation as well as municipal distribution on a concession basis; municipalities retained responsibility for capillary

networks. Around the same time, the Integrated Metropolitan Development Plan was published which included the first comprehensive proposal for water treatment in the RMSP, the result of a generation of water technicians who began to envision a more integrated approach to water management and end the ‘energetic logic’ that had dominated over the past 50 years.

The “Solucão Integrado” (Integrated Solution) project proposed to transfer sewage through a tunnel to Cantareira where it would be treated in a set of stabilization pools. Although the plan was considered to be comparatively inexpensive and had the support of water technicians within DAEE, the new state government canceled it and replaced it with a project named SANEGRAN (Keck 2002).³⁷ This new plan was technologically complicated and economically intensive, requiring the construction of three water treatment plants, and after the 1980s recession, the project was stalled due to lack of funding with only one treatment plant operating far below predicted capacity. This became a common feature in states across the country due to the “lack of transparency and accountability of state-owned concessionary companies, whose centralized management remained disconnected from any social control by users or local public powers, as well as subordinated to private interests associated to expensive public works, of doubtful priority and slow economic return” (Vargas 2000:3). The federal funding system under PLANASA had collapsed by the mid-80s with huge external debts and although it had succeeded in increasing the levels of water supply and sewage collection, it still remained far from its original goals. With the failure of the centralized federal system and the end of the military regime in 1983, water sector reform and decentralized policy-making began to be discussed with more intensity.

Throughout the early PLANASA period, there were inherent contradictions in state-level water policy and local planning that had further aggravated the situation in the RMSP and the Tietê River. By 1975, southern industrial areas began complaining that pollution in the Billings Reservoir was affecting production and the federal Minister of Mines and Energy

(MME), together with state agencies, began to look for alternative sources of energy,

³⁷ This was hypothesized to be due partly to Light’s opposition to exporting water out of the Tietê/Billings System, and the rumors that Martins had family with large amounts of property near where the stabilization pools would have been implemented (Keck 2002).

reducing the city's dependence on Billings and the need to pump the polluted river water south (Keck 2002). The high indices of pollution throughout the watershed had also created conditions of local scarcity prompting authorities to find new sources of clean water. The Billings Reservoir was viewed as the best potential source of water *if* there was an effort to protect its water from continued degradation due to uncontrolled development along its margins and lack of pollution control. In an effort to protect all current and potential water supplies, between 1975 and 1977 the state implemented a series of water source protection laws restricting new growth and infrastructure development in about 27 municipalities – about 53% of the RMSP area in all directions except the western region (Anaconda 2002). The legislation had been developed without consultation with local governments and lacked any consideration for local socioeconomic conditions, and the results were disastrous. The land in areas closest to protected water sources experienced rapid devaluation, which led to more intense clandestine development by the urban poor, who already had limited availability to land due to high real estate within the city. Lacking the ability to monitor and implement fines for violating the laws protecting these areas for development, and prohibited from providing urban services, such as waste collection and water infrastructures, to these areas, municipal governments virtually had their hands tied. The result was even more intense water pollution, as the new communities essentially had no 'rights' to demand services in areas they were occupying illegally.

Ironically, despite the state claiming that the water source protection laws were necessary to clean up the Reservoir, it failed to make efforts to stop pumping the Pinheiros River, a major source of pollution, into Billings. The logic of energy production continued to be the fuel driving the state apparatus and producing contradictory policies that prioritized economic development over socioenvironmental concerns. By the end of the 1970s, communities around Billings had begun to get organized to protest the poor water pollution and, along with an international seminar in Brasilia in 1982 instigating more concrete articulation of integrated water management, *Operation Energética* finally ended and was replaced by a new regulatory regime - *Operation Sanitária* (Operation Sanitation) (Keck 2002).

Operation Sanitária was implemented in May 1983, involving a complete halt to pumping Tietê water through the Pinheiros River so that it was allowed to flow along its original course downstream into the Middle Tietê watershed. This created new sites of contestation as downstream communities were ill-prepared to receive a pollution load twice its former size, resulting in the loss of aquatic health, degradation of fishing resources and effects on public health, particularly in Pirapora do Bom Jesus where foam began appearing in greater quantities than it had in the 1970s (PBJ 1984). A group of 68 Middle Tietê watershed municipalities - from Pirapora and Santana de Paraíba, to Barra Bonita – formed the Association in Defense of the Tietê, and began to organize to pressure the government to continue to pump water through Pinheiros. The government, alarmed with the drastic effects that had resulted downstream and still faced with the fact that there was not yet any sufficient alternative to the energy that had been supplied by the Sistema Tietê/Billings, revised their original plan and adopted the so-called Operation “Balanceada” [Operation “Balanced”] in January 1984 (dos Santos *et al.* 1985; Emplasa 2003). In this program, pumping water to Billings resumed, but only at 50% of the volume that had been before Operation “Saneamento”. Thus, the state government was able to resume meeting the demand for energy, and the impacts of the pollution in the Pinheiros river could then be divided the equally between the two regions. Not until a decade later, when communities around Billings began to organize into a strong coalition to protect the Billings Reservoir from pollution, did the government finally decide to completely halt the Pinheiros pumping, and allow the river to continue its natural course sending all the pollution of the watershed downstream.

The period prior to 1992 marked an important twenty-year struggle in efforts to implement wastewater sanitation in the RMSP. The decision to build resource intensive water treatment plants under SANEGRA in inevitably led to a slow process constantly faced with a shortage of funds. By 1983, the Barueri treatment plant was still not complete and the implementation of Operation “Balanceada” was hoped to be a temporary measure until it could be finished (PBJ 1984). Studies done at the Billings dam during the brief period the Pinheiros pumping was stopped had produced surprising results indicating rapid recuperation of environmental quality, benefiting communities in the area and supporting the contention that it could be used in the future as a water supply

source (CETESB 1994). The progressive reform-minded water technicians that had supported the *Solução Integrada* continued to challenge the state on sanitation policy, particularly CETESB, which was involved in studying the effects of water pollution in Pirapora and Billings, and meeting with local communities affected by the foam. CETESB continuously reiterated, at conferences and regional discussion, that wastewater treatment was the “only correct alternative to solve the inconveniences generated by the sewage of the [RMSP]” (dos Santos *et al.* 1985:2) at conferences and regional discussions. Due to economic difficulties, however, SANEGRAN was stalled until 1992, when it was revived with a huge injection of foreign funds.

The shift to democratic rule in 1983 had led to increased space for progressive actors within the state, particularly in DAEE, to articulate ideas for water sector reform leading to the development of the watershed management system throughout Brazil. The principal agencies involved in the water sector – CETESB, DAEE and SABESP - had already been decentralized to regional or watershed units in an effort to increase efficiency and local responsibility (see Muñoz 2000). After the Rio Conference in 1992, there was a renewed interest in wastewater infrastructure and the state was able to secure money from the Inter-American Development Bank to complete the implementation of the rest of SANEGRAN, now named *Projeto Tietê* (Keck 2002). This came at the same time as a social movement organized by the environmental NGO - SOS Mata Atlântica - succeeded in obtaining over one million signatures pressuring the government to clean up the Tietê and protect water sources in the region. On September 4, 1992, the State Constitution prohibited the discharge of wastewater in ‘natura’ to Billings. Since the Pinheiros River was a major source of pollution, Operation “Saneamento” was officially reinstated, rendering the river diversion illegal and returning the river to its original course.³⁸

Projeto Tietê was begun in earnest in 1995 and the first phase was completed in 1998 with three new water treatment plants and an expanded capacity at the ETE Barueri,

³⁸ This was based on Article 46 of Disposições Transitórias da Constituição no Estado de São Paulo. It was later altered though Resolução Conjunta SMA/SES no.3 de 04/09/92 and Resolucao Conjunto SEE/SMA/SRHSO no.1 de 13/03/96 allowing the reversal of the Pinheiros River only for flood alleviation (Emplasa 2003).

as well as 1,800 km of sewer collector pipes.³⁹ It had counted on a total investment of US\$1.1 billion from the Inter-American Development Bank (IDB) (US\$450 million), the federal bank (US\$100 million) and SABESP (US\$550 million). According to a Projeto Tietê bulletin, collection of sewage in the RMSP rose from 70% to 80% of households while water treatment practically tripled from 24% to 62% of households, representing an improvement of 550 million litres per day of treated wastewater (SABESP 2004a). In 2002, Phase II began construction of 1,300 km of additional sewer pipes at an estimated cost of US\$400 million – half of which was financed by the IDB, and half by SABESP and the National Bank of Economic and Social Development. Predicted to be completed in 2005, it plans to increase collection and treatment to 84% and 70%, respectively, decreasing untreated sewage by an additional 300 million litres per day. There is a Phase III planned for gradual improvements in the capacities of the five water treatment plants throughout the city; however, based on the population projections for the RMSP, it will be at least twenty years before sewage treatment is expected to be at full capacity (FUSP 2002). With the end of Phase I there were significant improvements noted downstream in the Middle Tietê watershed. The reappearance of fish and aquatic life in some of these areas provided important sources of political and discursive support for the state project.

6.3 30 Years of Toxic Foam in Pirapora

The effects of the manufactured hydroscape of São Paulo and the slow progress of wastewater sanitation have resulted in a peculiar regime of local water management in Pirapora do Bom Jesus, consisting of palliative measures to reduce the quantity of foam in the river and to reduce the foul odours produced by the foam from the generation of hydrosulfide gases. Generally, this has evolved as part of an effort to minimize impact on the health of the local population; however, the maintenance of the tourism industry on which the city has historically depended on has been the dynamic factor influencing attempts to resolve the issue. In the thirty years that Pirapora has been plagued by

³⁹ This project actually has three parts – the improvement of wastewater treatment by SABESP, widening and dredging of the Tietê River by DAEE and improving industrial pollution control by CETESB.

noxious foam and gases, there have only been a few episodes significant enough to initiate discourse and action outside the local scale.

The foam first appeared in 1975 and, although it stretched almost 30 km along the Tietê River affecting neighbouring municipalities such as Santana de Parnaíba, Cabreúva and Itu, the effects in Pirapora were the most dramatic as foam reaching heights of five metres appeared to be “attacking” the urban center. Besides the noxious smells that were produced, it was noted by CETESB that the foam was “blown as far as riparian populations causing eventual problems to public health, as [...] diverse pollutants concentrate in the foam causing, besides public health problems, destruction to plants and vegetable gardens, [and] oxidation of metals” (Light 1979:2). As the foam demonstrated no signs of disappearing, an executive committee of federal and state agencies attempted to address the problem with cooperation from CETESB, SABESP, DAEE and Light.

As discussed above, on a physical scale, the foam is created as a result of turbulence at the bottom of the Pirapora Dam as the water drops 25 metres, which ‘shakes up’ the organic matter and sulfides creating foam and producing hydrosulfide gases. When the foam first appeared in 1975, CETESB concluded that the foam was attributed to the presence of a bioresistant synthetic surfactant - ABS⁴⁰ - used in the production process of detergents, which had been responsible for the appearance of sewage foam in Europe and the United States during the 50s and 60s. Brazil did not begin to produce ABS until 1971; by this time most of the industrialized countries had banned its use and replaced it with LAS,⁴¹ a biodegradable derivative, which, together with wastewater treatment, eliminated the appearance of foam (Hatamura 1995). In 1976, Brazil passed an Anti-Pollution Law that would prohibit the use of non-biodegradable synthetic surfactants after January 1981⁴² and Light suggested the installation of a system of *aspersores* (shower sprays) over the river to spray and dilute the foam as a palliative measure until the law came into effect (Light 1979). CETESB was adamant that the only solution was the wastewater treatment for all the whole Alto Tietê region. In any case, the *aspersores* project was never undertaken, perhaps due partly to the estimated cost of

⁴⁰ Branched alkylbenzene sulfonate.

⁴¹ Linear alkylbenzene sulfonate.

⁴² Introduced by the Minister of the Interior, Law No. 6360 was approved on Sept.23, 1976, and regulated by Decree No.79094 of Nov.5, 1977.

Cr\$5 million (Jul/79)⁴³ during a time when the state was already strained for funds to complete its flailing water treatment project (SANEGRAN), and perhaps due to the belief that the pollution laws and water treatment would remedy the problem in the next few years.

Not until May 1983, when Operation “Saneamento” was first implemented, requiring the Edgard de Souza and Pirapora Dam gates to be opened wider thus releasing higher volumes of water and creating greater foam-producing agitation at the bottom of the dam,⁴⁴ was the state forced to come up with a solution. Despite the new laws requiring biodegradable detergents, the increased volume of water in the Tietê resulted in high quantities of foam almost immediately in the area stretching from Santana to Barra Bonita, which interrupted local economic activities, primarily dependent on boating, fishing and tourism. By this time it was undeniable that the only solution was wastewater treatment; the harmful detergents had been replaced with biodegradable detergents, however, since the river water was completely anaerobic, it made biodegradation – a process that requires oxygen to stimulate the breakdown of the chemical compounds – impossible (de Castro & Martins 1984). When Operation “Saneamento” was reinstated in 1992, after having been aborted in favour of a program to reinstate half of the Pinheiros diversion, the resulting increase in foam was no longer shocking, and although the health risks and socioeconomic issues remained the same, the town appeared to have had somehow learned to cope with the poor environmental and socioeconomic conditions.

There were some measures taken during the 80s to limit the quantity of foam produced in Pirapora. With the collapse of SANEGRAN and the realization that the river would continue to be polluted for a number of years, it was evident that longer-term measures were needed to control the foam and the state began to undertake mitigative

⁴³ The Cruzeiro represented the Brazilian currency between 1942 and 1994, undergoing several conversions in response to the high rates of inflation. On July 1, 1994, it was converted to the Real with 1 Real = 2,750 Cruzeiros (CR) (“O Real: Histórico” www.portalbrasil.net/economia_real_historico.net [cited May 11, 2005]).

⁴⁴ The foam was much worse in Pirapora than it was in Santana, and this is often attributed to the relative heights of the dams – Pirapora is 25 metres high, while the Edgard de Souza dam is only XXm. A CETESB study demonstrated, however, that the higher levels of foam in Pirapora were not attributable to the heights of the dams; in terms of foam production, both had the same gravitational potential. The different results were attributed to the specific geohydrological drainage conditions at the base of the Pirapora Dam, where it was much narrower and not as deep (dos Santos et al. 1985).

actions. Eletropaulo, which had replaced Light, implemented emergency measures to reduce the foam using huge moveable pipes similar to those used for irrigation; eventually the company installed six water cannons that blasted the foam with water under high pressure (dos Santos *et al.* 1985). By 1994, after Operation “Saneamento” came into effect, Eletropaulo made alterations to the river banks near the dam to be able to support a flow rate of 700 m³/s instead of 480 m³/s, and a diversion tunnel was built alongside the dam to allow another 570 m³/s to be released directly downstream, thus avoiding turbulence caused by the vertical drop. In addition, the Pirapora mayor and Eletropaulo developed a system of regulation based on the goal of minimizing the impact to the tourism industry – the dam would close on the weekends, particularly Sunday, avoiding the presence of foam and noxious smells that had already proven to be a deterrent.

Throughout this period, CETESB studied and monitored effects in Pirapora do Bom Jesus where the problem of odour and foam had “become insupportable” and its research repeatedly concluded that the foam was extremely toxic and gases were creating problems for human health. Bacterial studies in 1983 demonstrated that the foam samples collected in front of the dam had fecal coliform concentrations more than 100 times the concentration in the river water (de Castro & Martins 1984). The foam also showed high concentration ratios of oils and greases, and heavy metals (aluminum and iron) ranging from 71 to 86 times the concentrations in the river. CETESB technicians concluded that, due to the extremely toxic levels in the foam, there was a great health risk for households living along the margins of the river, and recommended that the foam be removed or abated (Hatamura 1995:19). Workers who had been working near the river were already reporting headaches, nausea and vomiting.⁴⁵ Data from the medical clinic in Pirapora found that in the last semester of 1983 there were four major health issues reported: problems with respiratory organs, digestive organs, skin protection, and vision, including the observation of “some burning due to contact with the polluted water (first degree burns).”⁴⁶ Considering that in windy conditions the foam easily floated in the air,

⁴⁵ This information is based on a series of reports of local conditions in Pirapora in 1983 found in the CETESB library archive.

⁴⁶ Letter to the Mayor of Pirapora do Bom Jesús from the Medical Post doctor (illegible signature), dated January 12, 1984. This was found in the above noted documents available at CETESB.

into kitchens, houses and streets, the risks to the health of the population could be considered significant enough for concern.

Although the foam was disturbing, the hydrosulfide gases produced by the foaming process were a greater cause of concern. At the time, Brazil did not yet have any regulation standards for H₂S whereas other countries had established threshold limits, generally accepted to be between 0.005 ppm and 0.1 ppm. In Pirapora, the data showed that in some months, the recorded concentration of H₂S was as high as 0.37 ppm, exceeding a standard of 0.005 ppm as much as 32% of the time (de Castro & Martins 1984; CETESB 1994). In a qualitative survey of the riparian communities in Pirapora and Santana, 100% found the odour to be the most significant issue affecting their communities and 80% complained of frequent headaches (CETESB 1983). Significant correlations were found between the number of clinical visits for respiratory issues and the concentrations of H₂S in the air, as well as with the periods when the dam doors were open, indicating that the H₂S was produced as a result of being released at the dam rather than other environmental factors (Gaddini 1984). The studies all concluded that the river foam in Pirapora was likely to produce serious human health risks.

Perhaps the most surprising aspect of the foam issue was the lack of any significant citizen's movement. In its qualitative surveys, CETESB pursued a secondary objective of identifying the presence of popular mobilizations in Santana and Pirapora. Presumably this was a result of the internal pressures to enhance democratic participation, and the transitions that were occurring in the state at the time, but also the fact that many of the water reformists were within DAEE and CETESB.⁴⁷ In a survey of 100 citizens in each of Santana and Pirapora, CETESB researchers found that:

“In both municipalities, the attitude of relative apathy and demobilization in relation to the problem [of foam] is very visible in the interviewees. The virtual absence of other local problems identified by the interviewees

⁴⁷ The state government appointed Werner Zalouf, an environmental engineer, to be President of CETESB in 1982. Zalouf was known for being dedicated to progressive politics surrounding pollution control, and, in his leadership role, he began to restructure the agency (Lemos 1998). A principal change was the integration of technical personnel and social scientists within CETESB who, prior to 1983, had never worked together. As a result of these new relationships and new ways of looking at environmental pollution research and action, CETESB became a significant facilitator of urban environmental movements in the state; the Cubatao Pollution Control Project, organized by CETESB during this period, resulted in actions to implement stronger pollution laws and reduce pollution in the industrial hotspot of Cubatao.

is illustrative [of this]. This attitude, while denoting that the social problems and infrastructure in these municipalities are less grave than those found in the big cities, also demonstrates an incipient level of consciousness in this community concerning the importance of collective action for the resolution of their problems. In this mode, they tend to accept with greater facility the paternalistic conception of exclusive responsibility of the State for the solution of social, urban and environmental problems” (CETESB 1983:25).

By 1985, aside from the river foam, there were other issues that interviewees reported as important problems, namely water shortages, unemployment and the mosquito infestation that had recently appeared (CETESB 1985). This indicated that the presence of the foam and odours was producing wider social repercussions to the community.

In 1997, the newly elected mayor of Pirapora, Miguel Bueno, eager to address the health and economic conditions of the town, succeeded in pressuring the State Secretary of Sanitation and Water Resources to initiate a study of alternative solutions to the water cannons, which had not demonstrated success in reducing significant quantities of foam.⁴⁸ The Technological and Hydraulic Centre Foundation (FCTH), along with SABESP and Eletropaulo, opted to install the sprinkler (*aspersor*) system that Light had recommended in 1979. Originally, the Light project had planned to use the river water as a source for the spray, however, realizing that this might result in the production of even more foam, SABESP sourced clean water from a small stream nearby.⁴⁹ The R\$565,000 (CAD\$251,000) project was completed on May 17, 1998, by SABESP. Although Eletropaulo had taken responsibility for resolving the foam issue during the 1980s, the State now made SABESP responsible for the construction and operation of the sprinklers. The reasons for this were rumored to be essentially political,⁵⁰ although it might also be attributed to SABESP’s responsibility for wastewater treatment defined in its concession contracts with the municipalities.

⁴⁸ Letter from Paulo Roberto Borges, Superintendent of U.S. Guarapiranga, SABESP, to Dr. Waldemir Félix de Castro, Superintendent of Southwest Distribution, Eletropaulo, dated June 20, 1997.

⁴⁹ They also investigated the viability of using chemical products to maximize the efficiency of the spray, however, luckily, this project was abandoned due to economical and ecological issues (SABESP interviewee, personal communication).

⁵⁰ SABESP interviewee, personal communication.

By 2003, the foam continued to appear on a yearly basis though not with the same intensity it had in the periods following 1975 and 1983.⁵¹ The mayor's office communicated regularly with the operators of the Pirapora dam, now under the control of the Metropolitan Enterprise of Water and Electricity (EMAE), to ensure the dam's doors would close at least on Sundays, when the majority of tourists were in town, and during special events.⁵² The doors would open again on Monday to relieve the reservoir of its accumulated water level, producing high quantities of foam and extremely strong smells that would stabilize by the end of the week. There had been rapid population growth over the last twenty years centred in neighbourhoods higher in the hills that were relatively cut off from the traditional town centre, and far enough from the river not to experience the discomforts and potential health risks of the foam. Economic diversification had intensified, primarily in industrial parks, although tourism was still a foundation, primarily for the traditional center where the only jobs were within city hall administration or the hotels and commerce that mainly catered to tourists and were mostly only open on the weekends. The foam continued to leave black stains on the houses by the river and oxidize metals, such as statues; these were cleaned and repainted regularly. Many residents continued to complain of respiratory problems although no comprehensive health studies had yet been undertaken.

On June 28, 2003, newspapers throughout Brazil and internationally reported that foam reaching as high as five metres was plaguing the town of Pirapora, spreading onto streets and creating health issues. The levels of foam had actually begun increasing dramatically as early as April and had already overflowed onto one of the bridges that divide the town's centre, as well as onto the children's playground. This was one of several similar events over the past twenty years, however, it was the first time that international media had picked up on it and the result was a national and international media hype highlighting the "attack of the foam".

The foam was partly produced by natural events. The year 2003 had been the driest in almost 66 years, creating a higher concentration of pollutants in the water (CETESB 2004). Due to the impermeability of the subsoil throughout the RMSP, when

⁵¹ This paragraph and the one following it are principally based on personal communications with residents and staff working for the municipality of Pirapora.

⁵² Paulo Brito Phillipe, personal communication.

it rains the rivers fill up quickly and the gates at Pirapora have to be opened much wider to relieve the Tietê/Billings System. In 2003, because there was a higher concentration of pollutants than normal, when rain did fall and the gates were opened, the result was a greater production of foam.

There were also institutional factors that functioned to limit control of the foam levels. The sprinkler system, operated by SABESP remotely from Lapa, had fallen into disrepair and was functioning inefficiently as well as infrequently. At the time, it was only operating for a maximum of five hours per day in dry seasons (May to December) and twelve hours per day in rainy seasons (January to April), mostly during the evening (PBJ 2003). These norms arose from the need to limit the use of the nearby water source for the sprinklers – a stream which was already approaching dangerously low levels – and observations about the times of the day that foam, and gases, were likely to be in greater concentrations. In contrast to the SABESP norms, however, the gates of the dam operated by EMAE would often be left open for up to 24 hours, so that foam would still be produced during the times the sprinklers were not functioning. Until then, neither EMAE or SABESP had apparently attempted to communicate with each other about their strategies or operations as it related to the foam.

A civil action lawsuit was initiated against SABESP by the Public Attorney in Barueri on June 26, 2003 (Lyra 2003).⁵³ The lawsuit was based on the reports of health risks and economic losses due to pollution created by the foam and gases, referring to Article 46 of the State Constitution that required the State to communicate with the municipal governments that would be affected by the decision to end the Pinheiros diversion, and alleging that no consultations had taken place, thus making SABESP and the State liable for the local conditions. In July, the judge ruled in favour of the lawsuit, requiring SABESP to pay R\$100,000 (CAD\$44,500) in damages to the municipality for every day the foam overflowed onto streets and bridges.

Throughout July there were visits to Pirapora by Governor Geraldo Alckmin and the Secretary of Water Resources, Mauro Arce, and meetings between the mayor,

⁵³ Although the Public Attorney claims to have instigated the action without having been approached by concerned citizens, and that the action itself directly led to the resulting media attention, which is possible given the it was instituted a few days prior to the first media reports, no other interviewees involved with the issue confirmed this. In fact, there were various speculations as to how the media became involved, including comments that a city councilor called the media directly. This was impossible to confirm.

SABESP and EMAE to try to resolve the issue. EMAE announced to the media that they planned to retrofit the Pirapora and Edgard de Souza Dams as small hydroelectricity generators⁵⁴ proposing to reduce the foam through some operational process. There was little information given on these plans and EMAE admitted to merely being in the initial study phase of the project. SABESP also did some studies on alternative methods of using the sprinklers, making overdue improvements to the equipment. In the end, the Governor provided funds so that a small-capacity primary water treatment station could be built and the treated water could be used to supply the sprinklers with water so that they could function 24 hours per day. He also promised to paint the houses facing the river in preparation for Pirapora's annual celebration in August, provide temporary health service workers to accommodate the increased clinical visits, and create employment opportunities in the public works projects that would be involved.

There were a few demonstrations against the pollution, but they were not instigated by the residents. One was organized by the Movement in Defense of Life (MDV) and SOS Mata Atlantica, both of whom had been proactive in the movement to clean up Billings and were most active in the Gurapiranga and Billings subcommittees. Based on local media reports and comments by residents, the public demonstration was not looked upon favourably by Pirapora residents, particularly the mayor. The municipality reportedly attempted to have the demonstrators removed, claiming they were disrupting the peace. Local newspaper reports claimed that the agitators were not associated with anyone in the town, and that the attention they were drawing was affecting Pirapora negatively. Some residents felt that they were "scaring tourists away."⁵⁵

Part of the antagonism towards the demonstrators may also be attributed to the political discourse that essentially placed Pirapora and the Pinheiros-Pirapora region in direct conflict with the ABC region – where the Guarapiranga and Billings Subcommittees were located. The state government took advantage of the opportunity to highlight two of its projects whose successes were threatened by politics in the ABC region, and which presented high economic stakes for the state. Project Tietê promised to

⁵⁴ At the moment the dams merely function as flood control elements in the Sistema Tietê/Billings.

⁵⁵ These issues were brought up in various discussions with local residents.

clean up the river so that by the end of 2020 it would be completely clean. The problem, according to the state government, was the 7 municipalities in the RMSP that did not have water services concession contracts with SABESP; thus, the responsibility for ensuring that sewage collector pipes were linked up to the water treatment plants being built lay with the municipality. Considering the high volumes of pollution derived from these areas, without their cooperation in water treatment, the Tietê River would estimate to never be clean (FUSP 2002).⁵⁶

The governor also used the opportunity to promote the Flotation Project, which was anticipated to begin testing in July, and had been opposed vehemently by the Billings Subcommittee. The Flotation Project promised to clean the Tietê River and resume the Pinheiros diversion in order to enhance the production of energy at the Billings dam through a process of precipitating pollutants out of the water with chemicals. The project had been stalled since 2001 due to protest by environmental and political groups from the Billings area who have not been convinced that the project would be successful in depolluting the river. In Pirapora, it was felt that, should the Flotation Project prove to be successful, the foam would be directly eliminated or reduced since the river would again be permitted to be pumped to the Billings Reservoir, effectively reducing the volume of water that would reach Pirapora in the Tietê River.

The water treatment station was completed in September 2004, only one year after international media attention had ‘put Pirapora on the map.’ There is an inescapable irony in the fact that Pirapora’s water will be “100% treated” in order to produce clean water to spray the foam and effectively reduce the local impact of the lack of water treatment in the RMSP. Local media reports hail the mayor as a local hero for his role in achieving state government intervention.⁵⁷ There is also a certain amount of pride within the town for the increased attention it has received by the media, academic researchers

⁵⁶ The antagonism may also be partly derived from the political parties of the two regions; whereas the ABC region was dominated by PT politics and municipal administrations, the Pinheiros-Pirapora region did not have a strong PT presence and the PSDB, to which the state governor as well as the Pirapora mayor belonged,

⁵⁷ It was claimed that the mayor had close connections with the state governor, and that the latter had visited Pirapora on the mayor’s request. It is also likely, however, that the state governor’s involvement was fuelled by the objective of maintaining good public relations about the Project Tietê, which had already claimed to have achieved reductions in Tietê River pollution. The Public Attorney’s legal action, and the media’s involvement, may have contributed enough threat for the state governor to deal with Pirapora.

and foreigners.⁵⁸ Yet, there was also a general lack of optimism that the Pirapora water treatment plant would solve the problem and that greater interventions were necessary outside of Pirapora and the Pinheiros-Pirapora region.

⁵⁸ I heard reports of foreign reporters, scientists doing water studies, academics doing research on potentials to increase tourism, including one plan to have “glass” boats traveling on the river through the foam.

CHAPTER 7: THE ROLE OF THE PINHEIROS-PIRAPORA SUBCOMMITTEE IN ADDRESSING POLLUTION IN PIRAPORA

During the introductory speeches at the first meeting of the SCBH-PP on September 15, 1998, the problem of Pirapora was framed as a public health issue that had the potential of being addressed within the participatory and collaborative space of the subcommittee. From the outside it is relatively surprising that the SCBH-PP was not mentioned in any of the newspaper reports regarding the extreme foam event in 2003, nor did the Pirapora mayor, who was the President of the subcommittee at the time, articulate any relation to the subcommittee. It would appear as if the SCBH-PP was not involved in contributing to resolving Pirapora's issue even though it had achieved some symbolic representation in the subcommittee's discourse. This chapter explores whether the SCBH-PP played any role in attempting to resolve the water pollution problems in Pirapora, and what the perception is – both within and outside of the subcommittee - of the role that it *should* and *can* take.

7.1 The Contribution of the SCBH-PP in Pirapora

Closer analysis of the SCBH-PPs activities reveals that there had been many discussions about Pirapora, not so much within the political forum of the committee, but in the technical committee. The mayor and his representatives from the Municipal Secretary of Health continuously pushed the issue, as well as the municipal representative of Santana de Paraíba, an urban planner, where foam was also a problem though not to the same degree. However, the discussions were usually symbolic rather than action-oriented. The only real action was in the form of FEHIDRO funding for two municipal proposals totaling almost R\$250,000 (CAD\$111,000) during the 2003/2004 term. The first project was proposed in 2003 at about the same time as the foam issue was beginning to attract media attention. Of six projects proposed that year, the Pirapora mayor - in partnership with SABESP - was granted 30% of the total available FEHIDRO funding for the fiscal year. The project involved the installation of automatic sensor cameras near the town. These sensors would be linked to SABESP's headquarters in

Lapa and signal to the regional office if high foam levels were detected. SABESP could then respond by turning on the sprinkler system and communicating with EMAE to close the dam doors. Recognized as being a palliative measure, the project was considered to be an “emergency” response and was approved despite having to reduce funding to other projects.⁵⁹

The second project was proposed by the Municipal Secretary of Health, and was approved in 2004 for R\$51,000 (CAD\$22,700) to implement an environmental education ‘nucleus’ in the town. The project involved implementing a program in local schools to use indicator plants as a means of measuring air pollution caused by the river. It was envisioned that at the same time as students would become aware of local environmental impacts, they would also be contributing to systematic collection of data on pollution that had never yet been undertaken (Luiz Sano, personal communication). Environmental education did not exist in Pirapora and, although it was common community discourse that “toxic foam” was causing health and socioeconomic problems, there had been few local projects of “empowerment.” Currently the project is being analyzed by FEHIDRO agents and there is a fear that it may be canceled due to narrow views of what FEHIDRO considers to be ‘educational’.⁶⁰

Interviews with SCBH-PP members revealed contradictory perspectives about the role of the subcommittee in Pirapora. There was some confusion about what the project in 2003 actually entailed with a few interviewees believing that they had contributed to the construction of the wastewater treatment plant either through directly funding it or through promoting the idea within the discursive space of the technical committee, which led to the mayor proposing it to the State Governor.⁶¹ Others believed that there had been no real effort of the committee to address the issue; although they did feel that the camera project was necessary, there was also awareness that the problem would not be resolved without sewage treatment in the RMSP.

⁵⁹ The reduced FEHIDRO funding left over for the other projects in the subregion resulted in the reduction of one of the proposed Carapicuíba projects, which resulted in a lot of controversy and discussion by representatives as well as external actors from the municipality and local civil society groups.

⁶⁰ As the project involves collection of data, FEHIDRO agents feel that this project should not be classified as “environmental education” meaning the proposal would need to be modified to satisfy scientific technical criteria (Luiz Sano, personal communication).

⁶¹ One member claimed responsibility for the idea of using treated water for the aspersores rather than the exploiting the stream’s water. Other members interviewed denied this.

Part of the reason for the confusion could be the fact that everyone wanted to “do something” about Pirapora and thus the project was approved with little discussion in the technical committee; most of the discussion focused on changes they would have to make on other projects. The same day that Pirapora made the front pages of the national press, the subcommittee plenary was meeting to approve the projects based on the recommendations of the technical committee. Based on the minutes, there was no real effort to discuss the issue in the political space of the plenary. One of the representatives of the environment sector attempted to initiate discussion, however, a SABESP representative indicated that this issue had already been discussed in the technical committee and the project they had approved represented the palliative measures they could take. Most of the plenary discussion was focused on Carapicuíba’s environmental education proposal, which had only been granted half the funding it requested. Members linked to the project, as well as community activists, had attended the plenary to debate this reduction, although no attempt was made to discuss reducing funds to the Pirapora project. With the public profile of the foam at the time, it could be assumed that no one was willing to challenge it by debating the usefulness of the Pirapora project. Thus, there was no real discussion of the costs and benefits of the Pirapora project and, from the variety of responses from interviewees, it is clear that participating members left without a clear idea of what they had actually approved. In this scenario, members could have easily associated the ETE Pirapora that Governor Alckmin announced a few days later as the same project they had approved in the SCBH-PP.

Despite interviewees’ claims that the SCBH-PP had been involved in the project, no one (outside of Pirapora –based members) knew whether any advancements had been made on either the ETE Pirapora or the actual project that was approved by the SCBH-PP – the camera monitoring system.

There was also some division in ideas about the role the SCBH-PP *should* take in Pirapora both by inside and outside actors. There were few inside actors that felt the SCBH-PP should take a more active role. Most of the outside actors that felt it should take a role had had no direct participation in the SCBH-PP, thus believed in the normative ideal that it would be a space of collaboration to resolve regional water problems. It was generally felt, since the relevant actors were in the subcommittee –

SABESP, EMAE, municipalities and environmentalists – that the SCBH-PP represented a vital discursive space where the real problem of sewage treatment could be addressed. The reasons cited were based on one or all of three assumptions: 1. that the fault for delays in water pollution control lay with SABESP for not investing in infrastructure and water treatment, and that the subcommittees would be able to put pressure on it to increase coverage; 2. that the reason for SABESP’s lack of adequate infrastructure development lay in rapid urban development growth without coordination between municipalities and SABESP to ensure adequate infrastructure, thus the subcommittee would provide the platform for collaboration to take place; and 3. that the cause of the pollution originated *outside* the subregion, particularly from the municipalities that did not have concessions with SABESP, and the SCBH-PP could put pressure on other subregions to implement wastewater treatment.

In general, however, inside actors were already disillusioned with the prospects for resolving wastewater treatment through the SCBH-PP. One of the principal attitudes was that within the subcommittee, the discursive space was dominated by narrow, individualistic agendas where no one really wanted to talk about sewage treatment.⁶² The other view was that the problem was beyond the abilities of the SCBH-PP because either it had no *power* to put pressure on the RMSF or it really did not have a legitimate role to play outside of the subregion

7.2 The Politics of Representation and Scale

One of the main criticisms by state and (technical) municipal representatives is that the civil society actors that participate actively in the SCBH-PP have very narrow agendas and an inability to “think regional,” as well as a lack of technical knowledge and experience to participate effectively. There were only two civil society members identified by interviewees as having made a significant contribution to the SCBH-PP; both were part of respected and broadly represented organizations with strong ties to

⁶² This comment by interviewees was invariably accompanied by the expression “sewage does not win votes.” This experience could be contrasted, however, with the experience in the adjacent Sorocaba – Middle Tiete Watershed Committee where water treatment projects have been credited for boosting local political power (Brannstrom 2002).

communities and active participation on other forums in the RMSP. The factors credited for their “good participation” were their capacities to participate (knowledge of water resources issues) and dedication to the “objectives” of the subcommittee (regional vision and topic setting). It is clear that within the subregion Pinheiros-Pirapora there appears to be less experience with participatory governance than other subregions, such as the Billings-Tamanduatei subregion where local activists have been involved in water resources management issues since the 70s. This suggests that *development of participation* as well as knowledge of water resources issues is necessary in order for the space to be effectively participatory. Yet, there were strong reactions, particularly from state members, that they were not willing to invest the time and energy needed to develop this capacity.

This implies that there is an expectation that those ‘elected’ to serve as representatives to the SCBH-PP will be so based on their capacities to work in collaborative environments and experience in water resources issues. A closer look at the elections process, however, reveals that there is very little from which to draw this conclusion. There is very little information recorded on discussions that take place at the elections or criteria used to make selections. In many cases, there are few to no contenders for the position (such as university representatives), thus the representative wins by default. It may be that there a variety of reasons that influence the elections, including political power or organizations present on election day, resulting in representatives that are elected for reasons that may not have to do with regional visions or water resources protection for the greater good.

Most of the participation of civil society members in the 2003/2004 term appeared to be centred on the highly politicized issue of the Lagoa de Carapicuíba. This issue had been raised since the first SCBH-PP term (1998-2000), and the discussion finally came to a conclusion in mid-2004 after a Working Group was created to focus on it. Although state and municipal members from Pirapora and Santana claimed to want to discuss the foam issue, they claimed that the civil society representatives were only interested in Carapicuíba and tended to drive the debate in the SCBH-PP. Some civil society representatives were noted for being very confrontational, taking control of the discussions and preventing other representatives from discussing topics relevant to them.

On the other hand, civil society representatives felt that the subcommittee was the only place where they could have some power to address local issues with municipal and state representatives. In the case of the Lagoa de Carapicuíba where the state had begun dumping mud dredged from the bottom of the Tietê River, there had earlier been no attempt to consult with local communities. Civil society representatives and local political parties were able to use the SCBH-PP to gain access to municipal actors and state agencies that had earlier refused to communicate, and used the space to create pressure for collaboration. This was facilitated by strong networking with the community, other civil society organizations and key municipal actors. Thus, although civil society was criticized for “directing the agenda” and lacking the technical capacities to participate, through their determination, they were able to facilitate collaboration on a contentious water resources issue and ensure that state actors adequately addressed environmental protection.

The Carapicuíba case demonstrates that capacities to participate in the SCBH-PP may not necessarily be dependent on participants’ technical knowledge but on their abilities to obtain power within the subcommittee. It also demonstrates that participation of civil society may be key to securing local benefits, particularly if there is no local participatory space to influence policy process. Many of the civil society actors in the 2003/2004 term were active in the Carapicuíba region or were interested in the issue so there was already a common objective could unite representatives, helping them to “direct debate”. In contrast, there were no civil society actors from Pirapora in the SCBH-PP to foster the same type of directed action nor was there any form of participation evident through networking. None of the civil society members interviewed had any network connections with Pirapora. In the database of the SCBH-PP there is only one civil society group registered from the town that, by the time of my research, no longer existed. The absence of local civil society action may be a principle reason why the foam problem has not had more effective articulation in the subcommittee. Given that the spaces of engagement of civil society organizations have not appeared to extend to all groups in the region, it is difficult to conclude that there is anything more than discursive representation.

Representation of the state is highly questionable as well despite claims to be willing to talk about the foam issue. Theoretically they should be able to ‘represent’ their agencies’ activities in the region, yet, in 2003, when the Pirapora foam became a critical issue, there was no attempt to obtain information and introduce it to the subcommittee by either SABESP, CETESB or EMAE. Technical agents responsible for resolving the issue in Pirapora did not have any reported communication with their organization’s subcommittee representative. EMAE, for example, was quoted in media reports as having plans to create small hydroelectricity dams in Pirapora and Santana that they hoped would also serve to eliminate the foam issue, yet, there is no indication that this was ever brought to the attention of the subcommittee. This is not surprising considering experiences in the CBH-AT where the state has demonstrated its unwillingness to highlight projects that could be polemic. There is still a very strong state-centralist attitude that prejudices the democratic and participatory legitimacy of these committees.

The lack of participation or representation in Pirapora is not an issue that has been addressed in the subcommittee, although no one appears to be under the assumption that ‘true’ representation exists. There have been no initiatives by any of the sectors to address inequalities in representation across sociopolitical space or regional scale and there are strong assumptions that where there is conflict, civil society will organize. The SRPP is the only region where prior significant popular movements or regional organization did not exist (Alvim 2003).⁶³ In conditions where local politicians do not foment this type of experience in political participation or where there is little empowering knowledge of these processes, it might be naïve to expect self-organization (Jacobi 2004; Posner 2003). Without recognition of power, heterogeneity and ‘exclusion’ in representative watershed governance, participation becomes rhetorical and only serves to empower “power over” rather than “power of” (Kujinga & Manzungu 2004; Johnson & Wilson 2000; Perrons & Skyers 2003).

The presence of ‘true’ representation does not necessarily imply that the water pollution in Pirapora would have been better addressed. There is another problem related to the politics of scale and the perception of the subcommittee relative to the scale of the

⁶³ The other subcommittees were implemented in conditions where there were grassroots popular movements, intermunicipal consortia or high incentives for such organization, particularly in relation to water source protection planning.

RMSP. There is general agreement that the problem of water pollution in the region will not be addressed until all the upstream municipalities implement wastewater treatment. There is belief that the issue is already addressed by the state with Projeto Tietê. Although many also feel that a significant problem is the municipalities that do not have concessions with SABESP and have very little wastewater treatment, there is a general expectation that the CBH-AT will adequately account for and address these subregional differences. The discursive ‘framing’ of the issue as being beyond the reach of the SCBH-PP essentially disempowers action within the subcommittee.

The belief by actors outside the subcommittee that the SCBH-PP could act as a representative for the subregion within the CBH-AT framework is currently not realistic. As described earlier, the CBH-AT is not organized to encourage subregional representation except by mayors, who are (legitimately) accused of only representing their own interests. There are only three civil society representatives within the CBH-AT based in the Pinheiros-Pirapora subregion; most of the representatives are from the ABC region where popular participation has tended to be much stronger. Thus, there is an overrepresentation of one region over another. The assumption that civil society representatives will ‘represent’ the sector for which they were elected – such as *all* neighbourhood organizations across the RMSP – lacks a critical understanding of the extremely heterogeneous socioeconomic and political conditions that exists within each sector. In addition, there is little systematic communication between the CBH-AT and its subcommittees. Neither institution comprehensively reflects on decisions taken in the other, despite some topics having significant relevance – for example, the Flotation Project was only recently discussed in-depth by the SCBH-PP even though it had been a topic of discussion in the CBH-AT and other subregions for a number of years.

The CBH-AT has already been noted to be dominated by discursive representation rather than constituent representation (Keck & Jacobi 2001). This strongly limits the opportunities for Pinheiros-Pirapora groups to be represented by their sector representatives unless they are actively involved in networks with representative organizations. If, as I argued earlier, participating members in the committees can only be considered situated individuals where their discursive interactions are determined, in large part, by spaces of dependence and engagement, as well as intersubjective dynamics,

then the outcomes of these processes result in a production of scale that may not physically or distributionally ‘reach’ the limits of the watershed. Thus, the exclusion of local civil society in Pirapora from both direct participation and networked participation means that they lack influence to *expand the scale* of the SCBH-PP. Although the Pirapora mayor has a strong political role and has been able to achieve some benefits for the town, there has been little effort to extend access (and knowledge) of the SCBH-PP or to encourage participation and networking by local civil society.

The perception of scale may also be an important factor in the SCBH-PP lack of direct action in Pirapora. None of the inside actors interviewed felt that the subcommittee should take on a role to ‘represent’ the subregion to the rest of the RMSP. The principal reason given was that the objective of the SCBH-PP is to deal with ‘subregional’ issues, while the CBH-AT would deal with wider-scale water resources issues. Yet, this ignores the integrative function of rescaling water management to the watershed for which the CBH-AT was designed. The subregion is only part of this watershed where social and hydrological processes are mutually constitutive within and between municipal borders. Many problems within the SRPP can be linked to socioeconomic and hydrosocial processes happening upstream, including urban development and water pollution. Aguilar & Ward (2003) demonstrate that human and social development within peri-urban regions is highly uneven and the lack of research of these changes masks extreme inequalities across scale.⁶⁴ Without a conceptualization within the subcommittee of its position relative to the scale of the watershed, it runs the risk of being marginalized in decision-making processes in the CBH-AT and loses its opportunity to access political space for which to pressure for improvements in a subregion that has been one of the most drastically marginalized from the socioeconomic benefits of the RMSP’s urban development process.

⁶⁴ For example, most research might compare a peri-urban community to average metropolitan indicators masking trends in internal movement of people and capital (Aguilar & Ward 2003). Other techniques would be to assess access to public services by analyzing schematic maps instead of using percentage of coverage (Silva 2000). By adopting this perception, studies within the subregion would be more ‘empowering’ in terms of knowledge of difference across geographic scales.

CHAPTER 8: CONCLUSIONS

This research has explored the politics of representation and scale within and outside the Pinheiros-Pirapora Watershed Subcommittee. The primary role of the watershed committee system in São Paulo is to create a space of articulation between the state, municipalities and civil society to sustainably manage water resources. In Brazil, this institutional restructuring marks important progress as, until the 1980s, power over water resources was centralized in state governments and the authoritative state, resulting in a lack of coordination between land use planning and water management. In the RMSP, the state's preoccupation with generating energy to fuel industrial growth led to a complete redesign of the natural hydraulic elements in the Alto Tietê Watershed, drastically altering the hydrosocial relationships within the region. Dams, canals and diversions were constructed to control water flow; floodplains were exposed initiating large-scale settlements on unsuitable land, degrading local economic and health conditions; pollution was pumped directly into the water reservoirs; and, sanitation and health became secondary concerns to energy production. The manufactured hydroscape of Sao Paulo is thus intimately connected to the patterns of urban development that have largely resulted in marginalization of a significant proportion of the population.

In the RMSP there is a rapidly transforming peri-urban area that has lacked metropolitan-wide coordination of land use planning and urban services provision. While some peri-urban areas have been forced to absorb the large groups of urban poor that have been pushed further outside of the core (by high land prices and lack of access to land tenure), others have gained in economic wealth due to the concentration of exclusive elite neighbourhoods. Thus some municipalities and regions within metropolitan São Paulo, although they share a common bond in their struggle with the hegemonic power of the core, are redefining their relationships vis-à-vis each other where many are finding themselves even further excluded from accessing the socio-economic benefits of urban growth. Collaborative and participatory approaches that expand access to political power to marginalized groups or geographies can help to redistribute socioeconomic benefits providing benefits that have the potential to drastically alter local realities. However, particularly in Sao Paulo, where there are large proportions of the population that do not

have access or experience with democratic participation, there is a limited ability to participate in influencing policy processes under current systems of structural inequalities that fail to eliminate power even in participatory spaces (Fraser 1992; Silva & Machada 2001). Thus, while the Alto Tietê Watershed Committee has proven to be the only successful metropolitan-wide institution providing space for peri-urban areas to articulate and influence decisions over water, it exists under exclusionary practices that lack reflection and redefinition of representation and scale.

The questions of who has (or does not have) access to the political space of the watershed committees in the RMSP and what are the implications for the redistribution of power over water decision-making across geographic scale have proven to be very significant in considering the cases of the Pinheiros-Pirapora Subregion and Pirapora do Bom Jesus. It is true that because the Pinheiros-Pirapora Watershed Subcommittee existed, the Pirapora mayor was able to gain access to political space to articulate about the water pollution problems in Pirapora. This has most likely served to expand knowledge of the issue and create conditions of partnerships with other groups through networks with relevant state and municipal representatives. Yet, the presence of the Pirapora mayor in the SCBH-PP has not been accompanied by local civil society participation and there have been few attempts by groups participating in the SCBH-PP or the mayor to stimulate participation from Pirapora residents.

From these processes it is clear that the political construction of scale (Brenner 1998) has resulted in the effective *exclusion* of Pirapora despite the physical scale in which the SCBH-PP is supposed to operate. Representation within the subcommittee does not extend its scalar reach (Cox 1998) to include local civil society either through networks or facilitation of direct participation. The identification of ‘stakeholder groups’ who democratically elect representatives theoretically legitimates these actors to deliberate as if they were speaking for their constituent. Yet, evidence in the SCBH-PP demonstrates that there is very little constituent representation; there is virtually no effort by representatives – state, municipal and civil society - to communicate with who or what they represent. Instead, representation is discursive (Keck 2004) where each member participates as individuals with place-specific, context-dependent opinions.

The production of scale through these intersubjective participatory processes not only results in a narrow scalar reach within the subregion but it also affects the perception of scale by the SCBH-PP's in terms of its position and role within the CBH-AT. The institutional construction of the CBH-AT limits the abilities of subregion's to be adequately represented on the larger watershed scale and lacks any structural incentive for subregions to interact with each other. Representatives in the SCBH-PP lack a vision of how they can improve local conditions (that are invariably influenced by extra-local activities) through using the watershed committee system as a space for articulating subregional interests. This is a significant loss of opportunity to redistribute power and influence over policy within the metropolitan region, particularly for a subregion that has been greatly effected by centralized hegemonic processes that have governed the Sao Paulo hydroscape for over 100 years.

Two examples demonstrate why this might be important. First, if the Flotation Project that has been proposed by the state government to “clean” the Tietê River so that it can be diverted once again through Pinheiros to Billings is implemented, there are possibly significant positive benefits for the Pinheiros-Pirapora Subregion as there would be a greatly reduced quantity of (polluted) water entering the region. The Pirapora mayor has been bringing this to the attention of the SCBH-PP as it has special significance for reducing the foam pollution in his town. There are, however, serious concerns with the environmental consequences of the project and communities in the Billings and Guarapiranga areas, and environmental organizations have been very active in opposing it. The lack of participation of the SCBH-PP in these debates limits the development of knowledge of the issues by its members and representation of diverse views within the subregion that do not have access to external networks. The second example is the implementation of the water pricing schemes. The CBH-AT will be the deliberative space for the determination of watershed investment priorities – how the money will be spend and where. Since the SCBH-PP lacks significant representation on the CBH-AT or influence within the Alto Tietê, there is currently limited opportunities for it to articulate needs for the subregion. Investments in the subregion will be based on the outcomes of the discursive process of the CBH-AT that will depend on who is involved and the interests they represent.

It is not expected that the SCBH-PP should have reached the ideal of 'true' representation or that it ever will. Comparatively, it is still relatively young and grew from conditions where there was not a prior tradition of political participation and collaborative action, and where there is lack of continuity from term to term. The resolution of the Lagoa de Carapicuíba issue represents the subcommittee's first successful experience with collective decision-making involving all three sectors and perhaps sets the stage for more progressive objectives.

The absence of representative accountability to respective sectors is disturbing, however, particularly amidst rhetorical claims of 'participation.' Swyngedouw asserts that "scale redefinitions alter and express changes in the geometries of social power by strengthening the power and control of some while disempowering others" (1997:142). Within the institutional space of the SCBH-PP, some areas have benefited more than others through environmental education programs, project funding and policy development, which, in the most part have depended on the access of groups within the subcommittee or the scales of engagement of its actors. There does not appear to be collective efforts within this space to enhance the distribution of benefits to communities that may not be directly represented by local actors, such as Pirapora. The lack of local opposition and activism in Pirapora is surprising when considering the level of pollution that has had extreme socioeconomic effects, and indicates a strong need to facilitate democratic participation and empowerment. The current institutional processes within the SCBH-PP provides no means for which to identify these gaps and respond to it through redefining *participation* and *representation*. Without self-reflection on what "good participation" should be or how representation can improve the legitimacy and the reach of decision-making, the watershed committees in Sao Paulo remain exclusive sociopolitical spaces that prejudice the potential for participatory watershed governance to be effective.

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**APPENDIX A: MEMBERS OF THE PINHEIROS-PIRAPORA SUBCOMMITTEE OF
THE ALTO TIETÊ WATERSHED COMMITTEE - 2003/2004 CYCLE**

Civil Society

Domestic Consumption

Gilberto Francisco Perassoli – Titular
AFE – Associação Família Esperança (Family Hope Association)
Osasco

Maria de Lourdes Baptista Mello – Alternate
Associação Filhos da Terra (Sons of the Land Association)
Osasco

Walter Carneiro Rios – Titular
Sociedade Amigos do Jardim Bonança II (Friends Society of Bonanza Garden II)
Osasco

José de Souza Barcelos - Alternate
União dos Moradores do Parque Bandeirantes e Adjacências (Bandeirantes
Park Resident's Union)
Osasco

Industrial, Comercial, Leisure, Services and Agricultural Consumption

Sérgio Sidney Manojó - Titular
Associação Comercial e Empresarial de Osasco (Osasco Commercial and
Business Association)
Osasco

VACANT - Alternate

Sindicated Organizations

Valdemir Martins da Luz
Sindicato dos Trabalhadores em Industrias Metalúrgicas, Mecânicas e de
Material Elétrico de Osasco e Região (Osasco and Region Metallurgists,
Mechanics and Electric Materials Worker's Union)
Osasco

Vacant - Alternate

Environmental Defense

Josefa B. Silva – Titular
SOS Manancial do Rio Cotia
Carapicuíba

Tânia Maria P. Silva – Alternate
MOVIECO – Movimento Ecológico
Barueri

Jonathas Russomano – Titular
IACE – Instituto de Ação Cultural e Ecológica (Cultural and Ecological Action
Institute)
Pirituba

Carlos Marx Alves – Alternate
SEO – Sociedade Ecológica de Osasco (Osasco Ecological Society)
Osasco

Technical Organizations

Pietro Mignozzetti – Titular
Associação dos Engenheiros, Arquitetos e Agrônomos de Osasco e Região
(Osasco and Region Engineers, Architects and Agronomists Association)
Osasco

VACANT - Alternate

Universities and Research Institutions

VACANT – Titular

VACANT - Alternate

Entities in Defense of Citizen's Interests

Meire Garcia Pizelli – Titular (**Vice-President**)
117ª seção OAB – Barueri (Order of Brazilian Lawyers)
Lapa

VACANT - Alternate

Municipalities

Jandira

Paulo Henrique Barjud – Titular
Alexandre Souza da Rocha – Alternate

Carapicuíba

Fuad Gabriel Chucre – Titular
Paulo Rubens Celegato – Alternate

Osasco

Celso Antonio Giglio – Titular
Sebastião Bognar – Alternate

Itapevi

Dalvani Carames – Titular
Carlos Mitsuru Habe – Alternate

Pirapora do Bom Jesus

Raul Silveira Bueno Junior – Titular (**President**)
Luciano Olgado Silva – Alternate

Barueri

Gilberto Macedo Gil Arantes – Titular
Ricardo Salles Nemer – Alternate

Santana de Parnaíba

Silvio Roberto Cavalcanti Peccioli – Titular
Maria Del Carmem Carbaleda Adsuara – Alternate

São Paulo

André Luis Gonçalves Pina – Titular
Rita de Cássia Ogera – Alternate
Secretaria Municipal de Planejamento Urbano - SEMPLA

Valmir de Oliveira - Titular
Fábio Cavalcanti Anguarita Silva - Alternate

Estado

Secretaria da Habitação (Ministry of Housing)

Rosanna Azzolini Simoncini - Titular
Edmur Godoy Filho – Alternate

Sabesp

Milton de Oliveira – Titular
Leopoldina - São Paulo

José Alberto Galvão Ferro – Alternate
Carapicuíba

CEPAM – Centro de Estudos e Pesquisas de Administração Municipal

Waldemar Sândoli Casadei – Titular
Luiz Henrique Oliveira – Alternate

IPT – Instituto de Pesquisa Tecnológica (Technological Research Institute)

José Luiz Albuquerque Filho – Titular
Butantã – São Paulo

Kátia Canil – Alternate
Butantã – São Paulo

DAEE – Departamento de Águas e Energia Elétrica

Antonio Azzi Lara – Titular
Osasco

Roberto Sueiki Minami – Alternate
São Paulo

EMAE – Empresa Metropolitana de Água e Energia

Carlos Eduardo Guimarães do Nascimento – Titular (**Secretário Executivo**)
Pedreira – São Paulo

Oscar Brás Berreta Pión – Alternate
Pedreira – São Paulo

CETESB

Sérgio Rancevas – Titular
São Paulo

Jussara Vedovelle de Almeida - Alternate
São Paulo

CPLA – Coordenadoria de Planejamento Ambiental

Márcia Maria do Nascimento - Titular
São Paulo

Carlos Alberto Saito – Alternate
São Paulo

Secretaria de Estado da Saúde

Margarete Newmann dos Reis – Titular
Osasco

Ubiratan Carvalho Pereira – Alternate
Osasco

APPENDIX B: PHOTOS OF TIETÊ RIVER FOAM IN PIRAPORA DO BOM JESUS



Historical Centre of Pirapora facing the Tietê River [SABESP Photo 2003].



River foam overflowing into the playground [SABESP Photo 2003].



River foam flowing past the Town centre [SABESP Photo 2003].



Foam overflowing over the main bridge in Pirapora [SABESP Photo 2003].



Foam overflowing the playground [SABESP Photo 2003].



Governor Geraldo Alckmin on the sprinkler system over the Tietê River [SABESP Photo 2003].