

Water Reform in Brazil: An Analysis of its Implementation in the Paraíba do Sul Basin and a Consideration of Social Marketing as a Tool for its Optimal Success

by

Brandi M. Nelson

A practicum submitted in partial fulfillment of the requirements for the degree
of Master of Science at the University of Michigan
August 2008

Practicum Committee:

Associate Professor Dr. Maria Carmen de Mello Lemos

Professor Dr. Bunyan Bryant

Ad Hoc Professor Dr. Rosa Maria Formiga-Johnsson

Abstract

On January 8, 1997, the former President of Brazil, Fernando Enrique Cardoso signed the National Water Resource Policy into law (Law No. 9.433, 1997). The key principles of the National Water Policy include: an integrated approach with the river basin as the planning unit, water as a fragile and finite resource, water as an economic good, and finally, decentralized and participatory management of the resource (Formiga and Scatasta, forthcoming). The legislation provided for the implementation of bulk water pricing with the resulting revenues meant to finance the activities mandated by basin committees in the watershed area of Rio Paraíba Do Sul (in Rio de Janeiro and São Paulo, and also in the state of Minas Gerais, that basin committee is Comitê para Integração da Bacia Hidrográfica do Rio Paraíba Do Sul (CEIVAP) (Abers and Keck, 2004).

To improve the sustainability of many different resources it is a widely accepted concept that charging a fee for something will spur sparing use by the target audience, particularly if the price is high. One-hundred percent of the collected monies have been invested within the basin; mainly designated to the following: non-structural institutional interventions, sediment control projects, and municipal wastewater treatment.

Payments from agriculture and small hydroelectric plants have been mostly symbolic or non-existent and payments from other sectors have not been high enough to maintain a sustainable system. Convincing those that have not been actively participating is central to the success of this initiative: this paper will explain a framework called Social Marketing which is becoming more widely used throughout the globe to inspire behavior change. Social Marketing is a tool that can be used to persuade more users to pay the cobrança.

Table of Contents

Table of Contents	0
Chapter I: Introduction.....	1
Chapter II: Background.....	4
Methodology	4
Objectives:	4
Research Methods.....	5
Scope:.....	5
Interviewees Included:	6
Natural Resource Management.....	7
Water Policy and Management.....	8
Chapter III: A New Water Law	10
Chapter IV: Comitê para Integração da Bacia Hidrográfica	16
do Rio Paraíba Do Sul.....	16
Chapter V: Resistance to Change	22
A Preemptive Strike.....	22
The Agricultural Sector.....	23
Shortcomings	25
Chapter VI: Social Marketing.....	26
Practical Examples.....	28
Social Marketing: Applying It to Cobrança.....	29
Chapter VII: Conclusion	32
Appendix A : A Look at Some of the Basin Industry.....	1
Companhia Siderúrgica Nacional (CSN) and the city of Volta Redonda, RJ	1
Companhia de Saneamento do Estado de Sao Paulo (SABESP).....	3
Appendix B : Water Supply Chain	5
Appendix C : Water Distribution.....	1
Appendix D : List of Abbreviations.....	1
Bibliography	1

Chapter I: Introduction

For the past few decades, water scarcity has emerged as one of the most pressing socioeconomic and ecological problems of our times (UNDP, 2007). Even in water abundant countries such as Brazil, the issue of water management and conservation has gained increasing salience in the country's social and governmental policy agendas (Formiga-Johnsson, Kumler and Lemos, 2008). Around the world, long seen as an emergency response to drought, water conservation has become a preferred proactive strategy to avoid water scarcity in the future. Yet, historically, Brazil's highly hierarchical and sectorialized water management system has paid little attention to conservation as a strategy to address issues of water scarcity and quality. Although an estimated thirteen percent of the world's fresh water resources are in Brazil (ANA, 2004) the country has been beset by water shortages and water quality issues, especially in the semi-arid region of Northeast Brazil. To improve management and reduce scarcity risk, for the past fifteen years, the Brazilian government has been reforming its water management system. In 1997, Brazil implemented a National Water Resource Policy, an encompassing water reform that subscribes to the tenets of integrated water management. Among the features of the new system is the perception of water as a public good with economic value. This notion has been motivated by the idea that water charging would encourage conservation, especially among traditionally inefficient users such as irrigated agriculture and sanitation utilities.

The National Water Resource Policy (Law No. 9.433, 1997) includes the following key principles: an integrated approach with the river basin as the planning unit, water as a fragile and finite resource, and finally, decentralized and participatory management of the resource (Cardoso, 1997). The latter has been operationalized through the creation of watershed committees or consortia formed by representatives of organized civil society (water users defined

by a minimum level of consumption) and different scales of the state, from municipal to federal levels. The organizational structure at the river basin level designates the committee as the political institution where negotiations and participatory decision-making takes place. With the organization of the basin committees, a fee for a water-use system was initiated, called the cobrança. The legislation provided for the implementation of this charge and intended that revenues finance activities mandated by basin committees in the watershed (Garrido, 2005).

The urgency of water reform in Brazil is further exacerbated by an increasingly vulnerability of the country's water systems to climate variability and possibly climate change. While drought problems harass the northeast, recurrent episodes of water shortage in the south and southeast have public officials scrambling to find proactive solutions, and the realities of climate change have spurred a nationwide debate on how best to prepare for potential negative impacts of a changing climate on different natural resources, including water. The Paraíba River serves the most socioeconomic developed region of Brazil, which includes the three following states: São Paulo, Rio de Janeiro and Minas Gerais.

Since water in Brazil has long been considered a free resource, determining the value of that resource is a rather new concept. Paying for water to be supplied (capture, piping and delivery costs) to consumers is a relatively common thing, but creating a system that will account for the cost of extracting water from its source (groundwater-aquifer or surface water-river) is not. While the cobrança was created in Brazil as a tool to ensure better allocation and conservation of water resources, as well as provide monies for the infrastructure needed for water withdrawals, many constraints to its full implementation remain.

The main sectors of water in the Paraíba do Sul River Basin (PSRB) are industrial plants, agribusinesses, and irrigated agriculture and water utilities, especially the water supply and

sanitation sectors. The hydroelectric sector was the main user of water in the region, but the increasing transfer of electric power production to other areas has decreased its relative importance in the region. All these users, plus environmental Non-Governmental Organizations (NGOs), water research institutions and public agencies, were deeply involved in the negotiation and implementations of the cobrança in the Paraíba do Sul River Basin (PSRB) (Formiga-Johnsson, Kumler and Lemos, 2008). However, despite an agreement to implement cobrança in the basin, the rate of success in terms of compliance with the payment of water fees has been less straightforward. Certain sectors such as agribusiness and irrigated agriculture have been slow to comply and thus far have been allowed, for the most part, to get away with not paying for bulk water.

This report focuses on Brazil's water reform by exploring the implications of an integrated watershed management program in the PSRB located in the southeast region. It discusses the implementation of the cobrança by the PSR watershed committee, the Comitê de Integração da Bacia Hidrográfica do Rio Paraíba do Sul (Paraíba do Sul River Basin Integration Committee--CEIVAP). I will show how social marketing might be used to ensure continued support by industry, and to gain respect and support from the agricultural sector for the implementation and enforcement of the cobrança in the basin. Social Marketing is a tool for inspiring the public, demonstrating both the need for a certain behavioral change and the specifics of that change. Since the cobrança relies on voluntary behavior, social marketing may be a valuable tool to convince recalcitrant sectors to pay for bulk water. According to Rothschild, marketing manages behavior in an environment that "invites voluntary exchange," (Kelman, 2003). Convincing those that have not been actively participating is central to the success of this initiative.

Social marketing can support environmental change by reframing concepts around the use and conservation of water and thus, encouraging positive behavioral change towards environmental sustainability. For example, instead of implementing a water fee, the committee could create a “contribution to the longevity of the water supply” that links the price of water to long-term benefits for the whole of society. In addition, well-designed social marketing strategies should first understand behaviors and incentives that may be competing with its recommended actions (McKenzie-Mohr and Smith, 1999). Reframing of the issue involves education and the concept of exchange defined by a relationship in which “one party gives up something to get something from another party” (Rothschild, 1999).

In ensuing sections, I will discuss history of Brazil’s environmental policy and briefly describe CEIVAP and a few of its obstacles, including resistance by bulk water users to comply with the cobrança. Next I will discuss the cobrança and highlight some of the industry in the basin. Finally, I will explain the concept of Social Marketing and delineate how I think it can improve the chances for sustainability in the Paraíba do Sul.

Chapter II: Background

Methodology

Objectives:

Focus: This report has three areas of research foci: 1) understanding the behavior and actions of watershed users in the PRSB; 2) understanding the implementation of the formal and informal institutions (including regulation) of the water reform; 3) exploring decentralization and social marketing as theoretical frameworks to support the study.

Research Methods

Scope:

In order to understand the impacts of reformed institutional arrangements on the water management system key stakeholders in the public and private sectors of the Paraíba do Sul watershed basin were interviewed. Interviewees included representatives of the watershed committee and other key local political figures. To determine decision-making strategies of private actors in response to watershed initiatives, I interviewed executives and environmental officers from companies in the watershed with the most substantial water consumption. Information derived from those interviews and case studies revealed critical factors necessary to affect water policy reform as well as behavioral change in the agricultural sector. I supplemented the interviews by conducting research conducting extensive on and offsite research both in regard to relevant case studies, on decentralization, agribusiness, natural resource management in Brazil and social marketing.

Prior to my research trip I did study the language but was not fluent before I arrived in Brazil. I had a translator/guide during the three-week trip that aided me with the interviews and the review of some print materials.

Interview Questions:

In Portuguese:

1. Quais aspectos da cobrança, como instrumento de sustentabilidade da gestão das águas, do Comitê conseguiu implementar até agora?
2. Como o acidente no rio Pomba afetou o plano de recursos hídricos da Bacia.
3. que foi feito para tornar a água potável novamente? Qual o órgão responsável para este tipo de ação?
4. Como é feito o cálculo para a cobrança da água bruta?
5. Quais as dificuldades encontradas para a implementação da cobrança da água?
6. Como está sendo feita a educação ambiental da população sobre a lei 9433/97? Quão efetivo são estas ações e o que pode ser feito para melhorá-las?
7. Qual o sistema de monitoramento usado para identificar os pagadores e os não-pagadores? No caso de não-pagamento está previsto uma multa? Qual seu valor?

8. Quais as ações o comitê vem tomando para tentar influenciar uma mudança na política do governo para permitir que os lucros da cobrança permaneçam na bacia para futuro investimento?

In English:

1. What things has the committee been able to accomplish so far concerning the cobrança as a means to make water resources management viable?
2. How did the toxic spill at the Pomba River affect your plan of action concerning the river basin?
3. What has been done to make the water safe for consumption again? Whose responsibility is it?
4. How do you determine how much to charge for the use of the bulk water?
5. What difficulties are you facing in implementing the charge for water?
6. How are you educating people about the law, and its importance? How effective is it? In your opinion, what can be improved in that aspect?
7. What system do you have to keep track of those that pay or do not pay? Do you charge fines to those that do not? If so, how much are the fines?
8. What things has the committee been doing to try to influence a change in government policy to allow the revenue earned from the cobrança to remain in the basin for investment?

Interviewees Included:

Zeila Chittolina Piotto
Votorantim Celulose e Papel
Jacareí, São Paulo

Paulo Afonso Valverde Júnior
CESAMA
Juiz de Fora/Minas Gerais

Edilson de Paula Andrade
Secretário Executivo do CBH-PS e Representante, DAEE
Taubaté, São Paulo

João Carlos Rodrigues
Centro das Indústrias do Estado de São Paulo – CIESP
São Paulo, SP

Maria Cristina Yuan
Brazilian Steel Institute (IBS)
Rio de Janeiro, RJ

Mauro Ribeiro Viegas, (Vice-Presidente de CEIVAP)
FIRJAN, Federação das Indústrias do Estado do Rio de Janeiro
Rio de Janeiro/RJ

Paulo César de Souza
SAAE
Volta Redonda, RJ

Ana Maria da França Martins Brito
Instituto de Pesquisas Avançadas em Economia e Meio Ambiente - Instituto Ipanema
Botafogo, Rio de Janeiro

Natural Resource Management

For most of its history, environmental policy making in Brazil mirrored other policy sectors in being exclusionary, insulated and inefficient. Prior to the 1960s, natural resources management in Brazil was equated to their exploration to sustain an accelerated pattern of economic growth. Created by Decree- (Law 289) in 1967, The Brazilian Institute for Forest Development (“Instituto Brasileiro de Desenvolvimento Florestal”—IBDF) serves as a great example of disconnect between environmental and natural resources policy in Brazil. The IBDF constituted the first federal agency dedicated to conservation and preservation of renewable natural resources in Brazil and it fulfilled a role that “fell mainly within the realm of wood production—management of the demand and the supply of forest resources” (ANA, 2004). By 1967 every state had at least one agency dedicated to pollution abatement, but the Brazilian Congress nonetheless began to see the need for a national environmental policy (Keck, 2002). Air pollution from a wood pulping plant began to sicken residents of Rio Grande do Sul, coincidentally the home state of the for the Brazilian President’s chief of staff. Consequently the first national environmental agency was created explicitly for environmental protection and management policies, (ANA, 2004).

During the 1970s most of the institutional structure for environmental protection and resource management came into being (Guimarães, 1991). In response to the 1972 Stockholm summit on environment and development, Brazil took steps to adhere to some principles that

came from that conference. That commitment took the form of SEMA,¹ the Secretaria de Estado de Meio Ambiente and was created in 1973 (Formiga and Scatasta, forthcoming). The document that justified its creation repeated the need for “rational use,” and emphasized pollution concerns over natural resources management (Drummond and Barros-Platiau, 2006). Positive results were achieved in industrial [water] pollution, but little advancements were made in controlling domestic pollution, and none in addressing non-point source pollution (Formiga and Scatasta, forthcoming).

Water Policy and Management

Water resource management in Brazil has taken many steps to evolve into what it is today. The Water Code (Código de Águas) of 1934 was a major step in establishing any management strategy related to natural resources, and it demonstrated enough foresight to propose the integration of multiple uses. The code, known specifically as the Decree of July 10, 1934 (24.643) became popularly known as The “Water and Mines Code” (“Código de Águas e Minas”)² and enabled the expansion of Brazil’s hydroelectric power system (ANA, 2004). It also distinguished private land ownership from the ownership of water and minerals on that land. At that time, the country’s economy relied heavily on agriculture and until the 1950s when industrialization emerged as the main focus of economic growth conflicts over water use were easy to resolve (Kerr do Amaral, 1996).

The management of water has been traditionally sectoral with little integration across the several areas important to water conservation and sustainability. For example, pollution prevention and water quality management have been the responsibility of the state environmental agencies while water management per se was centralized at the federal level. Another major

¹ SEMA is a special secretary created at the federal level of government.

² Distribution of water resources in Brazil. 2002. www.ana.gov.br

problem was with the disassociation between the two sets of institutions dealing with water quantity vs. quality management. As a result of this compartmentalization, water resources management and environmental policymaking were largely kept separate (Formiga and Scatasta, forthcoming). Water scarcity, pollution, multiple use conflicts and population pressures meant that water management had to be restructured.

Until recent reforms, policies affecting water resources in Brazil primarily privileged the water-using sectors then associated with the country's demographic, economic and industrial boom. Although industrial water use was not as supported by the government, as were sanitation and irrigation (there never was a water strategy explicitly devoted to the industrial sector), in practice the Brazilian government accorded an absolute priority to industrialization ensuring that since the 1960s natural resources, and especially water, were available at low or zero cost for industry use (Formiga and Scatasta, forthcoming).

...the federal department in charge of the power sector (DNAEE), created in 1968, to assume a near absolute control over water resources management, by absorbing and de jure assuming the functions of a number of water management institutions that had been created since the 1930's. This arrangement prevailed until recently and contributed to the predominance of hydroelectricity among Brazil's power sources. (Formiga and Scatasta, Forthcoming).

In 1986, the Ministry of Mines and Energy created a Working Group, made up of state and federal agencies, to plan the organization of a water resources management system (ANA, 2004). During this time of change a broader shift in the political structure of Brazil provided just the opportunity needed to advance new ideas. In 1988, as part of Brazil's negotiated transition from authoritarianism to democracy, Congress passed a new constitution that came to be called *Constituição Cidadã* or the "Citizen Constitution" (Zaverucha, 1997). In that constitution, the Brazilian congress stipulated that the federal government held responsibility for implementing a national water resources management system. Their duties included planning and regulating

water use, preservation, and the restoration of Brazil's water resources (Asad and de Azevedo, 1999). One of the first basins the federal government began to apply its new responsibilities to was the Paraíba do Sul.

Chapter III: A New Water Law

Inspired by the Dublin Principles³ on January 8, 1997, former president, Fernando Henrique Cardoso signed the National Water Resource Policy (Cardoso, 1997). The key principles of the National Water Policy include: an integrated approach with the river basin as the planning unit, water as a fragile and finite resource, water as an economic good, and finally, decentralized and participatory management of the resource (ANA, 2004).

The main tool for water resource management gave duties to committees created within each watershed basin. The organizational structure at the river basin level sets the committee as the political institution where negotiations and participatory decision-making takes place. This new institutional arrangement presents all watershed users an opportunity to re-evaluate the sustainability of their relationships with the watershed. The basin committees⁴ employ bottom-up democratic decision-making processes, and participation from municipalities, non-governmental ecological organizations (NGO's) in addition to industry, academic specialists and state representatives (Asad and de Azevedo, 1999). Currently, there are over one hundred river basin committees in Brazil at different stages of development (Kumler and Lemos, 2005).

³ The 1992 Dublin Conference established four guiding principles for managing freshwater resources:

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

IRC International Water and Sanitation Centre. Last Updated August 8, 2006. <http://www.irc.nl/page/10433>.

⁴ This paper will look at the watershed area of Rio Paraíba Do Sul (PS) (in Rio de Janeiro and São Paulo, and also in the state of Minas Gerais) and its committee known as CEIVAP.

The reform did more than establish a new level of water resource management. “The Law defines water as a publicly-owned scarce resource...” and also established some new economic tools to aid in the sustainability of the resource (Zaverucha, 1997). Under the new law, water users must pay bulk water charges (*cobrança*) and must obtain a permit (*outorga*) to use water from the appropriate state or federal water agency (Gruben, Lopes and Formiga-Johnsson, 2003). The legislation provided for the implementation of the charge with the resulting revenues meant to finance the activities mandated by the basin committees.

Although almost all states included *cobrança* in water legislation, in most cases it requires additional legislation and institutional change to be viable. The legislative problems are small compared to the institutional and political ones, as water agencies in most states simply do not have the necessary information or monitoring capacities, and governments have been slow to address these shortcomings. As a result, *cobrança* is not yet being widely applied (Abers and Keck, 2002).

The Paraíba do Sul River Basin:



Figure 3 Wikipedia Encyclopedia. <http://en.wikipedia.org/wiki/Para%EDba>

The PSRB, which encompasses 180 cities with a total population of 5,588,237 people, is located in the southeast region of Brazil (Braga, Strauss and Paiva, 2003). The basin is situated between the latitudes 20°26' and 23°39'S and the longitudes of 41° and 46°30'W and occupies an area of 57,000 Km² (Wikipedia, 2008). The Paraíba River is about 650 miles long and is designated as a federal river because it flows through more than one state, thus it falls under the jurisdiction of the federal government. Its headwaters are located in the state of São Paulo where it turns before continuing through the state of Rio de Janeiro and crossing Minas Gerais then flowing through a gorge on the Rio de Janeiro-Minas Gerais border and emptying into the Atlantic Ocean near the city of Campos⁵, Rio de Janeiro (Answers.com, 2003). The PSRB includes the following sub-basins: Dois Rios/Grande, Piabanha, Muriaé, Pomba and the Paraíbauna (COPPETEC Fundação, 2002).

The basin serves approximately 14 million inhabitants, which are more than double the basin's actual population, and the basin's hydroelectric potential is responsible for over 1.7% of the country's potential (Braga, Strauss and Paiva, 2003). With approximately 8,500 industries located in the basin and over 71, 000 hectares⁶ of irrigated agriculture, the basin is responsible for approximately 13% of Brazil's GDP (Braga, Strauss and Paiva, 2003).

The Paraíba River is extremely important as it supplies water to the most developed and industrialized region of the country. São Paulo [state] may be the most vital state to Brazil's economy. It is the leading industrial state and is also the commercial and services center of the country. Located in southeast Brazil, the state is also considered the most important agricultural

⁵ The city of Campos is a transportation hub and the commercial center of a rich agricultural region which produces coffee, cacao, rice, sugarcane, and beans; in the early 17th century, Campos was an important slave center, (Answers.com, <http://www.answers.com/topic/para-ba-river-brazil?method=5>).

⁶ A metric land measurement equal to about 2.471 Acres or about 107,637 square feet. *Dictionary of Real Estate Terms*. Retrieved July 27, 2008, from Answers.com Web site: <http://www.answers.com/topic/hectare>

producer in the country (Encarta online encyclopedia, 2005) as well as the largest producer (and consumer) of energy.

Rio de Janeiro (state) has an area of 43,653km² and is situated on the southeastern coast of Brazil. Most of the state's economic activity involves industry and services tied to urban areas, in particular the city of Rio de Janeiro, which serves as the state capital. Among its most important commodities are the iron and steel complex at Volta Redonda (Companhia Siderúrgica Nacional, CSN); textiles, electronics, and food processing in Rio; and oil refineries and shipbuilding in the Baixada Fluminense, the lowlands surrounding the city (Microsoft Encarta online encyclopedia, 2005).

Minas Gerais, with an area of 588,383 km² (slightly larger than France), is the third largest Brazilian state, and with nearly 18 million people, it is the second most populated state (v-brazil.com, 2004-2007). Minas Gerais (MG, literally “general mines”) is among the most developed states in Brazil. Nearly 21,000 km² of the Paraíba do Sul’s [watershed] drainage area is in MG (Formiga and Scatista, forthcoming). Minas generates approximately 10% of Brazilian GNP⁷ and its agricultural area nearest to Rio de Janeiro has the most fertile lands of the state. The state grows coffee and corn⁸ as well as tobacco, but production of the latter is enhanced by chemical and organic fertilization which affects water supply and quality. The river has been found to have high levels of chlorinated pesticides (Shaman, 1996).

One particularly contentious issue on the way the PSR waters are shared by the three states is an inter-basin water transfer between the PSR and the Guandu River to supply the Metropolitan Rio de Janeiro Region’s (RJMR). Currently this water transfer is responsible for 85% of the RJMR water supply (Kumler, 2005). Vital to both São Paulo State and the RJMR, the

⁷ GNP: Gross National Product: the total dollar value of all final goods and services produced for consumption in society during a particular time period

⁸ (v-brazil.com, 2004-2007).

inter-basin transfer has caused much conflict between the two states. To supply the RJMR, two-thirds of the Paraíba River is diverted to the Guandu River in Rio de Janeiro state. Especially in periods of drought, the water transfer can affect the level of reservoirs for the PS located in São Paulo state imposing hardships to communities in São Paulo state that depend on high water levels in the reservoirs for tourism and recreational purposes (Kumler and Lemos, 2005).

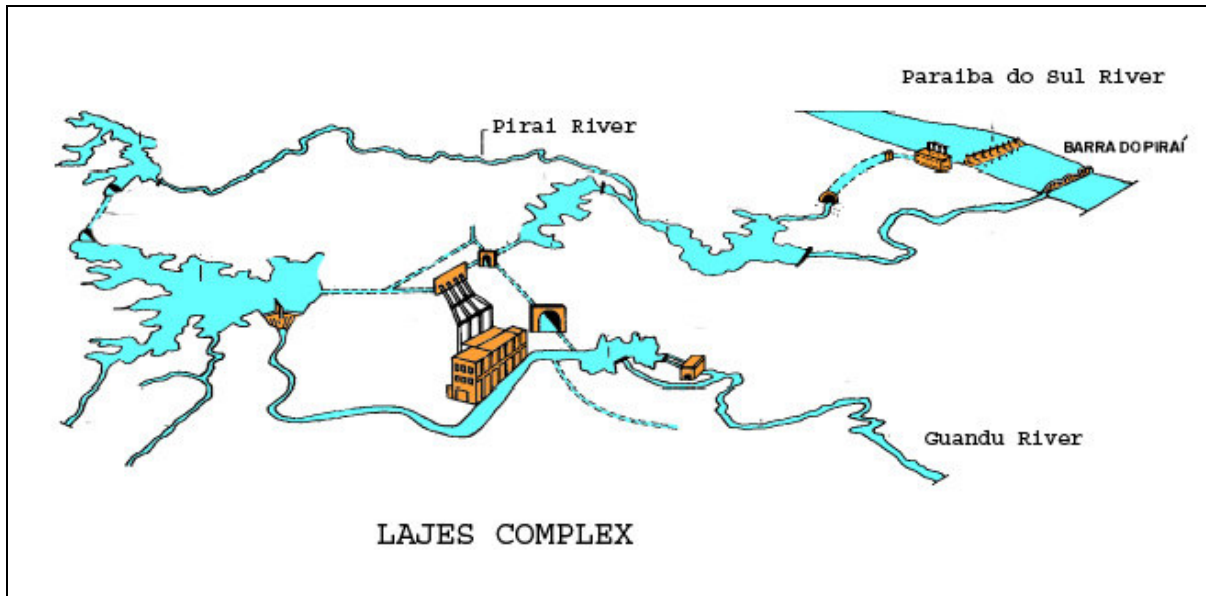


Figure 4: Lajes hydroelectric complex showing the water transfer from the Paraíba do Sul to the Guandu River. (Source: LABHID of COPPE, Federal University of Rio de Janeiro)

The basin is large and economically diverse, with growing industrial and urban regions. 87% of the basin's inhabitants live in urban areas situated alongside poorer, rural enclaves (Wikipedia Contributors, 2008). The industrial and demographic boom of the basin has not been accompanied by adequate measures to preserve environmental quality, which is a concern due to limited municipal wastewater treatment and industrial pollution (Formiga and Scatista, forthcoming). The following table identifies some of the main water users:

Raw Water Users – Paraíba do Sul River Basin

USERS	STATES			TOTAL	
	SP	MG	RJ	Quantity (Enrolled Users)	%
Industry	113	129	146	388	12.29
Water Supply and Sanitation Service	26	22	21	69	2.19
Irrigation	406	97	37	540	17.11
Animal Demand	1616	261	62	1939	61.44
Small Hydropower Plants	01	05	02	08	0.25
Other Users	121	56	35	212	6.72
Total				3156	100

Table 1: Raw Water Users, Braga, Strass and Paiva, 2003

According to Jerson Kelman⁹, the former President of ANA (Brazil's National Water Agency) the following problems are of the most serious threats to PSRB's water supply:

- 1 million m³/day of domestic sewage without treatment
- 7 tons/Day of industrial effluents
- Intensive erosive process
- Inadequate urban waste disposal
- Floods in urban areas

Neglect of a water resource is damaging not only to local communities, who depend on this water supply, but ultimately to the polluting organization whose ability to generate future revenues still depends upon the degraded resource. From 1998-2004 a severe drought in the area highlighted the need to create basin-wide cooperative conservation measures (Kumler and Lemos, 2005).

⁹ In January 2001, Dr. Kelman became the first president of Agência Nacional de Água (ANA).

Chapter IV: Comitê para Integração da Bacia Hidrográfica do Rio Paraíba Do Sul

Since the early 1990s several states have undertaken local level water reform, creating their own committees and water agencies. In the PSRB the increasing pressure on water resources from growing urban migration in both Rio de Janeiro and São Paulo, as well as from increased industrial activities management of water, had also mobilized the creation of earlier experiments of localized water reform (Lemos and Oliveira, 2004). Pre-dating CEIVAP, both the Executive Committee of Integrated States (CEEIVAP created in 1978), and the Comitê da Bacia Hidrográfica do Rio Paraíba Do Sul (CBH-PS created in 1994) held jurisdiction in São Paulo. The CBH-PS had great technical autonomy; it included three other existing agencies including the Company of Technology and Environmental Sanitation, and the department of Natural Resource Protection (Gruben et.al., 2003). CBH was a central factor in the formation of CEIVAP, which was officially created in 1996 but not structured until March of 2000. The following is a conceptual diagram of decision-making by water users on the Paraíba do Sul prior to and after the new water policy.

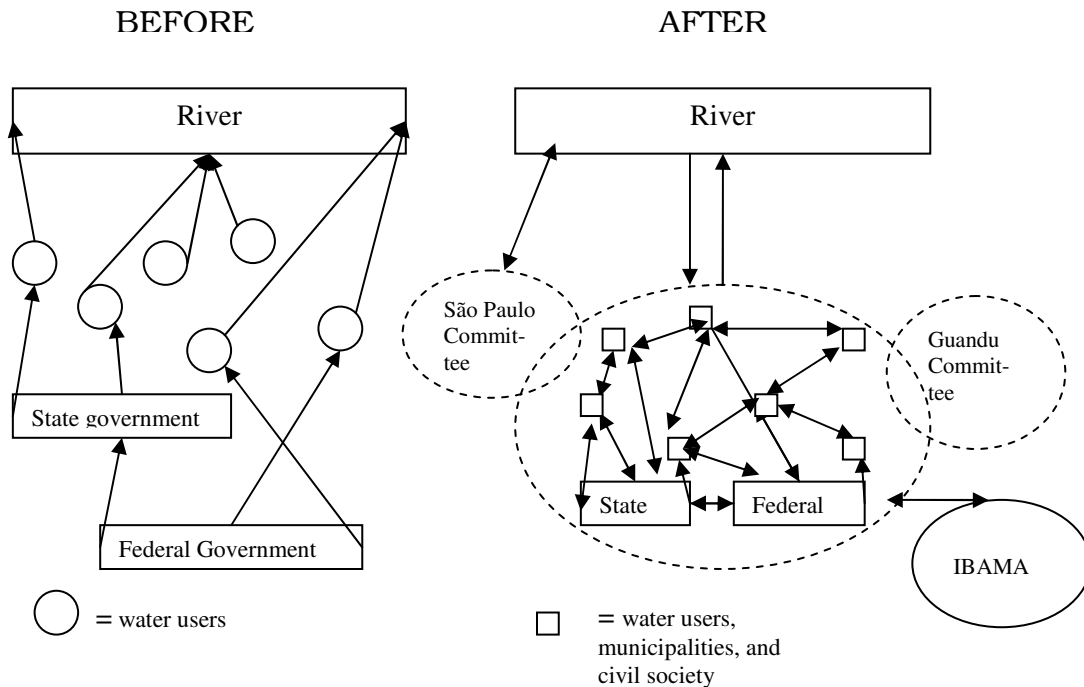


Figure 5. (Kumler and Lemos, 2005)

CEIVAP is a federal watershed committee with representatives of civil society that were chosen by the state governments of Minas Gerais, Rio de Janeiro and São Paulo. The number of representatives is split between three sectors: water users, civil society and the state (Gruben et al, 2003). Sectors choose their own representatives (usually in forums) with the exception of federal and state representatives who are appointed. The definition of water user is dependent upon a minimal level of consumption (greater than $0.001 \text{ m}^3/\text{s}$) and civil society organizations are eligible only if they have been a legal entity for at least two years at the time of the election (Kumler and Lemos, 2005).

CEIVAP consists of two directors, a President and Vice-President, and an Executive Secretary, the first of which was from São Paulo because of previous experience with CBH-PS. Subsequently, positions have rotated between the three states. The following quote describes the structure of CEIVAP in more detail:

The committee has 60 members in total who together form the plenary assembly (*plenária*). In addition, CEIVAP has three Technical Chambers: Planning and Investment, Institutional issues, and Environmental Education. CEIVAP's president, vice-president, and secretary may only serve two consecutive terms in these roles. And while civil society and many water users are new to official participation in river management, others, such as government, the hydro-electric industry, and sanitation companies have always had a hand in management (Kumler and Lemos, 2005).

The committee stands out in terms of its implementation because it is the first federal committee to establish the collection of money from users and the first to create an administrative agency *Agência do Vale do Paraíba*, Paraíba Valley Agency, AGEVAP (Kumler and Lemos, 2005). Furthermore, the basin has recently experienced severe drought events that tested the staying power of CEIVAP.

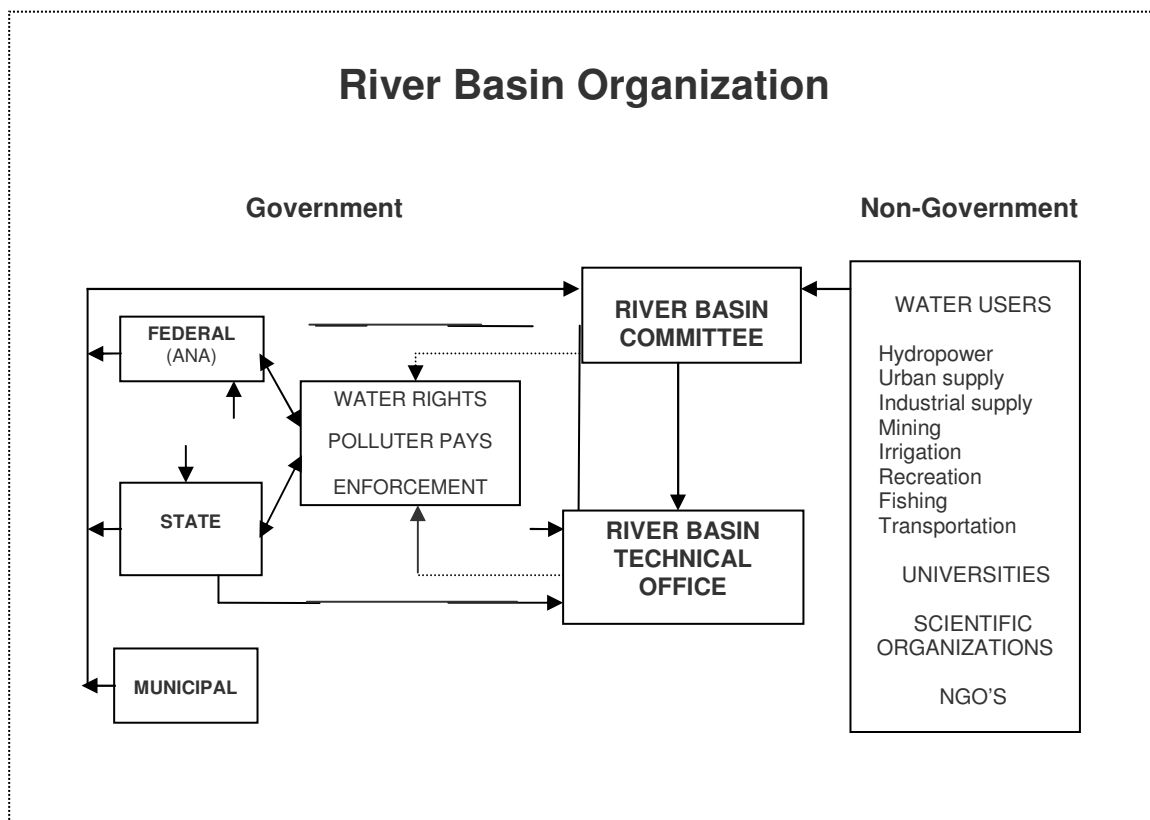


Figure 6: Committee Organization, (Kelman, 2003)

CEIVAP's first priority was to implement cobrança, the for-fee charges for federal water use in the PSRB. The cobrança is a tool that has been very useful to the reform, and is highly praised for its role in shaping the sustainability of the basin. However, negotiations for cobrança

took much longer than expected and evolved into two distinct stages (Formiga-Johnson and Scatasta, forthcoming). The table below is a summary of the implementation process of the reform, (Formiga-Johnson, Kumler and Lemos, in press).

<u>Stage</u>	<u>Time Frame</u> (an estimation)	<u>Major Accomplishments</u>
1	Feb-Dec 2001	<ul style="list-style-type: none"> ▪ Included the presentation of the initial proposal and its approval by CEIVAP. ▪ Charges for industrial and municipal users were ratified by the National Water Resources Council (CNRH) in March 2002.
2	Feb-Oct 2002	<ul style="list-style-type: none"> ▪ Continued debate and negotiations extend to all other users [water]. ▪ CNRH's Resolution ratifies CEIVAP's complementary regulation on <u>cobrança</u>.
	Collection of charges started in March 2003	

Table 2: Reform Implementation

At the end of the first round of debates regarding the cobrança, the committee agreed to implement water fees, but only on a temporary basis. The cobrança was approved for three years from its effective implementation.¹⁰ Some speculate that users may have been more willing to support the cobrança because it was originally to end in 2006 (Braga, Strauss and Paiva, 2005).

In 2001 some leaders of the industrial sector tried to bring an end to cobrança during the initial stage of negotiations. This posturing was quickly dismissed by CEIVAP, whereby industrial users organized to collectively influence the cobrança¹¹ to be disbursed in their favor. All of the stakeholders were adamant about their monies being used in their basin. The cobrança funds were to be deposited into the federal budget, but they were not guaranteed to be returned for use in the PSRB. In interviews conducted with industry representatives in Brazil, the concern over payment equity was voiced repeatedly. Users were concerned that their fees would be

¹⁰ Establishment of cobrança included the creation of a formula by which to decide the amount to be collected.

¹¹ Braga et.al distinguish between the terms charges and tariffs in their 2005 paper entitled: "Water Charges: Paying for the Commons in Brazil." *Water Resources Development*. Vol.21 (1). 119-132.

deposited into the general, federal treasury and lost to funding projects in their basin. In early May 2004, the Senate passed legislation mandating that cobrança monies be returned to the basins where they were collected, and that they be exempted from the stringent spending restrictions applied to general state revenues...(Abers and Keck, 2004).

It is a widely accepted concept that charging a fee for something will spur sparing use by the target audience, particularly if the price is high. Dr. Jordan of the University of Georgia reiterates a basic economic principle: "...it is the law of demand; if the price of a good increases demand will decrease, all other things held constant" (Jordan, 1999). Thus an aim of establishing a charging system is to discourage wasteful use and ultimately change consumer behavior. In the case of the PSRB the Water Law is aimed at reducing both the amount of water that consumers use and the amount of pollution that is released into the river. It is also important that funds be generated to pay for the administration of programs, public education, and maintenance of infrastructure.

While behavior change was a principle goal of the reform, it has [so far] been "largely oriented toward revenue generation, rather than the desire to change water use patterns..." (Formiga-Johnsson, Kumler and Lemos, 2008) The price of bulk water should also provide an economic incentive to reduce the emission of contaminants into the water source.

Perhaps the main issue in the long debates over the cobrança concerns the criteria that would be included in the pricing structure. "All uses as defined by the National Law- withdrawal, consumption and effluent dilution- are included in the formula..." (Formiga et.al, in press). One variable in the formula¹² used to calculate the cobrança is: K_2 --the "percent of effluent treatment by the user," i.e., to reward users who treat pollution themselves before

¹² Total Monthly Charges= $Q_w \times [K_0 + K_1 + (1 - K_1) \times (1 - K_2 \ K_3)] \times PPU$

releasing it into the river system the user is given a reduction in the net price. The second variable related to pollution is “ K_3 --the efficacy level of BOD (Biological Oxygen Demand) removal by the effluent treatment process used,” i.e. the impact of their emission on the ambient oxygen levels of water in the river upon which river ecosystems depend (Formiga-Johnson, 2000).

Variable	Description
Q_w = Monthly withdrawal use permit (m^3 /month)	Total amount of water flow which the user is permitted to divert and utilize. (volume/time)
K_0 = Withdrawal use multiplier	Baseline multiplier which is determined by general water use (withdraw, consume or dilute the water). Values for this figure are generally less than one and are determined by CEIVAP.
K_1 = Consumptive use coefficient for the user in question	Additional variable allows CIEVAP additional flexibility for differences between users
K_2 = Coverage (%) of effluent treatment by the user	A reduction in the net price meant to reward users who treat pollution themselves before releasing it into the river stream
K_3 = Efficacy level of BOD* removal by the effluent treatment process used	Impact of their emission on the ambient oxygen levels of water in the river upon which river ecosystems depend.
PPU= Public Unit Price (R\$/ m^3) for any type use – set at .02 R\$/ m^3 (US\$.083) by basin committee	The baseline cost per volume of water for all users.
Source: (Formiga-Johnson, pending)	
* BOD (Biological Oxygen Demand) is the amount of oxygen used by organisms and chemical processes in a particular river or ecosystem. (McKinley, 2003)	

Figure 7 Chart by Ruth Scotti

Finally, the formula established a unit price (m^3) of water withdrawal of R\$0.02 for industrial, municipal and mining uses; a unit price of R\$0.0005 for agriculture, and a unit price of R\$0.0004 for fish farming. Water consumption¹³ is more expensive than water withdrawal,

¹³ [Water]Withdrawal refers to water extracted from surface or ground water sources, with consumption being that part of a withdrawal that is ultimately used and removed from the immediate water environment. The majority of water consumption comes from domestic use. Bernstein, Ross. 2003. Volume of Water Consumed by the US. <http://hypertextbook.com/facts/2003/RossBernstein.shtml>

and thus it is possible to receive an adjustment in costs based on the released effluent (Formiga-Johnsson, Kumler and Lemos, 2008).

All of the collected monies have been invested within the PSRB and mainly designated to the following: non-structural institutional interventions, sediment control projects, and municipal wastewater treatment. In addition, some users are under federal jurisdiction while others are under state jurisdiction (Formiga-Johnsson, Kumler and Lemos, 2008). This has caused some tension and threatened the sustainability of the system. Industries that are within the same state may be subject to a different pricing scale for that reason users question the fairness and efficiency of the process. Some economic efficiency was sacrificed in order to get stakeholders accustomed to the idea of the cobrança, but now that the system is in place, it is crucial that the pricing structure be revisited to provide consistency and integrity.

Chapter V: Resistance to Change

A Preemptive Strike

The Industrial Sector, like other users, had much to lose from the new system. Any changes to the management structure and the laws governing the water resources could greatly impact industry's profit margin. The first proposal for the cobrança price, according to Formiga, Kumler, and Lemos, (in press) focused on pollution and recommended that the following users should pay:

- The 40 largest industrial plants in each state and
- The water and sanitation companies serving cities with a population higher than 10,000.

Industrial users immediately objected to that proposal and insisted that all users should pay, even if at different rates. Without that agreement, industry would not support the cobrança (Formiga-Johnsson, Kumler and Lemos, 2005).

Hackett, Lyon and Maxwell have studied the way that industries preempt [new] government policy by self-regulating standards before the new policies are handed down (1998). They “...present a theory of self-regulation in which this voluntary abatement can be explained by increases in the threat of federal and/or state regulation” (Hackett et.al, 1998). The model is presented in terms of corporate environmentalism. In the PSRB the industrial sectors early adherence to the process can be partly explained by their goal to dominate the negotiations and guarantee a palatable outcome for the sector. Early adoption reframed industry’s image from one of opposition to one of environmental progressiveness. They anticipated the need for action and preempted any regulation that would be too harsh on its treatment of the industrial sector (Formiga-Johnsson, Kumler and Lemos, 2008). A few of the most powerful industries, particularly steel and paper, were especially instrumental in getting the proposal adopted and cleverly capitalized on the results to refashion their image as environment-driven.

By banding together, industrialists and those representing the hydroelectric sector were able to make a number of changes to the cobrança proposal (Formiga-Johnsson, Kumler and Lemos, 2008). The prevailing formula did include two amendments that industry had lobbied for, a general reduction in the proposed price and an incentive system that would provide early joiners a discount. The amendments included all users in the basin, in particular agriculture, which had been a most uncooperative participant in the negotiations.

The Agricultural Sector

Agriculture is the largest consumer of water in the PSRB and is mostly utilized for irrigation. Agri-business has been given a reduction in the amount of money they have to pay for the capture and subsequent pollution of the water they use. Both the cobrança and outorga systems are expected to decrease water usage and increase the quality of water that is released

into the river. A representative from the National Confederation of Agriculture appreciates that the amount paid by agriculture has been discounted, but he doesn't think that the fees have proven educative in the sector, especially not with irrigators (Batista, 2008).

A study done by Célia Faganello regarding agricultural irrigation and the charge for water usage produced the following conclusions about attitudes of the irrigating community: "The results showed that irrigation management is not practiced, the preoccupation with water deficiencies exist, water use charges are not accepted, the monitoring of erosion processes is not done, but there is an agreement with the importance to preserve the vegetation along the river. Moreover, the results indicated a lack of knowledge about the impacts caused by inadequate water management that is expected to be the reason for the already existing degradation of water" (Faganello, 2007). Those findings would suggest that it will take more than the implementation of the new water reform—it will take a greater level of education about the reasons for it, training on new technologies and the introduction of a new perspective on natural resource management. Social Marketing can encompass all of the above and more.

Some worry that the charges will price small farmers out of business. However, the law does not apply to small farmers only to those that consume more than four liters per second (Batista, 2008.) Patrick Thomas, manager of cobrança collections at ANA believes that reducing the fees for the agricultural sector is a financial stimulation that improves technology and wastes less water (Batista, 2008). In fact, smaller users have gained access to a process that, previously, they had no say at all (Formiga-Johnsson and Kemper, 2005). Now that those users have theoretical access, it is important to let them know of their new rights and provide tools for them to use them. For example, zero tillage was a method that was widely used by agri-business, but wasn't an option for small farmers due to the high costs of the planting machines. "Zero tillage

(ZT) is a technique that fixes carbon in the soil—it consists of seeding uncultivated soil, as well as rotating crops and constantly covering the soil with crop residues" (Esteves, 2007). Thanks to cheaper manual and animal-powered planting machines as well as initiatives to train farmers on the new practice the amount of ground governed by this method has grown. I believe that this initiative was a success in part due to the adaption of application, through word of mouth social marketing, and the presence of 480 technicians trained in the area so far.

"The mindset is the main barrier to no-till adoption in countries where deep-rooted traditions hinder the abandonment of tillage and the plough," says German agronomist Rolf Derpsch who has promoted ZT in South America since the 1970s (Esteves, 2007). The problem of soil degradation illustrated in the Cerrado in many ways parallels that of water scarcity and pollution in the PSRB. The agricultural sector is beginning to feel more vulnerable as a result of a recent drought in the basin—this could be an opportunity to convince them of the benefits of the cobrança with the use of Social Marketing techniques.

Shortcomings

Despite the successes that CEIVAP has had with cobrança, there are a few things that still need to be resolved. First, the agriculture sector and small hydroelectric plants have been extremely resistant to paying for water and their participation has been essentially symbolic thus far. Garrido states that, "...it does not guarantee the best technical and alternative uses for water resources, since the determined prices distance themselves from marginal costs. If implemented with full cooperation from users for a period of six years, calculations show that in twenty years the net gains for investment in infrastructure are almost triple that amount, \$108 billion, in the

Paraíba do Sul¹⁴. These funds would be enough to accommodate infrastructural repairs and other water quality projects. However, the above conditions are not currently being satisfied.

Payments from agriculture and small hydroelectric plants have been mostly symbolic or non-existent and payments from other sectors have not been high enough to maintain a sustainable system. Convincing those that have not been actively participating is central to the success of this initiative: the following sections will explain a framework called Social Marketing which is becoming more widely used throughout the globe to inspire behavior change.

Chapter VI: Social Marketing

Social Marketing constitutes the planning and execution of programs designed to trigger social change through the implementation of concepts derived from commercial marketing. Unlike commercial marketing, which usually aims at financial gain, social marketing targets social change among specific portions of a general public. Like commercial marketing, social marketing targets specific groups, conducts research to greater understand those groups, and tailors campaigns to maximize appeal to them. Writing in Marketing Social Change, Alan R. Andreason, interim executive director of the Social Marketing Institute, identifies four approaches that precede and in part constitute the social marketing paradigm: education, persuasion, behavior modification and social influence (1995). These approaches can easily be mistaken for Social Marketing itself but the following will explain why using each one on its own is an incorrect, and perhaps, ineffective characterization of Social Marketing.

- 1.) Education: The primary hypotheses of those [social marketers] that utilize this approach is that people will change their behavior once they understand why they must. Proponents assume that changing beliefs will change behavior. How to make that behavior happen and how to maintain it is, in contrast, the foci of Social Marketing. The effects of peer pressure are ignored by “educators,” but Social Marketers realize that people often refrain from an

¹⁴ According to Formiga-Johnson, in 2002 estimates for required water infrastructural investments needed in the basin in the coming 20 years totaled 108 billion US Dollars.

action simply because someone they respect opposes it.

- 2.) Persuasion: This tactic acknowledges the importance of motivation. Persuasionists look for arguments that will convince an educated customer to act. The problem here is that the persuasionist is then trying to compel the customer to adopt their view of the world. Social marketers, on the other hand, use a customer-centered approach and recognize that change will occur when the customer's belief system is engaged.
- 3.) Behavioral Modification: This technique is based on rewards and targets specific individuals. "Behaviorists emphasize training and modeling of the desired behavior and then reward behavior (change) when it occurs," Andreason says. This approach fails to recognize the impact that feeling has on an individual's behavior, and the monetary cost of targeting individuals as opposed to carefully selected groups. In a world of limited budgets social marketers are aware that to be effective you must focus on changing the behavior of specific consumer groups and not mass markets.
- 4.) Social Influence: Advocates of the Social Influence approach believe that the most cost effective way to bring about a behavior change is to launch campaigns with the purpose of changing social norms. But the new paradigm cannot rely on that alone. Social Influence suggests a behavior to individuals and then insinuates social seclusion if they do not act in the prescribed manner. That approach may be limited to situations which:
 - a. Social norms and issues are well understood and accepted.
 - b. The pressures to conform are extremely strong.
 - c. The behavior to be influenced is socially important and visible.

Social Marketing is both different and more comprehensive than the aforementioned alternatives.

Social Marketers use the actions taken or not taken by their customers as a measure of success.

Extensive research about who their constituents are is essential, and defining a target audience and designing a cost-effective campaign are crucial. Acknowledging that every action or behavior has competition for a different action, and maintaining focus on the customer's wants and needs are also key elements of a social marketing plan.

The principal aim of Social Marketing is the influencing of action and that influence is achieved through a system of what is called "the four P's" (Social Marketing Institute, 2005):

- Product: The benefits associated with the desired action.
- Price: The cost of realizing the changed behavior.
- Place: The ease of accessibility in communicating the desired change.
- Promotion: The act of publicizing the change desired.

Experts, such as Sundararaman and Arnold (2008) acknowledge the importance of some additional “Ps”:¹⁵

- Partnerships: Whom can you team up with?
- Policies: Does the environment sustain the change?
- Politics: Can you handle any controversial or complex issues?

Other experts identify still more “Ps.” Weinreich (2006) adds Publics and Purse Strings to her analysis of social marketing strategy.¹⁶

- Publics: Refers to the target audience, secondary audiences, policymakers, and gatekeepers, as well as those who are involved in some way with either approval or implementation of the program.
- Purse Strings: Where will you get the money to create your program?

Practical Examples

In *Social Marketing and Consumer Policy*, the government of Victoria Australia identifies Social Marketing as “a comprehensive approach to policy development that targets behavioural change” and encourages consumer agencies to “expand their use of social marketing” (Consumer Affairs Victoria, 2006). The paper is one in a series that explores the strengths and weaknesses of information strategies and how consumers use available information. The quote below shows how social marketing is used.

Social marketing can target consumers and traders. While relevant to all consumers, it may highlight new ways to assist vulnerable and disadvantaged consumers in particular, which are often the least responsive to traditional efforts to influence behavior through information provision. It may also encourage compliance by creating industry environments that promote ethical behaviour, increasing consumer confidence and hence business growth, and reducing the need for other forms of regulation. Mrs Sally Macauley, Consumer Affairs Victoria, 2006.

There has been success using the Social Marketing framework in encouraging the adoption of environmentally friendly behaviors such as composting, recycling and conserving energy.

Another example of social marketing is as follows:

¹⁵ Ppt.: http://www.sprc.org/featured_resources/trainingandevents/conferences/co/pdf/SocMarket.pdf

¹⁶ <http://www.social-marketing.com/Whatis.html>

Energy conservation

The Pacific Gas and Electric Company in California offered homeowners free home inspections and advice on ways to make their dwellings more energy efficient. The advice was free and financing was available to make the recommended changes. Initially, the take-up of advice was low and the program was modified to incorporate two behavioral change techniques:

- The information provided was made more vivid and personal. Rather than simply identifying cracks under doors, 'the auditor would compare the crack to a hole the size of a basketball.'
- Auditors involved customers in the inspection, getting them to take measurements or read meters, for example.

As a result of the enhanced program, 60 per cent of homeowners made changes to improve the energy efficiency of their houses. This was more than three times the national average.

Public transport use

A pilot program was introduced in the United States to increase the use of urban bus services. The most effective strategy involved:

- providing participants with information on routes and schedules, and
- obtaining an agreement from participants to ride the bus twice a week.

Free bus tickets increased the number of rides per individual, but obtaining a commitment was more effective in encouraging new passengers to take the bus.

Figure 8. Examples of strategy in applying the Social Marketing Principle, (Consumer Affairs Victoria, 2006).

Due to poor enforcement the cobrança relies on voluntary behavior. Social Marketing seems a perfect tool. As the above examples illustrates, understanding what the customer needs, wants, or fears is key to a successful campaign, as is constant re-evaluation of the process, results, and desired outcomes.

Social Marketing: Applying It to Cobrança

According to Kotler et.al, one key element to a successful campaign provides an indication that social marketing would work well to encourage users (in the PSRB) that are not currently paying cobrança or are paying too little (2002). Campaigns increase chances of success when they start with those target audiences that are most ready for action; those featuring one or more of the following characteristics:

- A want or need that the proposed behavior will satisfy or a problem it will solve.

- The information regarding the benefits of the behavior and the costs of current or alternative behaviors.
- The belief that they can actually perform the behavior and experience important benefits.
- Engagement in the desired behavior, though not on a regular basis, and the perception of some initial benefit.

I contend that the stakeholders in this reform are in fact, “ready for action.” The industrial sector has engaged in the desired behavior, to pay the cobrança, and it is clear from their effort to preempt the process that they are able to pay the cobrança and recognize the benefits of doing so. The agricultural sector has either not paid or paid very little, arguing that it cannot afford the fees. Therefore, I believe that Social Marketing can affect reform. The following table is a tool for thinking through the necessary steps for planning a Social Marketing campaign:

Table 4: Social Marketing Plan Outline (Kotler, et.al, 2002)

<p>Where are we? <i>The Social Marketing Environment</i></p>	<p>Step 1:</p> <ul style="list-style-type: none"> ▪ Determine the program focus ▪ Identify campaign purpose ▪ Conduct an analysis of Strengths, Weaknesses, Opportunities and Threats (SWOT) ▪ Review past and similar efforts
<p>Where do we want to go? <i>Target Audiences, Objectives, and Goals</i></p>	<p>Step 2: ▪ Select target audiences</p> <p>Step 3: ▪ Set objectives and goals</p> <p>Step 4: ▪ Analyze target audiences and the competition</p>
<p>How will we get there? <i>Social Marketing Strategies (the four Ps)</i></p>	<p>Step 5:</p> <ul style="list-style-type: none"> ▪ Product: Design the market offering ▪ Price: Manage costs of behavior changes ▪ Place: Make the product available ▪ Promotions: Create messages <ul style="list-style-type: none"> ○ Choose communication channels
<p>How will we stay on course? <i>Social Marketing Program Management</i></p>	<p>Step 6: ▪ Develop a plan for evaluation and monitoring</p> <p>Step 7: ▪ Establish budgets and find funding sources</p> <p>Step 8: ▪ Complete an implementation plan</p>

For example, the questions, “Where are we?” and “Where do we want to go?” have been addressed by the law itself. The process was guided by the Dublin principles and further informed by water management practices in France. The main purpose for such a major undertaking was to decentralize water resource management and make bulk water users more responsible for their actions. The law also promotes improved stewardship in presumably ensuring a quality supply of water for generations to come.

In her paper, “What is Social Marketing?” Nedra Kline Weinreich discusses what she calls the “marketing mix” (2006). Weinreich’s strategy for planning a social marketing campaign takes the customer focus into account by addressing the elements of the marketing mix: product, price, place, promotion, public, partnership and the purse strings.

Following this model, a possible marketing mix strategy for cobrança and water conservation would be:

- The **Product** is one or all of these three behaviors: full participation in the cobrança process, i.e. paying the set price for bulk water consumption and subsequent pollution; obtaining a permit to use water from the appropriate state or federal water agency; attending “river basin committee” meetings featuring updates in the cobrança process and education about best management practices.
- The **Price** of engaging in the above behaviors include: the monetary loss for payment of cobrança, inconvenience of maneuvering the permit (outorga) process and loss of time resulting from the preceding actions.
- **Place**: In Social Marketing, place refers to the way consumers are reached, and the accessibility and ease of doing the prescribed behavior. Suggestions for connecting with more users include:
 - Establishing satellite committee offices, extension services, mobile water quality testing labs and mobile permit facilities where users can receive help applying for permits.
 - Identifying community contacts to use as information clearinghouses. Utilize churches and other religious organizations to spread the word about proper procedures and also as a means to extract feedback from more rural areas.
 - Providing water-testing kits with simple instruction to landowners and farmers so that they are able to monitor their own water quality.
 - Radio spots and television commercials [may be more effective with more urban audiences]—may cause industry to cooperate with the reform in order to keep a good reputation in the public eye.

- **Promotion** could be done through public service announcements, billboards, mass mailings, media events and community outreach.
- **Partnerships:** Figure out which organizations have similar goals to CEIVAP--not necessarily the same goals--and identify ways you can work together because one agency cannot do it all. Though CEIVAP is comprised of numerous groups and partnerships, further outreach is necessary to reach their audiences. Such additional groups may include: the Federation of Family Agriculture Workers (FETRAF), the National Confederation of Agricultural Workers (CONTAG), the Brazilian Confederation of Agriculture and Livestock (CAN), financiers such as the National Programme for Strengthening Family Agriculture (PRONAF) and private consulting firms like FNP Consultoria & AgroInformativos, São Paulo.
- **Publics:** Second to identifying the desired behavior change, identifying the target audience is the most important objective for a Social Marketer.
 - CEIVAP must decide where to concentrate its efforts. I suggest the following three “customer groups”¹⁷: small southeastern farmers; large, commercial farm owners (Agribusiness); and members of the large industrial leaders in the basin. Other potential actors include farm equipment and chemical salesman, local government representatives, banks, and of course the technical chambers within CEIVAP itself.
- **Purse Strings:** The fees that have been paid are one important source of monies that CEIVAP can use. But, by maximizing the resources and links that they will have access to due in part to partnerships, a good deal of their initiatives may be covered in kind or from private funding.

All aspects of the marketing mix must be taken into consideration during the planning process.

Chapter VII: Conclusion

It is important to have an informed citizenry for the purpose of affecting any type of social or policy change. In terms of water resources, Brazil has been faced with quantity and quality problems that can no longer be ignored. The historical norm that water is a public good that should not be paid for is a major hurdle to the success of accomplishing the goals set forth by the reformed water law. However, the connections between the responsibilities of land stewards and the negative environmental impacts as a result of prior norms are now being made.

By encouraging water conservation and discouraging pollution, cobrança is the main tool by which decision makers can reach the goal of sustainability in the watershed. Such a new

¹⁷ Andreason prefers to call the target audience customers in an effort to draw “attention to the active role the target person plays in the process.” P.8

concept for many in the PSRB has made extracting buy-in from bulk water users slow in achieving; however it is picking up momentum. Because the cobrança relies on voluntary behavior Social Marketing seems a perfect tool. In this theoretical framework, Lindblom deems exchange as an essential relationship in marketing. “One party gives up something to get something from another party” (Rothschild, 1999). Social Marketing constitutes a type of persuasion: an unspoken negotiation between the marketer and the target audience. Social Marketing has been used extensively in international health programs, especially for contraceptives and oral rehydration therapy (ORT), and it is being used with more frequency in the United States for such diverse issues as drug abuse, heart disease and organ donation (Weinreich, 2006). Social Marketing is simply a means to change behavior in society.

Appendix A: A Look at Some of the Basin Industry

Companhia Siderúrgica Nacional (CSN) and the city of Volta Redonda, RJ

Leading the increase in the industrial activity of the basin was the creation of da Companhia Siderúrgica Nacional (CSN) which was founded in 1946 and subsequently provided for the city of Volta Redonda. This huge company resulted in the economic integration of the states Rio de Janeiro and São Paulo (Gruben et. al, 2003).



Figure 9: http://encarta.msn.com/map_701517472/Volta_Redonda.html

CSN began as a state owned entity (privatized in 1993) that owes its conception largely to World War II. In 1940, due to a lack of advancement in the area, Brazilian steel was produced in furnaces using charcoal. The country imported nearly 70 percent of its annual consumption of iron and steel, raw and manufactured products (Long, 1948). Between the years of 1937 and 1939, Germany was the principle source of iron and steel crude. It accounted for 34 percent of the total Brazil imports. The United States supplied 33 percent during that time with England being Brazil's third largest source (6 percent) of imports. Such dependence upon uncertain

foreign markets gave Brazil a reason for desiring a domestic industrial center, which it created with the construction of CSN in Volta Redonda. “Even with a rapidly increasing steel industry based on charcoal, material reduction of imports was not easy because of the quantity and variety of products required. This was the fundamental reason for the development of the plan to construct the large-scale works at Volta Redonda to be financed by joint capital from the United States¹⁸ and Brazil” (Long, 1948).

Volta Redonda was chosen for CSN’s plant in 1941 because of its location in the Paraíba Valley between the two metropolitan areas of Sao Paulo and Rio de Janeiro (industrial Sao Paulo and the port of Rio). “...within a radius of 250 miles of the site falls 68 percent of Brazil’s steel consumption, and 80 percent lies within a radius of 375 miles” (Long, 1948). The Paraíba do Sul River provided ample water to the mills for production. It was thought, by proponents at the time that “cheap” water transport was available to move coal from the mines of Santa Catarina to the ports of Rio and then to move to Volta Redonda by way of existing rail lines. Iron ore was transported south from mines in Minas Gerais on existing railroads (Long, 1948). The United States and Great Britain became worried about their decreasing supplies of high-grade ore, so improvements to existing transportation infrastructure was made by American (North) engineers during the war. Over \$10 million (US) was invested in the town in order to accommodate the many workers that would settle there (Long, 1948).

In the 1960s, CSN provided everything from housing and health care, to water and electricity for much of the population of Volta Redonda (Bensen, 2005). CSN is (currently) a major company in global steel, exporting to more than 50 countries. It is self-sufficient in energy

¹⁸ \$45 million came from the U.S. Export-Import Bank, Time Magazine, October 21, 1946. Vol. XLVIII. No. 17. Accessed: 7-28-05. <http://time-proxy.yaga.com/time/archive/preview/0,10987,855503,00.html>

and iron ore and has its own port and railway, allowing it to have some of the lowest production costs in the world...¹⁹



Figure 10: Picture taken on the grounds of CSN: July 2003
This is one step for their industrial water use; the water is fairly clear.

Companhia de Saneamento do Estado de Sao Paulo (SABESP)²⁰

The main concern of declining water quality in the basin is primarily a result of limited wastewater treatment (largely from sewage flowing from favelas and urban centers) and industrial pollution. (Formiga and Scatasta, forthcoming)

At the end of 1994, the São Paulo State Sanitation Company (SABESP) was financially and operationally going through an unprecedented crisis which compelled it to take out short-term loans to cover outstanding debts of approximately \$ 766 million (US). At the time, SABESP was responsible for providing services to 331 municipalities in the state of Sao Paulo and the company did not have the volumes of water needed to address all of its consumers (SABESP, 2001). To save the company, a group of technicians decided develop a New Management Model for wastewater treatment. The central premise of SABESP's New

¹⁹ Excerpt taken from the newspaper article written by Todd Bensen, titled "Brazilians are fuming in a company town." 2005.

²⁰ Company Profile: <http://www.reuters.com/finance/stocks/companyProfile?symbol=SBS.N>

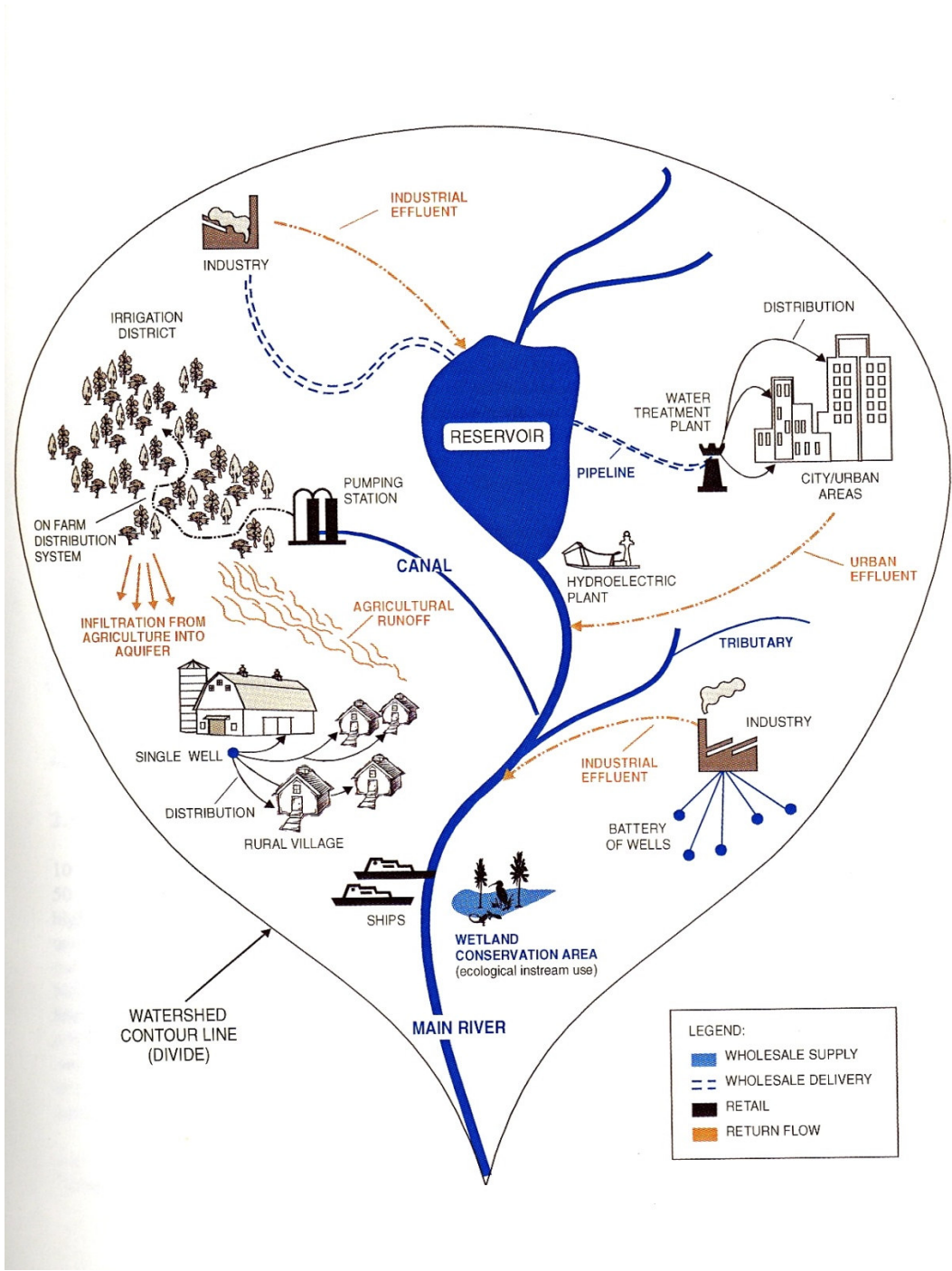
Management Model was to set up a decentralized organizational structure that would be managed by businesses in the region with the autonomy to administer their resources. Two new user categories were created in the context of the re-vamped tariff system.

“The slum-residential category provides a significant subsidy for consumption brackets of up to 30 m³/month...The popular-residential category guarantees access to services for low-income populations (up to 3.5 times the minimum monthly wage)” (Best Practices Database, 2001). The changes resulted in a financial, steadfast, and social turnaround for the company which now is able to adequately serve 24.6 million persons (approximately 70% of the state's population)” (Consumer Affairs Victoria, 2006.)

Coinciding with the country's water legislative changes, SABESP also mirrored the principals of the water reform and was able to learn the following about the process:

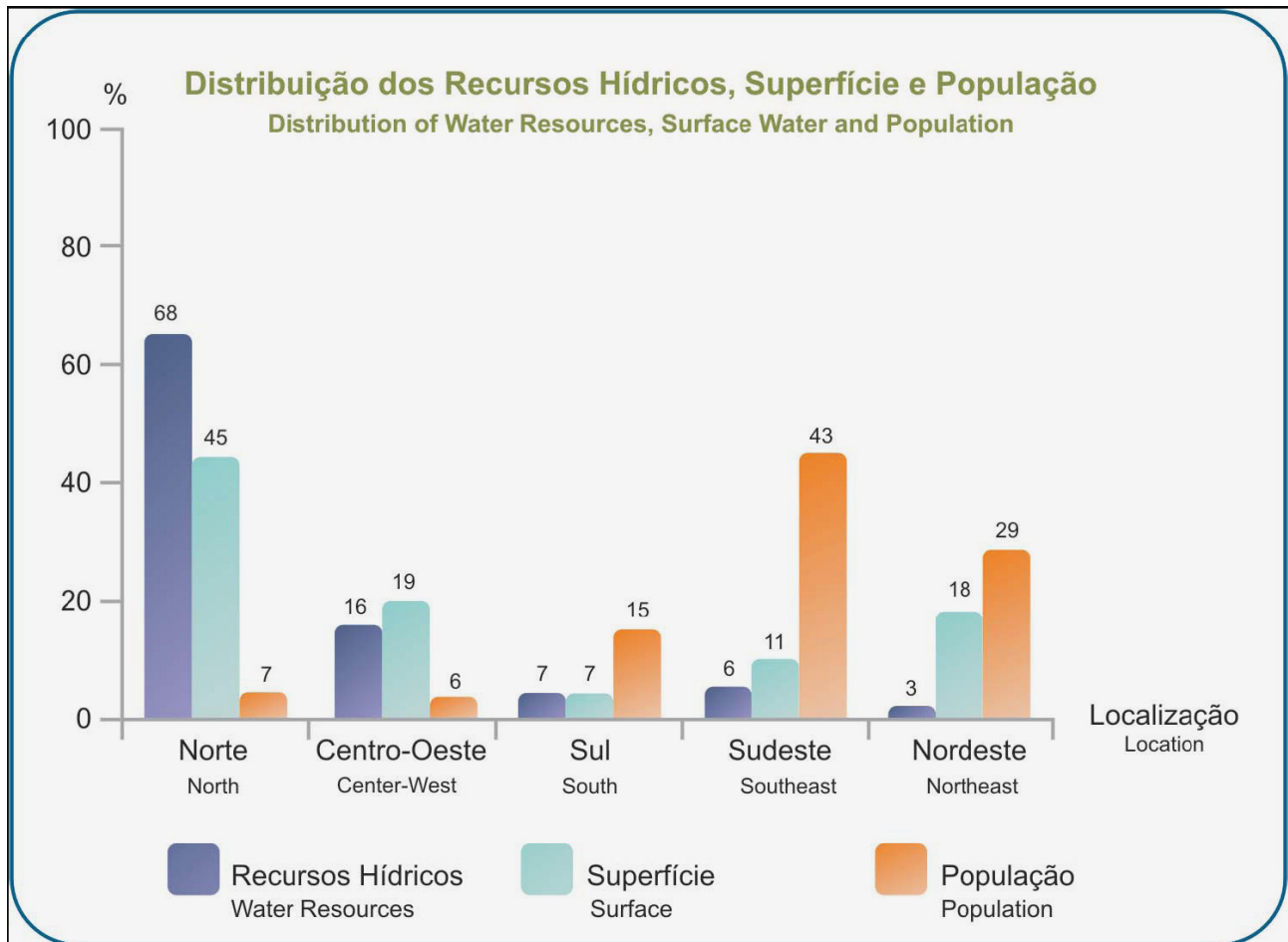
- Participatory management proves that the best way to address the population's needs is by setting up channels of communication and participation for making business decisions.
- The regionalization of the company, compatible with the legislation on water resources (especially regarding river basins) and sanitation, has proved to be the most effective policy.
- The regional scope favors safely moving toward combining services, since there are municipalities with profitable systems operating side-by-side with less well-equipped municipalities.
- The decentralized business units are able to work closely with the population and therefore have much more sensitivity in serving its customers.

Appendix B: Water Supply Chain



Water Supply Chain

Appendix C: Water Distribution



Illustrates the uneven distribution of water in Brazil (ANA, 2004).

Appendix D: List of Abbreviations

- ANA: Agência Nacional de Agua, National Water Agency
- AGEVAP: Agência do Vale do Paraíba, Paraíba Valley Agency
- CAN: Brazilian Confederation of Agriculture and Livestock
- CBH-PS: Comitê da Bacia Hidrográfica do Rio Paraíba Do Sul
- CEEIVAP: Comitê Executivo de Estudos Integrados da Bacia Hidrográfica do Rio Paraíba do Sul—Executive Committee for the Integrated Studies of the Paraíba do Sul Basin
- CEIVAP: Comitê para Integração da Bacia Hidrográfica do Rio Paraíba Do Sul
- CESAMA: Companhia de Saneamento Municipal
- CIESP: Centro das Indústrias do Estado de São Paulo
- CNRH: Conselho Nacional de Recursos Hídricos, National Water Council
- CONTAG: National Confederation of Agricultural Workers
- COPPE: Computer Science Department, Graduate School of Engineering, Federal University of Rio de Janeiro
- COPPETEC²¹: Fundação Coordenacao de Projetos, Pesquisas e Estudos Tecnologicos
- CSN²²: Companhia Siderúrgica Nacional
- DAEE: Departamento de Águas e Energia Elétrica
- DNAEE: Departamento Nacional De Águas e Energia Elétrica, National Water and Electrical Power Department
- FETRAF: Federação dos Trabalhadores na Agricultura Familiar, Federation of Family Agriculture Workers
- FIRJAN: Federação das Indústrias do Estado do Rio de Janeiro,
- IBDF: Instituto Brasileiro de Desenvolvimento Florestal
- IBS: Instituto Brasileiro de Siderurgica, Brazilian Steel Institute
- MG: Minas Gerais
- PRONAF: Programa Nacional de Fortalecimento da Agricultura Familiar, National Program for the strengthening of Family Agriculture
- PSR: Paraíba do Sul River
- PSRB: Paraíba do Sul River Basin
- RJ: Rio de Janeiro
- RJMR: Metropolitan Rio de Janeiro Region
- SABESP: Companhia de Saneamento Basico do Estado de Sao Paulo
- SAAE: Serviço Autônomo de Água e Esgoto, Municipal Water and Sanitation Service
- SP: São Paulo
- UNDP: United Nations Development Programme

²¹ A special operations division of the Federal University of Rio de Janeiro

²² The second major steel-maker company in Brazil

Bibliography

Abers, Rebecca and Keck, Margaret. 2004. "Running Water: Participatory Management in Brazil." NACLA Report on the Americas. New York: July/Aug. 38(1), 29-33.

Agência Nacional de Águas (ANA, The National Water Agency). "The Evolution of Water Resources Management in Brazil." 2004. <http://www.ana.gov.br/ingles/Portais/04-evolution.html>

Asad, Musa and T. de Azevedo, Luiz Gabriel. 1999. "The Political Process behind the Implementation of Bulk Water Pricing in Brazil." 2/25/2003. http://emedia.netlibrary.com/reader/reader.asp?product_id=38895.

Batista, Fabiana. 2005. "Cobrança pela água assusta produtor do São Francisco." O Estado de São Paulo, Agrícola. Accessed 4/16/2008 from Worldlingo.com.

Bensen, Todd. (of the New York Times). "Brazilians are Fuming In a Company Town." International Herald Tribune Online. May 18, 2005. Accessed: August 2, 2005. <http://www.iht.com/articles/2005/05/17/business/steel.php>

Best Practices Database. "New Management Model for Sanitation - SABESP, Sao Paulo, Brazil". 2001. http://hq.unhabitat.org/cdrom/water/HTML/bestpractice_brazil.htm.

Braga, Benedito P.F. , Strauss, Clarice. And Paiva, Fatima. "Water Charges: Paying for the Commons in Brazil." 2003. http://www.iadb.org/sds/doc/Water_Pricing_and_Pub-Pri_Partnership-5.pdf

Cardoso, Fernando Henrique. 1997. Lei Nº 9.433. Brasilia, 8 January 1997; 176th year of Independence and 109th of the Republic. http://faolex.fao.org/cgi-bin/faolex.exe?rec_id=009920&database=FAOLEX&search_type=link&table=result&lang=eng&format_name=@ERALL

Columbia Encyclopedia. The Columbia Electronic Encyclopedia, Sixth Edition Copyright © 2003, Columbia University Press. Licensed from Columbia University Press. All rights reserved. www.cc.columbia.edu/cu/cup/

Dictionary. The American Heritage® Dictionary of the English Language, Fourth Edition Copyright © 2007, 2000 by [Houghton Mifflin Company](http://www.houghtonmifflin.com). Updated in 2007. Published by Houghton Mifflin Company. All rights reserved.

Consumer Affairs Victoria. 2006. "Social Marketing and Consumer Policy." Research Paper No. 4 March 2006. BLS Printing, Melbourne, Victoria, AU. [http://www.consumer.vic.gov.au/CA256902000FE154/Lookup/CAV_Publications_Reports_and_Guidelines/\\$file/social_marketing.pdf](http://www.consumer.vic.gov.au/CA256902000FE154/Lookup/CAV_Publications_Reports_and_Guidelines/$file/social_marketing.pdf)

COPPETEC Fundação: "Plano de Recursos Hídricos para a Fase Inicial da Cobrança na Bacia do Rio Paraíba do Sul Metas de Racionalização de Uso, Aumento da Quantidade e

Melhoria da Qualidade dos Recursos Hídricos.” PGRH-RE-010-R0 - Volume 4. 2002. pg. 11.
<http://www.ceivap.org.br/downloads/pgrh-re-010-r0-vol4.pdf>

Drummond, José and Barros-Platiau, Ana Flávia. 2006. LAW & POLICY, Vol. 28, No. 1, January 2006 ISSN 0265–8240. Baldy Center for Law and Social Policy and Blackwell Publishing Ltd.

Esteves, Bernardo. 2007. "Zero Tillage: Brazil's own Green Revolution." Science and Development Network. www.scidev.net

Faganello, Célia Regina Ferrari. 2007. "Fundamentação da cobrança pelo uso da água na agricultura irrigada, na microbacia do Ribeirão dos Marins, Piracicaba/SP." *Ecologia de Agroecossistemas* by Universidade de São Paulo.

Formiga-Johnson, Rosa Maria. 2000. "Redefining Brazil's Water Management System: The Cases of the Paraíba do Sul and Curu River basins." World Bank. PowerPoint Presentation slides. Accessed:
http://lnweb18.worldbank.org/essd/essdext.nsf/18DocByunid/E48F12E6COE3185256B83005812FO?SFIDE/ROSA_PRES_fin.ppt

Formiga-Johnsson, Rosa Maria and Kemper, Karin, "Institutional and Policy Analysis of River Basin Management: The Jaguaribe River Basin, Ceara, Brazil" (June 2005). World Bank Policy Research Working Paper No. 3649 Available at SSRN: <http://ssrn.com/abstract=757424>

Formiga-Johnsson, R., Kumler, L.M., and Lemos, M.C. 2008. "The politics of bulk water pricing in Brazil: lessons from the Paraíba do Sul River Basin." *Water Policy*.

Formiga-Johnson, Rosa Maria; Scatasa, Monica. (pending). "One Brazil? The Impact of Regional Differences on Brazil's New Water Management System: An Analysis of its Implementation in the Paraíba do Sul and Curu River Basins." Capítulo do Livro G. Alaerts (ED.), *River Basin Management*. Washington: Resources for the Future, Forthcoming.

Garrido, Raymundo. March 2005. "Price Setting for Water Use Charges in Brazil." *Water Resources Development*, Vol.21, No. 1, 99-117.

Gruben, Anna; Lopes, Paula; Johnson, Rosa Formiga. 2003. "Bacia Hidrográfica do Rio Paraíba do Sul (São Paulo, Rio de Janeiro, Minas Gerais)," in Rosa Formiga Johnson and Paula Duarte Lopes (eds.), *Projeto Marca d'Água: seguindo as mudanças nas gestão das bacias hidrográficas do Brasil: Caderno 1: Retratos 3X4 de Bacias Hidrográficas*. Brasília: Finatec, 110-117.

Guimarães, Roberto P. (1991). "The Formation of Environmental Policies in Brazil." In *The Ecopolitics of Development in the Third World: Politics and Environment in Brazil* (Boulder: Lynne Rienner Publishers).

Hackett, S. C., Lyon, T. P & J.W. Maxwell. (1998). "Self-regulation and Social Welfare: The Political Economy of Corporate Environmentalism." *Nota Di Lavoro*, 55.

Jordan, Jeffrey L. 1999. "Pricing to Encourage Conservation: Which Price? Which Rate Structure? Water Resources Update." *Universities Council on Water Resources. Issue No. 114: Winter 1999 Management of Water Demand: Unresolved Issues* p. 34-37

Keck, Margaret E. Water, Water, Everywhere, Nor Any Drop to Drink: Land Use and Water Policy in São Paulo, Brazil. 2002. Berkeley: University of California Press.

Kelman, Jerson. 2003. Ppt. "Water Resources Management: Bridging the Gap Between Theory and Practice." 13th Stockholm Water Symposium. 11 de Agosto 2003.

Kerr do Amaral, Helena. 1996. "Brazilian Water Resource Policy in the Nineties." Instituto Cultural Minerva. Institute of Brazilian Business and Public Management Issues. The George Washington University. Washington, D.C. p. 1-22.
<http://www.gwu.edu/~ibi/minerva/Fall1996/Helena.Kerr.Amaral.html>

Kotler, Philip; Roberto, Ned; and Lee, Nancy. 2002. Second addition. "Social Marketing: Improving the quality of life." Sage Publications. Chapter 1 p. 11, 29, 53.

Kumler, L.M. (2005). "Old Institutions and New Approaches to Sustainability: Creative Cooperation in Managing Waters of the Paraíba do Sul Basin." MSc. Thesis, University of Michigan, Ann Arbor.

Kumler, Lori and Lemos, Maria Carmen de Mello. 2005. (in press). "Managing waters of the Paraíba do Sul Basin: A Case Study in Institutional Implementation and Change." *Water Policy*.

Lemos, Maria Carmem and João Lúcio Oliveira (2004). "Can water reform survive politics? Institutional Change and River Basin Management in Ceará, Northeast Brazil." *World Development*, 32(12), 2121.

Long, Robert G. "Volta Redonda: Symbol of Maturity in Industrial Progress of Brazil." *Economic Geography*, Vol. 24, No. 2. April, 1948. p. 149-154. Accessed: Wed. July 13, 2005.
<http://www.jstor.org>.

McKenzie-Mohr, Doug and Smith, William. 1999. Fostering Sustainable Behavior: An Introduction to Community Based Social Marketing. New Society Publishers. 186 pgs.

Microsoft® Encarta® Online Encyclopedia 2005 "Rio de Janeiro (state)," <http://encarta.msn.com> © 1997-2005 Microsoft Corporation. All Rights Reserved.

Microsoft® Encarta® Online Encyclopedia 2005 "São Paulo (state)". <http://encarta.msn.com> © 1997-2005 Microsoft Corporation.

Rothschild, Michael L. 1999. "Carrots, Sticks, and Promises: A Conceptual Framework for the Management of Public Health and Social Issue Behaviors." *Journal of Marketing*. Vol. 63, p. 24-37.

Shaman, David. 1996. "Brazil's Pollution Regulatory Structure and Background." <http://siteresources.worldbank.org/NIPRINT/Resources/BrazilsPollutionRegulatoryStructureandBackground.pdf>

Social Marketing Institute. 2005. "Social Marketing." <http://www.social-marketing.org/sm.html>.

Sundararaman, Ramya and Arnold, Paula. 2008. "Social Marketing: Changing Attitudes, Creating Opportunities." Ppt.: http://www.sprc.org/featured_resources/trainingandevents/conferences/co/pdf/SocMarket.pdf

Weinreich, Nedra Kline. 2006. "What is Social Marketing?" Weinreich Communications <http://www.social-marketing.com/Whatis.html>

Wikipedia Encyclopedia, <http://en.wikipedia.org/wiki/Para%EDba>)

www.v-brazil.com

Zaverucha, Jorge. 1997. "The 1988 Brazilian Constitution and its Authoritarian Legacy: Formalizing Democracy while Gutting its Essence." *Journal of Third World Studies*, vol 15, no. 1 (Spring 1998): 105-24 [text is pp. 105-117].