



THE UNIVERSITY *of* EDINBURGH

Edinburgh Research Explorer

## Water Reforms in Brazil: Opportunities and Constraints

**Citation for published version:**

Ioris, AAR 2009, 'Water Reforms in Brazil: Opportunities and Constraints', *Journal of Environmental Planning and Management*, vol. 52, no. 6, pp. 813-832. <https://doi.org/10.1080/09640560903083756>

**Digital Object Identifier (DOI):**

[10.1080/09640560903083756](https://doi.org/10.1080/09640560903083756)

**Link:**

[Link to publication record in Edinburgh Research Explorer](#)

**Document Version:**

Peer reviewed version

**Published In:**

Journal of Environmental Planning and Management

**Publisher Rights Statement:**

This is an author's accepted manuscript of an article published in the Journal of Environmental Planning and Management copyright Taylor & Francis (2009). Available online.

**General rights**

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

**Take down policy**

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact [openaccess@ed.ac.uk](mailto:openaccess@ed.ac.uk) providing details, and we will remove access to the work immediately and investigate your claim.



# Water Reforms in Brazil: Opportunities and Constraints

Antonio A. R. Ioris

Addresses for correspondence:

School of Geosciences  
University of Edinburgh  
Drummond Street  
Edinburgh, UK  
EH8 9XP

This is the author's final draft as submitted for publication. The final version was published in the *Journal of Environmental Planning and Management* by Taylor & Francis (2009)

Cite As: Ioris, AAR 2009, 'Water reforms in Brazil: Opportunities and constraints' *Journal of Environmental Planning and management*, vol 52, no. 6, pp. 813-832.

DOI: 10.1080/09640560903083756

Made available online through Edinburgh Research Explorer

## **Water Reforms in Brazil: Opportunities and Constraints**

*Abstract:* The last decade saw repeated attempts to adopt and implement an integrated management of water in Brazil. Internationally established principles, such as water economics and public participation, have influenced the development of a novel regulatory framework for water use and conservation in the country. However, despite changes in policies and in the legislation, the opportunity to address old and new management problems has been largely frustrated by the internal contradictions of the ongoing institutional reforms. A case study of the Paraíba do Sul River Basin demonstrates the distance between, on one hand, calls for decentralisation and responsibility sharing and, on the other hand, the persistence of bureaucratised and exclusionary practices. The main distortion is the excessive effort expended on the introduction of water pricing and environmental charges, a controversial policy instrument that has dominated the agenda of the new river basin committee, at the expense of addressing river restoration, public mobilisation and environmental justice.

*Key words:* water regulation, IWRM, water charges, water pricing, public participation, Paraíba do Sul, Brazil.

### **Introduction**

The control and management of water resources played an important role in the industrialization and urbanization of Brazil in the last century. Particularly since the early 1930s, the exploitation of rivers, lakes, groundwater and the coast became an integral part of national and regional development programmes. In a few decades, the accelerated rates of economic growth, combined with inadequate environmental regulation and deficient public services, created a situation of growing environmental degradation and manmade water scarcity in many parts of the country (Ioris, 2007). It was especially during the military dictatorship (1964-1985) that hardcore economic development was exploited as a main legitimating strategy for the ruling regime. It was only after the end of the dictatorship that an open debate on the need to reform water regulation became politically possible. It took more than a decade of congressional discussion to approve the new Water Act in 1997 (Law 9433/1997), which primarily aims at the restoration of the environmental condition of water bodies and the improvement of water use efficiency. The main forum for stakeholder participation under the new law is the river basin committee, which congregates representatives from water users, government and civil society. The legislation introduced new regulatory instruments, such as plans, licences and environmental charges, and

established the National Water Resources Management System (SINGREH).<sup>1</sup> Crucially, the new legal framework encapsulates a fundamental tension between social and environmental demands and an increased emphasis on the economic value of water resources. This tension corresponds to the contrast in the priorities of local communities, business sectors and governmental agencies. As pointed out by Mollinga (2008), changes in water management are not simply a technical problem, but water politics are at the heart of its policies and management approaches.

In order to understand the ongoing reforms, it is necessary to recognise the influence of multilateral agencies, such as the World Bank, IADB, GEF and JBIC, on development of new policies and legislation in Brazil. These international organisations have sponsored the production of prominent technical guidance (e.g. the Water Resources Series published by the World Bank in 2003) and financed key infrastructure and capacitation programmes (the Federal Water Resources Management Project (PROAGUA) funded by the World Bank in 1997). According to Conca (2006), one of the most important principles that was exported to Brazil and influenced the emerging regulation is the concept of integrated water resources management (IWRM), which is defined by Davis (2007) as “a facilitated stakeholder process to promote coordinated activities in pursuit of common goals for multiple objective development and management of water founded in sustainable water resource systems” (see also Global Water Partnership, 2003). To a large extent, the IWRM doctrine provided the conceptual and methodological rationale for the new public policies and regulatory instruments that are now being applied to the solution of water problems in Brazil. It is relevant to mention also that the introduction of new water regulation in Brazil also coincided with a period of economic adjustment and reorientation of the role of the national state (The Economist, 14 Apr 2007), under pressures for market liberalisation and deeper insertion into the global economy (Mollo and Saad-Filho, 2006). The new economic policies and neoliberal development strategies have significantly shifted the framing of water problems and the formulation of (public and private) responses.

The aim of this essay is to examine the extent that the institutional water reforms have been able to answer to the pressing demands for environmental restoration and conflict resolution in Brazil. Our research focuses on a case study of the Paraíba do Sul River Basin (henceforth, PSRB). The analysis was based on a preparatory fieldtrip in 2006 and a main data collection campaign between March and May of 2007. In addition to informal contacts with local stakeholders, twenty semi-structured, confidential interviews were carried out (most were later complemented by further e-mail discussions) with industrialists, sanitation

companies, NGOs, government officials (from municipal, state and federal agencies) and river basin committee members. The study also involved content analysis of documentation and attendance to open meetings (including sessions of the river basin committee). The research followed the recommendation of Watts and Peet (2004) that the investigation of the relations between events, structures and mechanisms, through a stratified sense of reality, can deploy a toolkit to explain the world via the reconstruction of existing theories about ecological questions. Sayer (1992) also points out that explanation in social sciences emerges from the dialectical movement from the abstract (the isolation of particular attributes and relationships from the whole) and the concrete (the multiplicity of structures and events that comprise the world). Santos (2002a) adds that the researcher needs to recognize the causal powers of particular aspects (such as water charges and public participation in the case of this study) that have autonomy but are at the same time integral parts of the concrete totality. Before moving to the case study, it is first necessary to explore in more detail the IWRM proposition.

### **Interrogating the Institutional Water Reforms**

There is a growing awareness around the world today of problems related to water use and conservation, ranging from local issues, such as river pollution and lack of water supply, to global challenges associated with climate change and desertification. This rising concern with the need to better manage water systems is reflected in the daily coverage of the mass media and in the work of academics and universities (for example, in Britain alone there are more than 60 master degrees on water-related topics). Issues of water management are certainly not new, but had already been considered by economists, engineers and philosophers at least since the 19<sup>th</sup> century. In the first decades of the 20<sup>th</sup> century, water management became associated with regional development and economic growth, such as the experience of the Tennessee Valley Authority (TVA) in the 1930s. The TVA example later influenced the construction of dams and expansion of water infrastructure all over the world (e.g. some of the largest dams were built in Brazil in the 1960s and 1970s). However, before too long, it became evident that water engineering and the unchecked exploitation of water resources were causing widespread environmental impacts and, in many cases, frustrating public demands. Concepts and techniques started to be revised in the last quarter of the 20<sup>th</sup> century and began to emphasise the integration of environmental conservation

with multiple uses of water and the interface with other landscape processes (such as land use and urban expansion).

The concept that better epitomises the contemporary attempts to improve water management is the aforementioned IWRM (Molle, 2006), which has two fundamental pillars: public participation and the recognition of the economic value of water. Other related notions, such as ‘adaptive management’ and a ‘transition management’, have also expanded the academic literature that underpins the institutional reforms in the water sector (Craswell et al., 2007). One of the best examples of the translation of such concepts into public policies was the approval of the Water Framework Directive (Directive 2000/60/EC) in Europe in the year 2000, a comprehensive piece of legislation that try to address water problems from ‘source to mouth’. However, the transition from old to new approaches, in Europe and elsewhere, has not been without tension and controversy. On the contrary, there have been major difficulties to follow the timetable and the objectives set up by the new water policies (European Commission, 2007). To comprehend the controversies around the current attempts to regulate and manage water, it is necessary to examine the contradictions of the governing theory of water regulation. Technical insufficiencies, local resistance by water mangers and lack of coordination between public agencies have already been identified as serious limitations of the new approaches (e.g. Fischhendler, 2008; Funke et al., 2007), but the more fundamental weaknesses of the IWRM doctrine are not normally acknowledged. For explanatory purposes, Table 1 presents a typology of the intrinsic shortcomings of the IWRM model, which are discussed below.

Limitation	Key Evidences	Negative Consequences
Epistemological	vague conceptualisation on what should be integrated	analytic confusion; reductionist agenda of integration
Operational	uncertainty on how to integrate and the sequence of steps	little improvement; implementation gridlock
Political	top-down water reforms; decisions controlled by the stronger groups	emergence/maintenance of conflicts; elite capture

*Epistemological limitation:* despite numerous efforts to conceptualise the meaning of integrated water management, its epistemological grounds remain unclear and uncertain. Although many scholars insist on the need to converge plans and integrate procedures (e.g. Bongartz, 2003; Faby et al., 2005; Hendry, 2006), the mechanisms and the details of integration are hardly ever explained. Quite the opposite: most of the literature presents

IWRM as a vague combination of aspirational (i.e. something needs to be done to solve current water problems) and exhortative measures (i.e. all sectors and groups should be involved in shared problems), without indicating how the communication between geographical areas and water user sectors can be achieved. Instead of resolving the elusiveness behind the principle of integration, some authors suggest an association of IWRM with other regulatory mechanisms, such as with the planning system (Kidd and Shaw, 2007), but this strategy is not able to elucidate how integration can be achieved. Others advocate the simple abandonment of IWRM objectives, such as Biswas (2008), who prefers a return to the narrow, technical approaches that characterised the past decades of water management. There is an obvious parallel here with similar concepts like sustainability or democracy, which produce only a superficial level of agreement, whilst the more tangible implications remain ambiguous and contested.

*Operational limitation:* because of its fluid conceptualisation, there has been a constant hesitation among water managers to adopt the IWRM methodology. Anand (2007) criticises the fact that, according to IWRM, all water users should be allocated to uses that maximize the net benefits, regardless of whether they are in an upstream state or a downstream state, and irrespective of group differences and cultural issues. Because of this idealised approach to water problems, IWRM is possible only if there is high degree of cooperation between water users and, in the case of a water dispute, “IWRM can at best be a distant goal” and “it is not clear whether it can guarantee sustainability requirements” (Anand, 2007: 115). Because elusive claims for wide-ranging integration alone seem unable to offer much guidance, practitioners and regulators tend to pick and choose only those aspects of the IWRM that appear more feasible. The recent experience shows that in many cases where IWRM has been tried, local water managers are inclined to drop the more ambitious goals of integration and normally restrict their intervention to a small number of workable management options (Blomquist and Schlager, 2005). Attempts to integrate policy reforms and achieve better water governance (as postulated by Galaz, 2007) are also constrained by the policy inertia settled over environmental regulatory agencies (Kirk et al., 2007).

*Political limitation:* the epistemological and operational limits of IWRM mentioned above seem to have a more elemental source, which is the difficulty to accept the politicised basis of water management. There is a persistent reluctance among decision-makers to recognise the mechanisms of exclusion from access to water, or the relationship between flows of water

and the circulation of power and money (Swyngedouw, 2004). Most of those sponsoring the IWRM agenda hesitate to admit that the differences between social groups can have a major influence on water allocation and on the distribution of negative impacts. It has been observed elsewhere that a critical limitation of IWRM is the entrenched mindset of water managers and hydrologists, who consider socioeconomic and political issues a deviation from the 'purist' goals of water management (McCulloch and Ioris, 2007). Some may even concede the relevance of political disputes, but argue that water conflicts as merely a form of circumstantial nuisances to be overcome or avoided and not a permanent feature of water management (Blomquist and Schlager, 2005). Many attempts that try to relate water management with broader governmental reforms also fail to hit the political core and, in particular, ignore complex social, economic, material and discursive arrangements (Köhler, 2005). Against the denial of the political dimension of water management, Swatuk (2005) recommends that it is important to reconsider and be prepared to revise the basic assumptions driving IWRM-based reforms.

Because of these intrinsic shortcomings, many experiences informed by the IWRM theory have fallen short of addressing the full extent of the nexus between economic growth, environmental degradation and socio-political injustices. That represents is a major weakness of the new regulation model, specially considering that, in countries such as Brazil, conflicts over natural resources are linked to systems of political control established since the colonial period (Bryant, 1998). It is not by chance that the same groups with less political power normally have fewer opportunities to have access to natural resources and suffer from a lower quality of the local environment. Social inequalities are systematically translated into an asymmetric distribution of information (Goldin et al., 2008), the exclusion of the weaker groups from water regulation (Zhouri and Oliveira, 2005) and the centralisation of the decision-making in the hands of higher authorities (Batterbury and Fernando, 2006; van der Zaag, 2005). Conventional approaches to public participation, such as advocated by IWRM, have a tendency to override existing decision-making processes, reinforce the interests of the already powerful and remove other perfectly legitimate management mechanisms (cf. Cooke and Kothari, 2001). The alternative is the promotion of genuine participatory strategies, which require both the transfer of power to the local level and an effective accountability of the political representation (Larson and Ribot, 2004; Ribot, 2002). Hickey and Mohan (2005) indicate that participatory approaches are more likely to succeed where they are pursued as



part of a wider radical political project with the involvement of currently marginalized groups.

The remaining of this essay will discuss the IWRM experience in the PSRB in the light of the above observations. This is a river basin where old management approaches, based on supply augmentation and river engineering, are now being replaced by new practices based on demand management inspired by the IWRM theory. Despite changes in the official discourse of governmental agencies and the local river basin committee, the next pages will show that the inherent limitations of IWRM-informed regulation have prevented the achievement of satisfactory responses to environmental and social problems. The main innovative contribution of this study is the fact that, while some publications have addressed the problems of water management in the PSRB, less attention has been given to the power nuances of the water regulatory reforms.

### **Case study of the Paraíba do Sul River Basin (PSRB)**

#### *The river basin*

The PSRB is located in the southeast of Brazil (Figure 1) and is one of the country's most dynamic economic areas, currently responding for around 11 per cent of the national GDP. Its strategic location and the abundance of natural resources provided favourable conditions for the expansion of cities, industries and agriculture in the river basin.<sup>2</sup> Already in the 18<sup>th</sup> Century, the Paraíba do Sul was the main communication route between the coast (Rio de Janeiro) and inland gold mines in the state of Minas Gerais. With the introduction of coffee production in the 1770s, vast areas of land were cleared in the river basin and the natural vegetation removed to open space for plantation farms.<sup>3</sup> By the end of the 19<sup>th</sup> Century, because of the significant rates of soil erosion and land degradation, coffee production started to decline. A new and stronger economic phase commenced around 1900 with the opening of textile and food industries in the Paraíba do Sul. The most significant milestone was the foundation in 1941 of the National Steel Company, the first major steel plant in Brazil. The proximity to the main consumer centres (Rio de Janeiro and São Paulo) facilitated the rapid development of a diversified industrial activity (Müller, 1969), which currently includes more than 8,500 manufacturing units (CEIVAP, 2001). In addition, there are more than 120 hydropower stations in operation in the river basin (seven with more than 50MW of installed capacity).

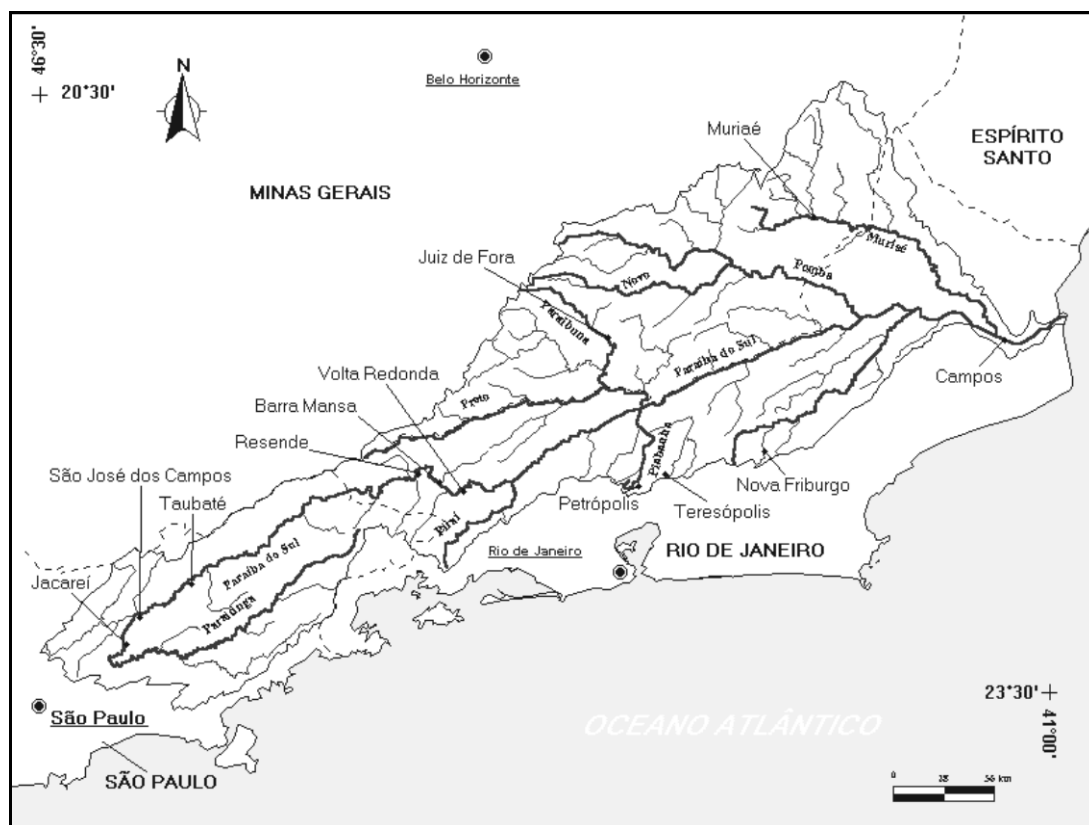


Figure 1: The Paraíba do Sul River Basin between the states of São Paulo, Minas Gerais and Rio de Janeiro in the southeast of Brazil (Source: CEIVAP, 2001)

Coffee production and industrialisation marked the development in the 19<sup>th</sup> and 20<sup>th</sup> centuries, but economic growth came at a high environmental cost. If the local economy benefited from the strategic location and abundance of natural resources in the river basin, economic development left a lasting legacy of river degradation and stakeholder conflicts (Aquino and Farias, 1998). It led to serious disputes between upstream and downstream water users related to the impacts of environmental degradation and the failure to observe environmental legislation (Gruben et al., 2002). Treacherous biological conditions are particularly evident in the middle section of the Paraíba do Sul River where most of industry and hydroelectricity are located (Araujo et al. 2003). The more polluted river stretches have rates of coliform bacteria between 50 and 160 times the legal threshold; water pollution is aggravated by the fact that only 17.6% of the catchment sewage receives some form of treatment (Coppetec, 2006).<sup>4</sup> The total rate of water demand amounts to 263 m<sup>3</sup>/s, which represents a significant pressure on available water resources (it is more than 74% of the low flows - see reference to Q<sub>95</sub> in 'note 2'). In addition, there are 256 sites of sand extraction for civil engineering, where the total evaporation of water (i.e. water loss) is equivalent to the

water demanded by 326,000 inhabitants or 6% of the river basin population (Dos Reis et al., 2006).<sup>5</sup>

### *The introduction of the new regulatory framework*

During most of the 20<sup>th</sup> century, water management in the PSRB was characterised by the expansion of urban water use and hydropower generation. Because of the low levels of investment in effluent treatment and environmental restoration, in a few decades the quality of the environment in the main river and in many of its tributaries was seriously compromised. The decision on where and how to manage water was centralised on the hands of the central government and followed mainly technical and economic criteria. The first, timid efforts to regulate water use in the PSRB took place in the upstream section (in the state of São Paulo) in 1939 with the organisation of the Paraíba Valley Improvements Service, an initiative inspired in the TVA experience and that aimed the hydroelectric exploitation of the river basin. The federal government's initial attempt to deal with the mounting water problems was the formation of the Paraíba do Sul Valley Commission (COVAP) in 1968. The commission was unsuccessful and was replaced in 1979 by a multiministerial committee (CEEIVAP), also with negligible results. The membership in both organisations was restricted to public agencies and civil servants, with limited input from water users and other stakeholders. The PSRB became notorious as an area with serious water quality and quantity problems, while national and state administrations were doing little to reverse the downward environmental trend (see CEIVAP, 2001).

It was only in the 1990s, when the level of pollution started to attract international condemnation and the reform of the national regulatory framework was being discussed in the parliament, that the Paraíba do Sul River Basin Committee (CEIVAP) was eventually established. CEIVAP is the official forum for debating long-term plans, addressing specific water problems and approving water charges (while the responsibility for issuing water licences and charging water users remains with the National Water Agency, ANA, the state regulator for rivers under the jurisdiction of the federal government).<sup>6</sup> The committee was certainly not established in a political vacuum (Gruben et al., 2002), but as a result of a long mobilization in the river basin (always stronger in the state of São Paulo) and in the whole country (the committee was in fact created in 1996, but was already under the spirit of the impending new legislation [which was passed in 1997]). As repeatedly stated in the official publications, the new committee was formed under the influence of the IWRM principles of

catchment integration and stakeholder participation. CEIVAP approved two master plans that guide the regulatory reforms in the river basin: one for the period 2002-2006 and the second for 2007-2010 (not publicly available at the time of this writing in 2008). The plans contain a long list of interventions designed to restore the main river and many of its tributaries; nonetheless, both plans fail to provide a clear strategic direction for dealing with environmental impacts, which leaves room for controversy and disputes (see discussion below).

Because of the relevance of the local experience for the national water policies, since its early days the federal government provided constant support for the organisation of CEIVAP (Braga et al., 2005). The new committee, therefore, was much better posited to deal with environmental problems than its predecessors. However, despite the institutional improvement, environmental degradation remains virtually unchanged in the river basin, as extensively documented in the master plans and by the environmental surveying services. The river basin continues to suffer from untreated domestic sewerage, industrial effluent discharge, sand mining and over extraction of water (cf. Araujo et al., 2003; Carvalho and Magrini, 2006; Pereira et al., 2006). In our interviews, various stakeholders expressed their concern about the competence of the new committee to deal with old and new water management problems. One major problem has been the difficulty that CEIVAP has to integrate federal and state regulation (the former applies to the main river and major tributaries, and the latter applies to the remaining tributaries).<sup>7</sup> The dual nature of water regulation (i.e. federal and state responsibilities for the same river system) is frequently blamed for the difficulty to implement the new water legislation in the large Brazilian river basins. In the PSRB alone, 13 tributaries or sections of the PSRB have their own sub-basic committees or their own consortium of municipalities, which not necessarily communicate to each other or with the overall catchment committee (CEIVAP).<sup>8</sup> It is perhaps ironic that the same reforms that aimed to advance integrated water management ended up creating a large fragmentation by tributaries and sub-basins.

However, although the internal disputes between sub-basin committees represent a real challenge for the modern regulation of water in the PSRB, the persistency of environmental degradation seems to suggest some more fundamental inadequacies in the new regulatory framework. During our research, it was not difficult to realise that, in the last decade, most of the catchment plans and CEIVAP activities have evolved around a single issue: the implementation of bulk water charges (i.e. water pricing). The priority given to the internal details of the new charging scheme was so dominant and time consuming that

virtually shifted the focus of the committee away from environmental and social questions.<sup>9</sup> The discussion about the charges emerged in 2000, when several committee members defended the need to reduce the financial dependency from central government grants. Between 2000 and 2002, opinions against and in favour of charges split the committee into two polarised views. In favour of bulk water charges were the federal government, academics and some NGOs. Against the charges were the representatives of agriculture, hydroelectricity and industry (see FIRJAN, 2002). The fierce debate about the charges, instead of improving the quality of stakeholder engagement, started to ruin the initial enthusiasm about the new committee.

In 2002, the contention took an unexpected turn when the industrial sector changed their position and agreed with the proposed charging scheme.<sup>10</sup> Apparently, the industrialists listened to the arguments and changed their opinion in line with the new regulatory model. However, the real reason was rather more mundane: the industry preferred to take a proactive action in order to secure reduced fees and avoid close regulatory scrutiny. Instead of a democratic mechanism of decision-making, water policies were being manipulated by the stronger politico-economic players with only marginal contribution from the other stakeholders involved in the committee. The controversy about charges has, in effect, prevented the committee from considering in detail the environmental problems and social issues related to water in the river basin. For instance, during these negotiations, the position of the industrial sector was curiously supported by the environmental NGOs, which declined to impose higher charges alleging that that it was better to settle the matter at once. The contrast between the institutionalisation of public participation channels and the capture of the decision-making process by the stronger groups ('elite capture', according to Ribot, 2002) has significantly undermined the legitimacy of the new regulatory approaches, without producing the results that were expected, as we see next.

#### *The narrow results of charging bulk water in the PSRB*

Charging bulk water has been the central policy instrument of the new water regulation in the PSRB and constitutes the most evident expression of the IWRM-based regulation in the river basin. On paper, it was claimed that the new charging scheme (an economic instrument of environmental policy based on the polluter-pays principle) would allow for the mitigation of the environmental passive, induce rational use of water and reallocate water according to economic efficiency (Garrido, 2004). In practice, however,

despite all the controversy surrounding its adoption, income has remained low and has been spent on administration costs or on isolated projects. Despite of the tiny environmental contribution of the new charging scheme, something that is accepted even by mainstream economists that helped to introduce the new regulation (e.g. Azevedo and Baltar, 2005), its implementation remains a very divisive matter. The difficulty to translate charges into environmental restoration in the Paraíba do Sul was early identified by academics that investigated the local circumstances (cf. Santos, 2002b), but a few years down the line it is still rare to find an independent assessment of the concrete results of the new policy instrument. On the contrary, most publications tend to replicate the discourse of official agencies and multilateral organisations (for instance, Braga et al., 2008). In order to present a more objective evaluation of bulk water charges in the PSRB, we will follow here the five criteria for the success of economic instruments applied to environmental management proposed by the OECD (1991), namely, environmental effectiveness, equity, acceptability, administrative feasibility and cost, and economic efficiency.

In terms of its effectiveness, the introduction of bulk water charges has offered a very limited contribution to restoring the environmental condition of the PSRB. Acselrad et al. (2007) compared the scale of the environmental problems with the initiatives funded by the revenues obtained from the charges and concluded that the current mechanism is clearly inadequate to revert the extension of the environmental impacts. Between 2003 and 2006, the charging scheme was responsible for collecting a total of R\$ 25.4 million, which is considerably less than the estimated need to restore the catchment: R\$ 360 million per year in capital investments or R\$ 4,600 million by 2025 (Coppetec, 2006).<sup>11</sup> In the year 2006, R\$ 7.1 millions were spent in fourteen municipalities, but the money went to short-lived projects with little capacity to produce environmental improvement. Notwithstanding the limited environmental improvement obtained from such initiatives, competition for financial resources is fierce in the committee (cf. Nunes Jr., 2007). As mentioned in our interviews, there is plenty of lobbying during the selection of proposals, which only helps to poison the dialogue between CEIVAP members and increases the suspicion of the general public about the real purposes of the whole regulatory system. One interviewee observed that:

“The distortion in the new [water management] system is evident; there is only mobilisation where there is water charge. Such has been the official policy, but the problem is that it restricts the discussion [in the committee] to the new charges” – school teacher and observer of CEIVAP activities (interview in Apr. 07)

Regarding the second OECD criterion - equity - there are two main problems associated with the current charging scheme mechanism. First, at the moment there is no provision to compensate for the environmental degradation caused in the past by sectors like agriculture, mining and industry. In the case of the PSRB, some companies have been using and degrading the river for decades, while other users arrived in more recent times; even so, both groups bear the same charges. It means an unequal allocation of responsibilities, considering the cumulative (historical) contribution to the environmental degradation. That can be described as a perverse cross-subsidy between past and present, given that current water users subsidise, in the form of bulk water charges, those that benefited from the river in the past. Second, when commercial firms and water companies are charged, they can easily transfer the financial levy to their customers. It means that the additional environmental costs are passed on to prices, what reduces the chance for a 'just' distribution of responsibilities and only increases the position of the privileged groups (as observed by Enzensberger, 1996).

Moving to the third criterion - acceptability - the level of suspicion and misinformation about the new water charging mechanism in the river basin remains very high. Among those supposed to pay for water use in 2004, more than half of water users refused or delayed their payment, which to a large extent can be related to a perceived lack of legitimacy of the new regulatory regime (Soares, 2005). In addition, as can be seen in Figure 2, the income remains fairly constant since 2003, which suggests that acceptability is not improving. Among all sectors, the industrial stakeholders have taken the most opportunistic approach to the bulk water charges: despite the fact that their political representation in the river basin committee, via the federation of the states of São Paulo (FIESP), Rio de Janeiro (FIRJAN) and Minas Gerais (FIEMG), agreed with the charges (as mentioned above), a significant proportion of the industrialists still maintain their dissatisfaction and refuse to make payments for their use of water (Féres et al., 2005). It should be added, that among those that agreed to pay, many industrialists have done so mainly to improve the public image of their companies (a manoeuvre that is normally termed 'corporate green-wash'), as pointed out in several of our interviews.

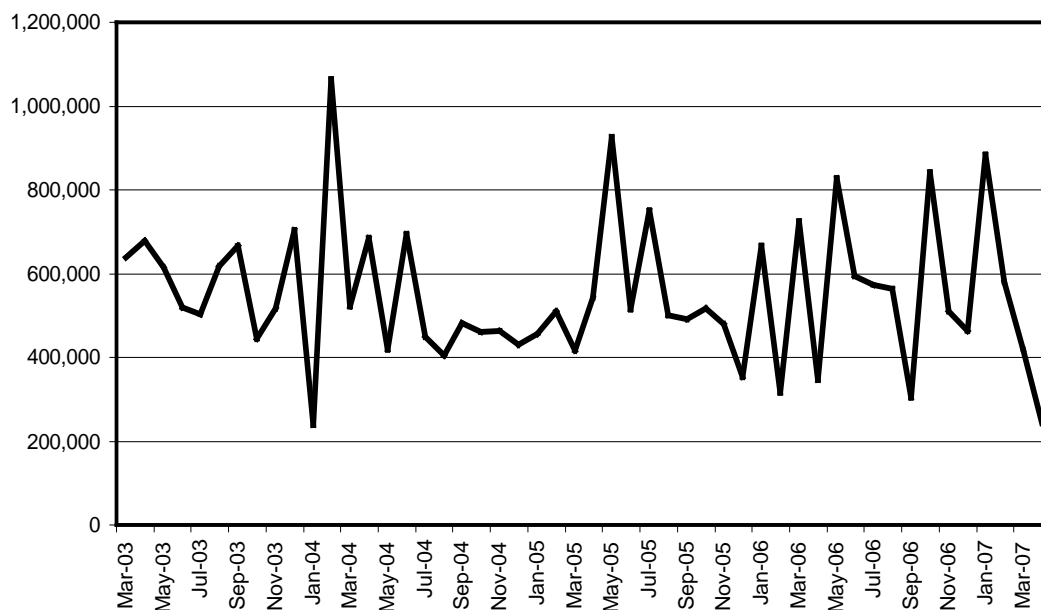


Figure 2: Monthly Revenues from Water Charges in the Paraíba do Sul River Basin between March 2003 and April 2007 (in Brazilian Reais – R\$)  
(Data Source: CEIVAP database)

Regarding the fourth criterion - administrative feasibility - the experience in the PSRB has been far from straightforward. To a great extent, the catchment paid the price for being the first to adopt bulk water charges. Because of the limited administrative structure, in the initial stages the revenues were managed directly by the National Water Agency (ANA). But, because ANA is a public organisation, the income from charges was considered by the Treasury as indistinguishable from other forms of taxes, which wrongly led to the arrest of the income by the Treasury. Such flagrant distortion produced nationwide criticism and, in 2004, a new law was passed to facilitate the administration of funds directly by the river basin committee. To some extent, the new administrative solution means (relative) immunity from the fiscal voracity of the Treasury. Nonetheless, there still remains the problem related to the sharing of responsibility between the federal and state administrations, which means that the Paraíba do Sul is supposed to have four different charging mechanisms, one for the main river and additional three for the tributaries located within the states (at the moment, only water use from the main river is the object of a full charging mechanism, but the three states are beginning the implementation of their own schemes).

Probably the main failure of the PSRB charging mechanism is related to the fifth criterion: economic efficiency. In neoclassical economic terms, high level of efficiency means optimal allocation of resources according to maximum marginal utility and low-cost regulation compliance. However, thus far the new water charges have neither influenced the



reallocation of water in the catchment, nor curbed the expansion of water use. On the contrary, the fundamental objective of the charging scheme has simply been the generation of income rather than incentives to stimulate efficiency and sustainable water use (cf. Formiga-Johnsson et al. 2007). For instance, in a survey with 488 industrial facilities in the catchment, Féres et al. (2008) found that, at least during the initial implementation period, water charges were not an effective mechanism to reduce effluent discharge. The same issue was highlighted in one of our interviews:

“The main ‘service’ associated to water charges was the improvement of the image of large multinational companies, because they use the payment for charges as means to get international environmental certification.(...) The initial environmental improvement [of the river status] is relatively easy, the [key] problem is how to progress further in terms of water quality” - academic and former member of CEIVAP (interview in Apr. 07).

For all the above reasons, it seems that the opportunity to improve water management has been largely wasted in the river basin under strong pressures for the adoption of water pricing exerted by the federal government. It confirms the observation by Brannstrom (2004: 217) that “[a]lthough goals of decentralisation may include better environmental management and more responsive government, the ultimate objective of reforms [in Brazil] is to implement water tariff schemes to fund water-related investments at the watershed scale”. As long pointed out by Kapp (1970), the underlying problem behind the adoption of market-based instruments of environmental management, such as bulk water charges, is that a monetary value (i.e. charge) is conferred to a non-mercantile resource (i.e. water); it therefore subverts the value relation between market and non-market attributes and dislocate environmental conservation. The treatment of water stakeholders according to their payment capacity has further eroded the differences between groups and, consequently, hidden the different responsibilities for the past and the present degradation of the PSRB. In other words, bulk water charges have provided a political excuse for not questioning the location, scale and operation of high impact activities. Finally, although the income generated has contributed little to restore the environmental condition of the river system, the controversy on the charges has virtually hijacked the discussion about water management in the river basin. Instead of creating synergisms between state and society, the persistent focus on charges has widened the communication gap between stakeholder groups.

### *The hierarchy of water stakeholders*

The fact that, since its inception, most of the activities of the river committee have focused on the organisation and implementation of a charging scheme indicates the hegemony of a particular rationale of water management (i.e. the IWRM principles). The formalist objectives and the controversial nature of the charging scheme have operated as a barrier for the involvement of social movements and more grassroots organisations in the river basin committee. Despite the rhetoric of public participation and decentralisation, the activities of the river committee remain alien and unaccountable to the majority of water stakeholders. On the contrary, the reform of the institutions of water management has evolved towards discrimination and fragmentation, which was recurrent opinion expressed by some critical stakeholders at our interviews:

“The conflicts around water are silent, unnoticed [in the PSRB]; (...) what is lacking in the whole process is public participation and real popular involvement” - local resident and member of CEIVAP (interview in Apr. 07)

“There is major lack of transparency in the approval of the river basin plan and other strategic documents (...). I would say, well, I am sure that there is really a lack of transparency”- solicitor and member of CEIVAP (interview in Apr. 07)

“The complexity of the new water regulation was underestimated when the new law [9433] was passed; (...) [because of the unexpected complexity] in practical terms, the decisions are now made behind closed doors and with minimal stakeholder input”- sanitation engineer and member of CEIVAP (interview in Apr. 07).

The minutes of the CEIVAP meeting between 2000 and 2008 (available at [www.ceivap.org.br](http://www.ceivap.org.br)) demonstrate that, when some member of the committee tried to discuss other questions, such as water pollution, upstream-downstream water conflicts or even environmental education, these ‘inconvenient’ voices were promptly quieted by the chairman on grounds of not being part of the agenda. For example, on 12/02/2004, Mr Jorge questioned about the differences between rates of water use in the states of São Paulo and Rio de Janeiro, but the discussion went no further. Similarly, on 19/10/2006, Mr Souza briefly complained about serious degradation in the lower section of the river and achieved nothing. The most illustrative example of the incapacity of CEIVAP to resolve conflicts in an

equitable manner was the debate about authorising the Itaocara hydropower plant, a scheme with 195 MW of installed capacity and 76 km<sup>2</sup> of reservoir area. On 23/08/2005, some members defended the project, but it was then challenged by a NGO representative. A new discussion was scheduled for the next meeting, which happened on 16/09/2005. Inexplicably, the meeting only involved the developers of the new scheme and not the population to be directly affected. The river basin committee, which should serve as an arena to resolve conflicts, closed the door to the traditional communities and local residents (Vainer et al. 2004). Examples like Itaocara lead to the conclusion that the river committee remains under the sphere of influence of existing power structures, which are committed to maintain the water reforms within the boundaries of the IWRM model.

Public involvement in the activities of the CEIVAP has been characterised by a persistent asymmetry in the opportunities to contribute to the decision-making process. As observed by Cornwall (2004: 84), “having a voice depends on more than getting a seat at the table”. The verticalisation of decision-making power in activities of the local committee has at least two causes: one is the established elitism of the Brazilian electoral system, which has profound reflexes on any attempt to broaden public participation. The other cause is the strategic relevance of the PSRB experience for the new national model of water management (under the 1997 legislation), which led to an exaggerated influence of national stakeholder groups in local affairs. In other words, too much is at stake in the Paraíba do Sul and, to a large extent, the overall success of the new national framework hinged on the local results. Thereby, the national government, particularly through the National Water Agency (ANA), spent a significant effort to translate the law into practice using the CEIVAP as a form of ‘test tube’. Among the new regulatory instruments, the successful adoption of water charges in the PSRB was seen as highly important for the political and administrative justification of the new Agency (ANA superintendent, pers. comm.). Another reason for taking the PSRB as a national showcase is the fact that the majority of ANA’s directors have come from the states of Rio de Janeiro and São Paulo and, therefore, have been personally involved (or have a personal interest) in the regulatory experience in the Paraíba do Sul. But the prioritisation of the river basin by ANA led other sectors, industry in particular, to escalate their involvement in the activities of the river basin committee and, as a result, even with a minority of seats, these powerful voices have been able to control important decisions in the river basin committee (cf. Sousa Jr, 2004).

The disputes between the federal administration and influential economic players have dominated the existence of the new committee and, crucially, shaped the interpretation

of water management problems and the formulation of responses. Due to the limited space available for other stakeholders in the committee, there was a gradual departure from the social and natural problems to a concentration of efforts on trying to maintain existing sectoral advantages. Schematically, it is possible to separate the committee members into three hierarchical levels (see Table 2). On the top level are the stronger players, namely civil servants from the federal government (in particular, from ANA) and the representatives of the industrial and agriculture sectors. The second hierarchical level is more heterogeneous and includes state and municipal administrations, NGO representatives, water utilities, colleges, syndicates and the representation of professional categories. The groups in the second hierarchical level have much less influence in the activities of the river basin committee when compared with the core groups, and also tend to compete with each other for resource and space. For instance, in some of our interviews there was a bitter criticism of professional NGO campaigners that (apparently) get involved in CEIVAP only to secure funds for their own projects (in other interviews, some NGOs confirmed that have been hired by CEIVAP to organise training and awareness raising campaigns). As a NGO activist conceded:

“The meetings of the committee [CEIVAP] have been largely ineffective: those that should be critical of the problems, like the NGOs, remain quiet because they want to raise funds for their own activities [through the committee] and don’t want to contradict the strong voices of ANA and industry representatives” - NGO activist and observer of CEIVAP activities (interview in May 07).

Similarly, the academic community has its own hidden agenda in relation to the internal activities of the committee. It is no secret that during the first decade of CEIVAP the same group of academics from Rio de Janeiro universities was hired to produce plans, reports and computer models (sometimes with the veiled collaboration of civil servants that are themselves responsible for supervising the work of the consultants). Such distortions seem widespread in the activities of the local river basin committee and can be related to the observation of the Transparency International (2008) that, because IWRM introduces unnecessary complexity, it opens new opportunities for rent-seeking (i.e. corruption) associated with the development of new procedures and methodologies.

There is still a third hierarchical level among the stakeholders involved in CEIVAP, but the influence of these participants is much less noticeable. It includes traditional water users (small farmers, fishermen, local residents, etc.) and representatives from local

organisations (not necessarily NGOs). These groups have had major difficulties to take part in the committee activities, only attending meetings as observers. Their involvement is not directly precluded, but the subtle formalities of the committee procedures act as a disincentive for those less familiar with the intricacies of the new water management model. The stakeholders that occupy this third hierarchical level are sometimes blamed by the more influential committee members for “not understanding the importance of the CEIVAP decisions” (cf. interview with a director of the committee). Nonetheless, in their interviews, representatives of traditional water users even complained about the jargon used in the committee meetings, fraught with acronyms, rules and conventions. That indicates the formation of a cognitive field that systematically leaves out those unable to grasp the details of the new water regulatory doctrine.

Hierarchical levels	Stakeholder groups	Key interests	Key attitudes
1 <sup>st</sup> level	federal government	press for the implementation of the new water regulatory framework (Law 9433/1997)	influence the river basin committee (CEIVAP) through grants and reports; use the CEIVAP as model for other catchments
	business (industry)	secure minimal regulation and lowest bulk water charges	dominate the political debate; commission of specialised consultancy; legal challenges
	business (agriculture)	exemption from water charges	complain about the difficulties to continue agriculture production and about the impossibility to bear additional charges
2 <sup>nd</sup> level	state governments	adjust the national regulatory framework to their financial and political needs	blame federal agencies for the difficulties to implement state water legislations
	municipal governments	secure funds for local investments in local projects	formalise political alliances with neighbour towns via consortium of municipalities (established in tributaries of the Paraíba do Sul River)
	environmental NGOs	expand the environmental debate; secure funds for their own activities	criticise polluters and other water users for environmental degradation in the catchment
	social NGOs	expand the environmental justice debate	see the water resources sector as an opportunity of public mobilisation
3 <sup>rd</sup> level	traditional water users	seek the recognition of their traditional water rights	normally sceptical about the innovative character and the ultimate contribution of CEIVAP
	civil society representatives	environmental restoration of the catchment	

This hierarchy of stakeholders is obviously only a simplified representation of a complex, nuanced web of interaction and disputes in the PSRB and in the river basin committee in particular. Even though, it probably helps to summarise the diversity of interests and the unevenness of decision power. The three layers of authority certainly existed

before the establishment of CEIVAP, but existing asymmetries have been significantly reinforced by the technocratic and centralised implementation of the new water management model. Instead of focusing on ecological restoration and on the satisfaction of the demands of the majority of the local population, in practice the new regulation concentrated power and resources in the hands of the catchment administrative bureaucracy, which is by and large subordinated to the interests of the stronger stakeholder groups.

## **Conclusion**

The recent experience of reforming water regulation in the PSRB vividly demonstrates the epistemological, operational and political limitations of the IWRM model mentioned above. Despite various institutional changes promoted under the influence of the international theory, environmental problems are still not properly addressed by the river basin committee or the environmental regulators. Notwithstanding repeated claims of success by official publications or academic papers (published by those directly involved in the implementation of new regulation), the river basin remains in a seriously degraded condition. The same processes that damaged the river system in the past continue to compromise the ecological stability and the quality of life of local communities in the present (e.g. untreated effluent discharges, unmitigated river engineering, soil erosion, etc). The fundamental distortion is related to the priority given to the introduction of bulk water charges in the PSRB, which is always a highly divisive instrument of environmental management in any part of the world where it is adopted. The controversy about the charges has indeed poisoned the tenuous public mobilisation that started in the river basin in the 1990s, without raising sufficient funds to restore environmental quality and without inducing a more responsible use of water resources.

In the same way, the new regulatory framework has largely underestimated the social complexity and the political struggles that unfold in the river basin. In particular, our research identified a persistent reluctance to address the political dimension of water management among the members of the river basin committee. As a result, there is little recognition of the fact that the regulatory reforms have been systematically manipulated by the central government, via its water agency (ANA), and by the stronger economic groups, industry in particular. Evidently, the local residents and small water users are not passive about the condition of their river basin and try to occupy, as much as possible, the political space available to them in the new regulatory structure. Nonetheless, it is difficult to expect a

sustained progress towards environmental sustainability without a more democratised basis of water management and the removal of political inequalities historically established in the PSRB. As pointed out by Middleton and O’Keefe (2001:16), “unless analyses of development begin not with the symptoms, environmental or economic instability, but with the cause, social injustice, then no development can be sustainable”. This observation seems to be immensely relevant to understand the hitherto contradictory results of water use and conservation in the Paraíba do Sul and, certainly, in other Brazilian river basins.

### **Acknowledgement**

The research was developed during the first half of 2007 at the Institute of Urban and Regional Research and Planning (IPPUR) of the Federal University of Rio de Janeiro (UFRJ). Financial support from the Brazilian Research Council (CNPq, protocol PDJ-155167/2006-5) is kindly acknowledged. Constructive comments from two anonymous reviewers were also highly appreciated.

### **References**

- Acselrad, M., Barcellos, F.C. and Costa, V.G., 2007. Condições ambientais na bacia do Paraíba do Sul e a efetividade da cobrança pelo uso da água pelo Estado do Rio de Janeiro. In: *Primeiro Seminário de Recursos Hídricos da Bacia Hidrográfica do Paraíba do Sul*, 7-9 Nov. 2007, UNITAU, Taubaté, São Paulo.
- Anand, P.B. 2007. Capability, sustainability, and collective action: an examination of a river water dispute. *Journal of Human Development*, 8 (1), 109-132.
- Aquino, L.C.S. and Farias, C.M.M.C., 1998. Processo de ocupação e desenvolvimento econômico da bacia. In: C.R.S.F. Bizerril, L.M.N. Araújo and P.C. Tosin, eds. *Contribuição ao Conhecimento da Bacia do Rio Paraíba do Sul*. Brasília: ANEEL, pp. 49–54.
- Araujo, F.G., Fichberg, I., Pinto, B.C.T. and Peixoto, M.G., 2003. A preliminary index of biotic integrity for monitoring the condition of the Rio Paraíba do Sul, Southeast Brazil. *Environmental management*, 32 (4), 516–526.
- Azevedo, L.G.T. and Baltar, A.M., 2005. Water pricing reforms: issues and challenges of implementation. *Water Resources Development*, 21 (1), 19–29.
- Batterbury, S.P.J. and Fernando, J.L., 2006. Rescaling governance and the impacts of political and environmental decentralisation: an introduction. *World Development*, 34 (11), 1851–1863.
- Biswas, A.K., 2008. Integrated water resources management: is it working? *Water Resources Development*, 24 (1), 5–22.
- Blomquist, W. and Schlager, E., 2005. Political pitfalls of integrated watershed management. *Society & natural resources*, 18 (2), 101–117.
- Bongartz, K., 2003. Applying different spatial distribution and modelling concepts in three nested mesoscale catchments of Germany. *Physics and Chemistry of the Earth*, 28(33-36), 1343–1349.
- Braga, B.P.F., Strauss, C. and Paiva, F., 2005. Water charges: paying for the commons in Brazil. *Water Resources Development*, 21 (1), 119–132.

- Braga, B.P.F., Flecha, R., Pena, D.S. and Kelman, J. 2008. Pacto federativo e gestão de águas. *Estudos Avançados*, 22 (63), 17-42.
- Brannstrom, C., 2004. Decentralising water resource management in Brazil. *European Journal of Development Research*, 16 (1), 214–234.
- Bryant, R.L., 1998. Power, knowledge and political ecology in the Third World: a review. *Progress in Physical Geography*, 22, 79–94.
- Carvalho, R.C. and Magrini, A., 2006. Conflicts over water resource management in Brazil: a case study of inter-basin transfers. *Water Resources Management*, 20, 193–213.
- CEIVAP (Comitê para Integração da Bacia Hidrográfica do Rio Paraíba do Sul), 2001. *Bacia do Rio Paraíba do Sul: livro da bacia*. Brasília: Sistema Nacional de Informações sobre Recursos Hídricos.
- Conca, K., 2006. *Governing Water: Contentions Transnational Politics and Global Institution Building*. Cambridge, Mass. and London: MIT Press.
- Cooke, B. and Kothari, U., eds., 2001. *Participation: The New Tyranny?* London and New York: Zed Books.
- Coppetec, 2002. *Plano de Recursos Hídricos para a Fase Inicial da Cobrança na Bacia do Rio Paraíba do Sul*. Rio de Janeiro: ANA-Fundação COPPETEC.
- Coppetec, 2006. *Plano de Recursos Hídricos da Bacia do Rio Paraíba do Sul: resumo*. Resende: AGEVAP.
- Cornwall, A., 2004. Spaces for transformation? Reflections on issues of power and difference in participation in development. In: S. Hickey and G. Mohan, eds. *Participation: From Tyranny to Transformation?* London: Zed Books. pp. 75–91.
- Craswell, E., Bonell, M., Bossio, D. Demuth, S. and van de Giesen, N., eds., 2007. *Integrated Assessment of Water Resources and Global Change: A North-south Analysis*. Springer: Dordrecht, The Netherlands.
- Davis, M.D., 2007. Integrated water resource management and water sharing. *Journal of Water Resources Planning and Management*, 133 (5), 427–445.
- Dos Reis, B.J., Batista, G.T., Dos Santos Targa, M. and De Souza Catelani, C., 2006. Mining influence of the extraction of sand in water balance in the valley of the Paraíba do Sul River. *Revista da Escola de Minas*, 59 (4), 391–396.
- Enzensberger, H.M., 1996. A critique of political ecology. In: T. Benton, ed. *The Greening of Marxism*. New York: Guilford Press. pp. 17–49.
- European Commission. 2007. *Towards Sustainable Water Management in the European Union: First Stage in the Implementation of the Water Framework Directive 2000/60/EC*. COM(2007) 128 final. Commission of the European Communities: Brussels.
- Faby, J.-A., Neveu, G. and Jacquin, N., 2005. Towards a European-wide exchange network for improving dissemination of integrated water resources: management research outcomes. *Environmental Science and Policy*, 8 (3), 307-319.
- Féres, J., Thomas, A., Reynaud, A. and Serôa da Motta, R., 2005. *Demanda por Água e Custo de Controle da Poluição Hídrica nas Indústrias da Bacia do Rio Paraíba do Sul*. Rio de Janeiro: IPEA.
- Féres, J., Reynaud, A., Thomas, A. and Serôa da Motta, R., 2008. Competitiveness and effectiveness concerns in water charge implementation: a case study of the Paraíba do Sul River Basin, Brazil. *Water Policy*, 10 (6), 595–612.
- FIRJAN, 2002. A cobrança pelo uso da água. *Súmula Ambiental*, No. 62, March/2002.
- Fischhendler, I., 2008. Institutional conditions for IWRM: the Israeli case. *Ground Water*, 46 (1), 91–102.
- Formiga-Johnsson, R.M., Kumler, L. and Lemos, M.C., 2007. The politics of bulk water pricing in Brazil: lessons from the Paraíba do Sul Basin. *Water Policy*, 9 (1), 87–104.



- Funke, N., Oelofse, S.H.H., Hatting, J., Ashton, P.J. and Turton, A.R. 2007. IWRM in developing countries: lessons from the Mhlathuze Catchment in South Africa. *Physics and Chemistry of the Earth*, 32 (15-18), 1237–1245.
- Galaz, V., 2007. Water governance, resilience and global environmental change: a reassessment of integrated water resources management (IWRM). *Water Science and Technology*, 56 (4), 1–9.
- Garrido, R.J., 2004. Reflexões sobre a aplicação da cobrança pelo uso da água no Brasil. In: C.J.S. Machado, ed. *Gestão de Águas Doces*. Rio de Janeiro: Interciência. pp. 105–133.
- Global Water Partnership (GWP), 2003. *IWRM Toolbox*. Stockholm: GWP Secretariat.
- Goldin, J., Rutherford, R. and Schoch, D., 2008. The place where the sun rises: an application of IWRM at the village level. *Water Resources Development*, 24 (3), 345–356.
- Gruben, A., Lopes, P.D. and Formiga-Johnsson, R.M., 2002. *A Bacia do Rio Paraíba do Sul, São Paulo, Rio de Janeiro e Minas Gerais*. Brasília: Projeto Marca d'Água.
- Hendry, S., 2006. Integrated water resource management: comparative frameworks for reform. *Journal of Water Law*, 17 (2), 47–60.
- Hickey, S. and Mohan, G., 2005. Relocating participation within a radical politics of development. *Development and Change*, 36 (2), 237–262.
- Ioris A.A.R., 2007. The headwaters of water problems in Brazil: commodification and exclusion. *Capitalism Nature Socialism*, 18 (1), 28–50.
- Kapp, K.W., 1970. Environmental disruption and social costs: a challenge to economics. *Kyklos*, 23 (4), 833–848.
- Kidd, S. and Shaw, D., 2007. Integrated water resource management and institutional integration: realising the potential of spatial planning in England. *The Geographical Journal*, 173 (4), 312–329.
- Kirk, E.A., Reeves, A.D. and Blackstock, K.L., 2007. Path dependency and the implementation of environmental regulation. *Environment and Planning C*, 25, 250–268.
- Köhler, B., 2005. Resource conflict in Latin America: to the political ecology of the setting from water. *Journal fur entwicklungspolitik*, 21 (2), 21–44.
- Larson, A. and Ribot, J.C., 2004. Democratic decentralization through a nature resource lens: an introduction. *European Journal of Development Research*, 16 (1), 1–15.
- McCulloch, C.S. and Ioris, A.A.R., 2007. Putting politics into IWRM. In: Proceedings of the “General assembly of the European geosciences union”. 15-20 April 2007, Vienna. *Geophysical Research Abstracts*, Vol. 9, 02981, 2007.
- Molle, F., 2006. *Planning and Managing Water Resources at the River Basin Level: Emergence and Evolution of a Concept*. Research Report No. 16. Colombo, Sri Lanka: International Water Management Institute.
- Mollinga, P.P., 2008. Water, politics and development: framing a political sociology of water resources management. *Water Alternatives*, 1 (1), 7–23.
- Mollo, M.L.R. and Saad-Filho, A., 2006. Neoliberal economic policies in Brazil (1994-2005): Cardoso, Lula and the need for a democratic alternative. *New Political Economy*, 11 (1), 99–123.
- Middleton, N. and O’Keefe, P., 2001. *Redefining Sustainable Development*. London: Pluto Press.
- Müller, N.L., 1969. *O Fato Urbano na Bacia do Rio Paraíba*. Rio de Janeiro: Fundação IBGE.
- Nunes Jr. T.T., 2007. *Perspectivas de Efetivação da Cobrança pelo Uso da Água no Brasil com base na Investigação da Percepção e Aceitação Social na Porção Mineira da Bacia do Rio Paraíba do Sul, Minas Gerais – Brasil*. MSc Dissertation. UFMG: Belo Horizonte.

- OECD, 1991. *Recommendation of the Council on the Use of Economic Instruments in Environmental Policy*. C(90)177/Final. Paris: OECD.
- Pereira, M.O., Calza, C., Anjos, M.J., Lopes, R.T. and Araújo, F.G., 2006. Metal concentrations in surface sediments of Paraíba do Sul River (Brazil). *Journal of Radioanalytical and Nuclear Chemistry*, 269 (3), 707–709.
- Projeto Marca d'Água, 2003. *Seguindo as Mudanças na Gestão das Bacias Hidrográficas do Brasil*. Finattec: Brasília.
- Ribot, J.C., 2002. *Democratic Decentralization of Natural Resources: Institutionalizing Popular Participation*. Washington, D.C.: World Resources Institution.
- Santos, M., 2002a. *A Natureza do Espaço*. 4th edition. Edusp: São Paulo.
- Santos, M.O.R.M., 2002b. *O Impacto da Cobrança pelo Uso da Água no Comportamento do Usuário*. PhD Thesis. UFRJ, Rio de Janeiro.
- Sayer, A., 1992. *Method in Social Science: A Realist Approach*. 2nd Edition. London & New York: Routledge.
- Soares, J.B., 2005. *Inovações Institucionais para a Gestão dos Recursos Hídricos no Âmbito Federal*. PhD Thesis. UFRJ, Rio de Janeiro.
- Sousa Jr, W.C., 2004. *Gestão das Águas no Brasil: Reflexões, Diagnósticos e Desafios*. São Paulo: IEB & Pierópolis.
- Swatuk, L.A., 2005. Political challenges to implementing IWRM in Southern Africa. *Physics and Chemistry of the Earth*, 30, 872–880.
- Swyngedouw, E., 2004. *Social Power and the Urbanization of Water: Flows of Power*. Oxford: Oxford University Press.
- Transparency International, 2008. *Global Corruption Report 2008: Corruption in the Water Sector*. Cambridge: Cambridge University Press.
- Vainer, C.B., Vieira, F.B., Pinheiro, D.C. and Carmo, M.C.D., 2004. Energia e conflitos sociais: o caso da barragem de Itaocara, Rio de Janeiro. In: H. Acselrad, ed. *Conflito Social e Meio Ambiente no Estado do Rio de Janeiro*. Rio de Janeiro: Relume-Dumará. pp. 251–262.
- van der Zaag, P., 2005. Integrated water resources management: relevant concept or irrelevant buzzword? a capacity building and research agenda for Southern Africa. *Physics and Chemistry of the Earth*, 30, 867–871.
- Watts, M. and Peet, R., 2004. Liberating political ecology. In: R. Peet and M. Watts, eds. *Liberation Ecologies: Environment, Development, Social Movements*. 2nd edition. Abingdon: Routledge. pp. 3–47.
- World Bank, 2003. *Brazil Water Resources Series*. Brasília: World Bank.
- Zhour, A. and Oliveira, R., 2005. Paisagens industriais e desterritorialização de populações locais: conflitos socioambientais em projetos hidroelétricos. In: A. Zhour, K. Laschefski and D.B. Pereira, eds. *A Insustentável Leveza da Política Ambiental*. Belo Horizonte: Autêntica. pp. 49–64.

---

<sup>1</sup> SINGREH is an administrative structure that extends from the federal government to state authorities and river basin committees. More than 140 river basin committees and 10,000 professionals are currently involved in the activities of the SINGREH.

<sup>2</sup> The river basin includes 55,500 km<sup>2</sup> between latitudes 20°26' and 23°00'. The average flow at the river mouth is 1,118.40 m<sup>3</sup>/s, with low flow (Q<sub>95</sub>) of 353.77 m<sup>3</sup>/s. The extension of the main river is around 1,100 km; the river network extends over 180 municipalities in the states of São Paulo, Minas Gerais and Rio de Janeiro. More than 5.4 million people live in the catchment (Coppetec, 2006).

---

<sup>3</sup> It is still possible to visit many of the lavish manor houses of the then affluent rural aristocracy, which included 32 noble titles among barons, viscounts and two earls (listed in Siqueira, in Müller, 1969).

<sup>4</sup> It is beyond the objectives of this paper to describe the full range of environmental problems in the Paraíba do Sul, but detailed assessment and analysis are available in Coppetec (2002 and 2006).

<sup>5</sup> Water management problems extend beyond the catchment boundaries via a complicated interconnection between the Paraíba do Sul and the Guandu Rivers. It has the capacity to transfer around 160 m<sup>3</sup>/s, which represents two thirds of the Paraíba do Sul water flow at the point of abstraction. From the Guandu River, water is further diverted to serve 80% of the population of the Rio de Janeiro Metropolitan Area (i.e. more than 12 million people depend on the Paraíba do Sul for their water supply). Because of the interbasin transfer, the Paraíba do Sul is significantly depleted of water in its medium section, aggravating an already precarious environmental condition.

<sup>6</sup> Membership in the CEIVAP is distributed between water users (24 seats), representatives of the federal, state and municipal governments (21 seats) and civil society organisations (15 seats). It should be mentioned that civil society representation has been systematically abused by the appointment of members of business federations, professional councils and consortiums of municipalities instead of genuine civil society representatives (Projeto Marca d'Água, 2003).

<sup>7</sup> According to the 1988 Brazilian Constitution, water has dual ownership: 1) federal, for those rivers that cross more than one state or are shared with other countries; and 2) state responsibility, for those confined to one state territory.

<sup>8</sup> Sub-basin committees have a legal mandate similar to the river basin committee, while municipal consortia have more targeted objectives, such as waste and sanitation.

<sup>9</sup> Because of the importance given to this issue, our research strategy was revised in the second month of the fieldwork and passed to consider the controversy around water user charges as the main indicator of the effectiveness of the institutional reforms in the PSRB.

<sup>10</sup> The implementation of charges started in 2003, after an initial registration of 4,500 water users in the river basin (Braga et al., 2008). All water uses above a certain threshold (i.e. consumptive use above 1 litre/second and hydropower bigger than 1 MW) must pay a monthly charge, calculated taking into account the extraction rate, the percentage of use and the quality of the effluent. There is a standard charge (R\$ 0.02/m<sup>3</sup>) for industries, water supply and mining, and significant discounts for agriculture and aquaculture.

<sup>11</sup> US\$ 1.00 is approximately R\$ 2.00.