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PROJECT PERFORMANCE ASSESSMENT REPORT

BRAZIL

WATER QUALITY AND POLLUTION CONTROL PROJECT (LOANS 3503-BR, 3504-BR, 3505-BR TO THE STATES OF SÃO PAULO AND PARANÁ)

ESPÍRITO SANTO WATER COASTAL POLLUTION MANAGEMENT PROJECT (LOAN 3767-BR)

June 11, 2007

Sector, Thematic and Global Evaluation Division
Independent Evaluation Group (World Bank)

Currency Equivalents (annual averages)

Currency Units = Cruzeiro (Cr$), Cruzeiro Real (CR$), and Real (R$)

1991	US$ 1.00	Cr$ 408.78	1999	US$ 1.00	R$ 1.82
1992	US$ 1.00	Cr$ 4,498.62	2000	US$ 1.00	R$ 1.83
1993	US$ 1.00	CR$ 88.45	2001	US$ 1.00	R$ 2.36
1994	US$ 1.00	CR$ 913.35/R$ 0.85	2002	US$ 1.00	R$ 2.92
1995	US$ 1.00	R$ 0.92	2003	US$ 1.00	R$ 3.08
1996	US$ 1.00	R$ 1.01	2004	US$ 1.00	R$ 2.93
1997	US$ 1.00	R$ 1.08	2005	US$ 1.00	R$ 2.33
1998	US$ 1.00	R$ 1.16	2006	US$ 1.00	R$ 2.14

Source: World Bank and UNDP databases

Abbreviations and Acronyms

CESAN	Companhia Espírito Santense de Saneamento
COBRAPE	Companhia Brasileira de Projetos e Empreendimentos
ICR	Implementation Completion Report
IEG	Independent Evaluation Group (formerly OED)
LAC	Latin America and Caribbean
PPAR	Project Performance Assessment Report

Fiscal Year

Government: January 1 – December 31

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Note: Since Vinod Thomas – Director-General, IEG – was World Bank Country Director for Brazil during the period covered by the PPAR, he recused himself from all review and supervisory functions related to it.

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A Project Performance Assessment Report (PPAR) is based on a review of the Implementation Completion Report (a self-evaluation by the responsible Bank department) and fieldwork conducted by IEGWB. To prepare PPARs, IEGWB staff examine project files and other documents, interview operational staff, and in most cases visit the borrowing country for onsite discussions with project staff and beneficiaries. The PPAR thereby seeks to validate and augment the information provided in the ICR, as well as examine issues of special interest to broader IEGWB studies.

Each PPAR is subject to a peer review process and IEGWB management approval. Once cleared internally, the PPAR is reviewed by the responsible Bank department and amended as necessary. The completed PPAR is then sent to the borrower for review; the borrowers' comments are attached to the document that is sent to the Bank's Board of Executive Directors. After an assessment report has been sent to the Board, it is disclosed to the public.

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Outcome: The extent to which the operation's major relevant objectives were achieved, or are expected to be achieved, efficiently. The rating has three dimensions: relevance, efficacy, and efficiency. *Relevance* includes relevance of objectives and relevance of design. Relevance of objectives is the extent to which the project's objectives are consistent with the country's current development priorities and with current Bank country and sectoral assistance strategies and corporate goals (expressed in Poverty Reduction Strategy Papers, Country Assistance Strategies, Sector Strategy Papers, Operational Policies). Relevance of design is the extent to which the project's design is consistent with the stated objectives. *Efficacy* is the extent to which the project's objectives were achieved, or are expected to be achieved, taking into account their relative importance. *Efficiency* is the extent to which the project achieved, or is expected to achieve, a return higher than the opportunity cost of capital and benefits at least cost compared to alternatives. The efficiency dimension generally is not applied to adjustment operations. *Possible ratings for Outcome:* Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.

Risk to Development Outcome: The risk, at the time of evaluation, that development outcomes (or expected outcomes) will not be maintained (or realized). *Possible ratings for Risk to Development Outcome:* High Significant, Moderate, Negligible to Low, Not Evaluable.

Bank Performance: The extent to which services provided by the Bank ensured quality at entry of the operation and supported effective implementation through appropriate supervision (including ensuring adequate transition arrangements for regular operation of supported activities after loan/credit closing, toward the achievement of development outcomes. The rating has two dimensions: quality at entry and quality of supervision. *Possible ratings for Bank Performance:* Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.

Borrower Performance: The extent to which the borrower (including the government and implementing agency or agencies) ensured quality of preparation and implementation, and complied with covenants and agreements, toward the achievement of development outcomes. The rating has two dimensions: government performance and implementing agency(ies) performance. *Possible ratings for Borrower Performance:* Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.

Contents

This report was prepared by Tim Campbell, Consultant, who assessed the two projects in May-June 2006. Debora Brakarz provided research assistance and Soon-Won Pak provided administrative support.

Principal Ratings

	*ICR**	*ES**	*PPAR*
WATER QUALITY AND POLLUTION CONTROL PROJECT (LOANS 3503-BR, 3504-BR, 3505-BR TO THE STATES OF SÃO PAULO AND PARANÁ)			
Outcome	Satisfactory	Satisfactory	Satisfactory
Sustainability	Likely	Likely	Likely
Institutional Development Impact	Substantial	Substantial	Substantial
Bank Performance	Satisfactory	Satisfactory	Satisfactory
Borrower Performance	Satisfactory	Satisfactory	Satisfactory
ESPÍRITO SANTO WATER COASTAL POLLUTION MANAGEMENT PROJECT (LOAN 3767-BR)			
Outcome	Satisfactory	Moderately Satisfactory	Moderately Satisfactory
Sustainability	Likely	Likely	Likely
Institutional Development Impact	Negligible	Negligible	Negligible
Bank Performance	Satisfactory	Satisfactory	Satisfactory
Borrower Performance	Unsatisfactory	Unsatisfactory	Unsatisfactory

* The Implementation Completion Report (ICR) is a self-evaluation by the responsible operational division of the Bank. The Evaluation Summary (ES) is an intermediate IEGWB product that seeks to independently verify the findings of the ICR.

Key Staff Responsible

Project	*Task Manager/Leader*	*Division Chief/ Sector Director*	*Country Director*
WATER QUALITY AND POLLUTION CONTROL PROJECT (LOANS 3503-BR, 3504-BR, 3505-BR TO THE STATES OF SÃO PAULO AND PARANÁ)			
Appraisal	Emilio H. Rodriguez	Asif Faiz	Armeane Choksi
Completion	Carlos E. Velez	John Henry Stein	Vinod Thomas
ESPÍRITO SANTO WATER COASTAL POLLUTION MANAGEMENT PROJECT (LOAN 3767-BR)			
Appraisal	Carlos E. Velez	Asif Faiz	Rainer Steckhan
Completion	Carlos E. Velez	John Henry Stein	Vinod Thomas

Preface

This performance assessment addresses a cluster of projects that represent a turning point in Bank strategy for the water sector in Brazil in the early 1990s. The projects are the Brazil Water Quality and Pollution Control Project (CPL 35030), implemented in São Paulo and Paraná, and the Espírito Santo Water and Coastal Pollution Management Project (CPL 37670). Reference is made occasionally to the Minas Gerais Water Quality and Pollution Control Project (CPL 35540). This third member of the cluster (and a fourth city) originated along with CPL 35030 in 1992, but because it began to advance quickly, it was split off and handled in a separate operation. A performance audit was completed on this project in 2000. The Minas Gerais project is invoked in key places in this report only to help understand the conception and evolution of policy and practice in the urban basin approach.

The review was based on standard sources, such as project documents, ESW and other materials, including Bank documents and staff involved in comparable countries (e.g., India, Mexico, and China). Where relevant and available, materials were also consulted from reviewed literature, as well as discussions with present and former Bank staff. Field work involved extensive interviews with country officials and beneficiaries in three states and the national capital, and benefited from notable sources of information, including:

- a focus group of senior project managers in São Paulo (described in Annex B);
- consultations with and observation of local community residents and beneficiaries;
- interviews with a former head of state government in Paraná and a former director of a national agency (ANA);
- data gathered by a private consulting firm on the comparative market values of properties—those belonging to direct beneficiaries as well as those belonging to residents in comparable properties near-by;
- a helicopter over-flight and multiple on-ground visits to review progress in a comparable project sight in Belo Horizonte; and,
- Country Director and key Bank technical staff in Brazil.

Though it is a self-standing product, this assessment also serves as an input into an evaluation of the effectiveness of World Bank assistance on the environment to Brazil and other key client countries.

Following standard IEG procedures, copies of the draft PPAR was sent to the Borrowers for comments, but none were received.

Summary

This report covers a cluster of urban environmental projects in Brazil conceived in the early 1990s and implemented over nearly a decade.[1] In all cases, an overarching objective was to preserve and improve water quality. But this aim was mixed with actions to assist low income residents in highly dense urban settings in three of Brazil's most important cities. In blending water quality with poverty reduction measures, the projects represented different versions of a new approach, and each produced rich insights.

The projects achieved their stated or revised objectives, and may have achieved greater benefits than anticipated. Project benefits appear to be sustainable and they have laid the groundwork for a new approach to managing water quality in large urban areas. Above all, they broke a conventional mold and represent important new standards of policy and practice in Bank assistance in the water and sanitation sector in Brazil. Brazilian institutions at local, state, and national levels interacted with each other and the Bank to shape a comprehensive approach to water quality and sanitation. The projects served as a vehicle to move upstream in water resource management, including planning, resource allocation, establishment of an economic concept of water, and laying the basis for sustainable finance. Theses projects adopted a wider geographic scope, moving to a basin-wide scale to achieve quality and efficiency objectives in dense urban areas.

During implementation, Bank and country teams learned that the water quality projects were inextricably linked with poverty issues. Studies conducted during project implementation in several cities revealed that the most serious issues of water pollution involved solid refuse and wastewater from low income settlements, not industrial sources. Thus, even before the advent of the Millennium Development Goals, these projects demonstrated that solutions for improved water quality were highly linked with measures to alleviate poverty, at least in some metropolitan areas.

Considerable time and resources were spent during implementation to address operational challenges related to sanitary connections for individual residences or, where this was not feasible because of topography or crowding, to build new shelter for resettled residents. In both cases, this entailed extensive beneficiary participation and attention to individual and block-by-block engineering and construction needs. In-situ retrofit approaches developed under the projects have been adopted by the City of São Paulo and are still being followed as of 2006.

Economic or financial parameters were not always fully met, but this was not sufficiently serious to require a change in project performance ratings. At the same time,

1. These are the Brazil Water Quality and Pollution Control Project, 1992 (CPL 35030), implemented in São Paulo and Paraná, and the Espírito Santo Water and Coastal Pollution Management Project (CPL 37670). Reference is made occasionally to the Minas Gerais Water Quality and Pollution Control Project (CPL 35540). This third member of the cluster of water quality projects originated along with CPL 35030 in 1992, but because it began to advance quickly it was split off and handled in a separate operation. A performance audit was completed on this project in 2000.

improved environmental quality differences for the poor living in project areas are significant. The evaluation also found evidence of additional benefits, particularly in urban real estate development and further home improvements in low income neighborhoods, which are typical of derelict areas that have been accorded more secure legal status and/or infrastructure.

The richest lessons from an institutional perspective arise from the decisions and actions taken by various actors and agencies in Brazil, as well as by project managers in the Bank. Technical specialists in different settings and under different state and local administrations sought to interpret and carry forward the original objectives of basin management over more than a decade. This process was interrupted in Paraná, where project-related institutional reforms were rejected by the newly elected state government shortly after the project closed. However, in the last quarter of 2005, the state resuscitated policy and institutional reforms in keeping with original project objectives.

The Espírito Santo project sought to achieve triple objectives in water and sanitation: environmental quality for residents in low-income areas, environmental quality in offshore waters, and improved efficiency of the state water company. The project assumed a similar posture as its predecessors in other states, but immediately ran into problems of mismanagement. These difficulties required patience and dedication by both Brazilian authorities and the Bank. Once remedied – with partial cancellations and redirection – the project moved effectively to address larger and longer term issues of basin management, coastal pollution, and water quality for the urban poor.

As the projects evolved, Brazil established the rudiments of global best practice in urban water resource management involving the poor. However, partly because of on-site circumstances, and due to the basin-wide scope of work and depth of policy reform, they took much longer to implement than originally envisioned. More importantly, key principles have now been adopted, including the economic value of water, the basin approach, and rational resource allocation processes, although Brazil is still far from consolidating this approach, which experience in developed countries (e.g., Spain, France) suggests may require decades.

The fact that Brazilian institutions are still engaged in the reform process is due in no small measure to the dedication and shared technical values among professionals in the sector, despite political differences in local and national governments. To an important degree, Brazil's success is also attributable to the leadership of sector professionals in the Bank. The fusion of urban poverty reduction and water basin management into a single approach has led to notable achievements in both realms and represents an approach that should be more widely replicated in Brazil and elsewhere.

Ajay Chhibber
Director
Independent Evaluation Group

1. Background and Context: New Approaches to Water Quality in Dense Urban Watersheds

1.1 The cluster of projects reviewed in this report arises from circumstances of the Latin American region that were unusual, if not unique, among the Bank's borrowers at the time, but are again being seen in some regions. Prolonged urban expansion in Latin America during the 1960s and '70s was in the range of 6 and 7 percent a year, far exceeding any of the Bank's borrowers today except in Africa. Rapid growth of cities challenged nations in the region to build basic infrastructure rapidly to keep up with needs for water, sanitation, and solid waste for several hundred million urban residents.

1.2 The debt crisis of the 1980s then brought to the region a sudden shift away from investment in infrastructure to adjustment lending. As the decade of debt began to pass in the late 1980s, nations and cities were facing infrastructure shortfalls. In turn, new issues – of water quality, poverty, and giant cities – began to arise. In the largest cities, municipalities were beginning to fuse into large metropolitan areas and spill over into surrounding watersheds.

1.3 For more than two decades, Brazil sustained a program of expansion of water supply and waste disposal through Planasa, a system of finance through state water companies that connected 50 million people to water between 1970 and 1990. The success of Planasa program was then overcome by two major changes in Brazil.

1.4 The macroeconomic environment of the 1980s (hyperinflation and monetary and fiscal controls) brought significant trouble to the management of water companies and states which were responsible for counterpart financing and maintaining the rhythm and integrity of capital investment in water and sanitation. A second and perhaps equally important factor was the move to decentralize Brazil in the mid-1980s. Devolution of fiscal responsibility and decision-making power were enshrined in a new federal Constitution promulgated in 1988. These changes brought local governments more prominently into view in the provision of infrastructure, and this transformation created a new level of governmental complexity in the management of urban water policy.

1.5 With the Bank reorganization of 1987, in turn, key components of the technical staff in the Bank were split up and distributed by Country Department, eliminating a critical mass of technical specialties. This move weakened the technical capacity in the sector, sharply reducing internal interaction and knowledge exchange. The Bank reorganization similarly broke up groups of technical specialists in the urban sector. These events help to explain why one sectoral domain of specialists, in this case the water sector and not others, say urban or public sector management, took the lead in important metropolitan-wide issues. Whatever benefits and validity might have been attached to the 1987 reorganization, in effect it made it more difficult for the Bank to respond to large-scale, multi-sector infrastructure issues in cities than previously.

1.6 Whereas the issues in the sector before the 1990s were largely a matter of expansion of connections, trunk infrastructure, and building a system of state companies, at the close of the last century new issues were becoming more important, for example protecting the quality of water resources, reducing pollution, and flood control, and management of all this in a complex governmental matrix of federal, state, and local authorities. Sector specialists in the Bank responded to these changes with a new approach, beginning with this cluster of water quality projects in Brazil.

2. Project Objectives and Design: Urban Water Basins and the Poor

Project Objectives and Relevance to Brazil

2.1 To address the emerging issues produced by urbanization, leaders in Brazil's water sector with help from the Bank began to look for more encompassing approaches to resolve growing problems of urban water resource management. Narrow or single sector approaches – in water, sanitation, urban upgrading, or solid waste – were not themselves capable of tackling the most important water resource issues, especially maintaining water quality and allocating it rationally across many competing uses. The objectives for both projects took a basin-wide approach, adopted for circumstances in each of the three states involved. See Annex D for more detail and schematic maps of the projects. [2]

2.2 Accordingly, the general project objectives of the Brazil Water Quality and Pollution Control Project (WQPCP) were to: (i) abate pollution levels and preserve water quality; (ii) help establish a sound policy for water pollution control, including river basin management units; (iii) help develop a financial capacity for the provision of services in water basins; and (iv) a national component, to set up project preparation financing and assistance in the most congested urban areas of Brazil.

2.3 More specific objectives were set in each of the two individual states of São Paulo and Paraná. In São Paulo, the specific objectives were to establish the institutional capability to manage the Guarapiranga basin, a large area that forms an important part of the urban fabric of the city, in an environmentally sustainable manner and to improve the quality of life for residents of slums and illegal settlements. For Paraná, the objectives

2. It should be pointed out that the two projects under review were implemented in three states. The projects are the Brazil Water Quality and Pollution Control Project, 1992 (CPL 35030), implemented in São Paulo and Paraná, and the Espírito Santo Water and Coastal Pollution Management Project (CPL 37670). Reference is made occasionally to the Minas Gerais Water Quality and Pollution Control Project (CPL 35540). This third member of the cluster of water quality projects originated along with CPL 35030 in 1992, but because it began to advance quickly it was split off and handled in a separate operation. A performance audit was completed on this project in 2000. The reader should be aware that the Minas Gerais is invoked in key places in this report only to help understand the conception and evolution of policy and practice in the urban basin approach.

were to rehabilitate and maintain the river that flows through the capital city of Curitiba, the Alto Iguaçú, and its larger basin as a reliable water source and to promote flood control and rehabilitation of flooded areas. The national component: (i) financed studies for future projects; (ii) gathered detailed river basin data to enable basin committees to manage water resources; and (iii) conducted analytical studies on the finance and economics of water resources.

2.4 For Espírito Santo, the overall basin approach was translated into objectives that were more attuned to the level of services and company performance. The objectives were to: (i) improve the efficiency of the state water company, CESAN; (ii) increase coverage level of water supply and sanitation in key parts of the city; and (iii) provide appropriate water and sanitation infrastructure to low income urban areas of the capital city, Vitória.

2.5 The objectives embodied in this cluster of projects were a good fit and formed an appropriate policy development at the time the projects were conceived. Among the most far-reaching of these objectives was the creation of a wholly new institutional apparatus for the nation's management of water resources, including a legal framework; economic principles that assigned a pricing scheme to water; applying the "polluter pays" principle; and organizational arrangements to put these new rules into effect. The project in Espírito Santo had similar objectives, but gave higher priority to improving the operational efficiency of the state water company. In comparison to its predecessors, the project in Espírito Santo was more tactical than strategic. The long term objectives remained valid for all the states in Brazil. [3]

2.6 Militating against this holistic approach were the individual interests and objectives of governments and agencies, any one of which stood to lose power, authority, or resources by changing the status quo in the way the water sector was managed. Also, more narrowly inside the Bank, the move toward a comprehensive approach ran against conventional wisdom gained over the years from difficult or failed projects that over-reached project management capacity at the local level, particularly in metropolitan areas. For instance, the Recife Metropolitan Development Project, a complicated multi-sectoral, mutli-agency project in the 1980s, has long been cited as the original "Christmas tree" (a project that has something for everyone). One of the overarching lessons of comprehensive projects was that few, if any, institutional vehicles were capable of harnessing and coordinating many agencies and complicated problems such as incomplete legal instruments, disparities in income of customers, and asymmetrical political power in governance. These issues were addressed in the water quality projects.

3. By contrast, two projects in Ceara, (both recently assessed by IEG in Report 36591, World Bank 2006) took a slightly different approach. The projects are the Urban Development and Water Resources Management Project (Ln3789-BR) called *PROURB,* and the Ceará Water Resources Management Pilot Project (Ln4190-BR), called *Pilot-PROGERIRH* . These projects aimed more narrowly at water company efficiency, water resource management by means of storage dams in sub-basins, and service improvements for the poor. Thus, the Ceara projects were not basin wide in approach; no attempt was made to institutionalize a rational system of water resource allocation, and attention to low income areas was confined to water connections and did not involve sanitation and water quality.

2.7 Sector specialists in Brazil and the Bank felt that a river basin approach offered potential advantages that more than offset the drawbacks of past comprehensive projects. The confluence of reform ideas in water were articulated both by Brazilian analysts as well as by the Bank as early as the late 1980s. River basin management strategies were well developed in Europe and the United States and had produced positive results. Spain created its first water basin committee in the late 19th Century (1866), and the Tennessee Valley Authority (TVA) in United States is a well-known example of a comprehensive water basin system that produced impressive achievements in regional development.

2.8 The principles of this approach were outlined in the Bank's 1993 water sector resources strategy paper (World Bank, 1993). That paper called for a set of principles and incentives that included the economic pricing of water, costs for abstraction and pollution, basin committees for planning and strategizing, agencies to execute the river basin investments, and a national authority to oversee and regulate this apparatus.

Basin Project Design—Hybrids of Water and Sanitation and Slums Improvement

2.9 Thus, the objectives of this cluster of projects were fundamentally concerned with preserving and protecting water quality and improving environmental circumstances in river basins in or around metropolitan cities (see Table 2.1) densely settled with low income populations. See Annex D for schematic maps of the urban water basins. With the exception of Espírito Santo, explained further below, the basins are central features of the urban landscape. Further, to the extent that the projects blended water quality engineering and economics together with attention to low income settlements in a single basin, the projects are hybrids of conventional approaches for urban water supply and sanitation, on the one hand, and slum upgrading or shelter improvement, on the other.

Table 2.1. Overview of Project Design

Project	Espírito Santo	Paraná	São Paulo	Minas Gerais
Physical Works				
Water Connections	***	***	***	***
Sewerage Connections	***	***	***	***
W/S Treatment Plants	***	***	***	***
Drainage	**	***	*	**
Solid Waste	*	**	**	*
Flood control	*	***		***
Environment				
Parks, reforestation		**	*	
Institutional Strengthening				
Basin management	**	***	***	***
Water company Efficiency	***	*	*	*
Poverty				
Urban Rehab		**	**	**
Resettlement		*	*	*

Key: *** = very important; ** = important; * = also included

2.10 All of the projects adopted river basins as the units of intervention, although the project in Espírito Santo gave more direct emphasis to cities and neighborhoods and, as noted earlier, to water company efficiency. All of the projects also involved

environmental sanitation of low income areas, although each of the states addressed this in a slightly different way. All of the projects engaged many institutional actors, as many as a half-dozen, in the planning and implementation of the projects.

2.11 Though the principles were largely the same, each of the states adjusted in accordance with the circumstances it found on the ground. For instance in Guarapiranga, the key issue was to rectify water quality and sanitation problems that resulted from mutually conflicting policies. Normally appropriate state regulations prohibiting settlement in a water catchment area for the city collided with proposals to connect water and sewerage for thousands of families that had settled despite environmental prohibitions. The institutional means to achieve this coordination in Guarapiranga was the subject of the only revised objective of the WQPCP. See Annex One on the focus group recollection of project design.

2.12 In Paraná, the central issue was flood control and the protection of low- and moderate-income neighborhoods from the ravages of seasonal flooding. Since its earliest stages of growth in the 1950s, low income settlements began to occupy the floodplains of the Iguaçú river system that drains the Curitiba city region. Inundations from the two rivers cutting through Curitiba affected 15,000 residents in 1991, leaving 1,500 homeless. Floods had caused untold loss and the city and state had spent tremendous sums in recovery efforts over the past decades (Tucci, 2005). Hydrologic and flood control efforts in Paraná aimed to stabilize the floodplain. Retention dams and holding canals were coupled with an expanded ribbon of park lands around the city. This design resulted in some resettlement, and greatly increased green spaces and parks on the floodplains. Preventing return settlement on such areas has been a recurrent problem in Latin American cities. Reflecting on Curitiba's strategy, the former mayor, quipped that "nobody invades parks and soccer pitches."

2.13 The Espírito Santo project can be seen as a basin style design adapted to very different circumstances. In Vitória, the design sought to improve connection levels, especially for the poor, build up waste water treatment for both the poor and coastal areas, and improve water agency efficiency. Company performance was well below the average for state water utilities in Brazil. Basin planning and action was included, but was not the most important focus of attention. Attention to basin management gradually evolved in Espírito Santo as the project entered its second phase. A key factor also, as pointed out in the ICR, was that the project was over-dimensioned for the capacity of the state at the time.

2.14 Studies financed by the national component were designed to lay the groundwork for legal reform and future basin projects. Water resource atlases, diagnostics of use, demand surveys, and other data gathering helped to form the basis for charging water and to explore the basis for authority to grant water rights. In short, the national objective took stock of the water resources, gauged supply and demand in each basin, and sketched out the normative system to manage and govern water resources.

Addressing Poverty in Water Basins

2.15 Poverty was central to these water quality projects for reasons intrinsic to residential circumstances of the urban poor. The poor face many risks when settling illegally. They manage their vulnerability in part by trading off the low cost of land for high vulnerability in risky areas, for instance in flood plains of Curitiba (and Belo Horizonte) or, in the case of São Paulo, prohibited areas such as the Guarapiranga watershed. Second, because of the difficult topography and highly dense patterns of settlement, connections for sanitation in slums are well below city-wide averages.[4] Lack of improved sanitation has become a central characteristic and determinant of a slum area (UN Habitat 2004).

2.16 Thus, addressing the sanitation needs of the urban poor necessarily became central to the approach and design of the water quality projects. Accordingly, a great deal of time and resources were spent during implementation of the projects in São Paulo and Curitiba to work out the fine-grain operational issues involved in connecting individual residences or, where this was not feasible, to build new shelter with sanitary connections for re-settled residents.

2.17 Alternative approaches might have followed conventional lines. For example, standard approaches to shelter upgrading were an option, but the choice of target areas would not normally coincide with water basins, nor deal with the economics and resource allocation issues of water resource management. Basin approaches, on the other hand, had been developed in a larger, regional context, usually in non-urban areas, and with virtually no contact with the urban poor.

2.18 The poverty and water basin approach can be seen as a hybrid, created to remedy shortcomings from conventional sector-driven project work. The downside of a hybrid is the complexity of management and possible tradeoffs in depth and scope of policy and reform. Employment and economic development, an important dimension for urban poverty alleviation, are mostly outside the scope of basin approaches so far, while emerging issues such as the proper role of the private sector and mechanisms for tradable rights would likely pull attention and resources away from poverty issues in future generations of these projects.

2.19 China, India, and Mexico have each chosen a water sector approach, and each can show gains in water quality management (World Bank and MoC 2005). But no country has succeeded as much as Brazil in this combined approach, and it appears unlikely that none has gone much further by pursuing either purely water or poverty separately (World Bank 2004a; Comisión Nacional de Agua de Mexico 2006).

2.20 Each of the three cities (four when Belo Horizonte is included), represents a data point from which to assess the appropriateness of design and efficacy of projects aimed at improving urban water quality. Even though the project concepts were well-received in

4. Thus in the early 1990s, access to improved sanitation in São Paulo was 83.7 percent; in Curitiba 55.4 percent (Habitat 2006); and in Vitória (in 1994) around 9 percent (World Bank 2004b).

the country, and they appear to emerge as best practice in the sector, how well were they implemented?

3. Rhythm of Implementation – Pitfalls, Recovery, Innovation

3.1 Although they followed markedly different trajectories, implementation in each of the project cities – São Paulo, Curitiba, and Vitória – experienced a shifting velocity punctuated by political change and project delay, followed by recovery and eventual progress. Partly for these reasons, each of the projects took longer than anticipated to implement. Besides political disruptions, the projects had to grapple with complex issues in low income settlements. Implementation required extraordinary patience on the part of sponsors (Brazilian authorities and the Bank) and higher than average supervision costs (337 staff weeks).[5] Average supervision budget at the time was on the order of 15 staff weeks and current Bank projects budget only US$80,000, or about eight staff weeks, roughly one-third of the total used to supervise the São Paulo and Curitiba components. Yet, the project produced many innovative techniques, for instance in management of low income households. Also water quality was largely sustained or improved and a new and growing institutional fabric, of both agency and practice, was put in place.

Political Transitions

3.2 All the projects ran an implementation roller coaster of ups and downs. One of the most important reasons for serious breaks in the rhythm of implementation was the frequent turnover in political administrations at the state and municipal levels. With the onset of decentralization in the early 1990s, municipal elections are held on a staggered schedule in relation to elections for state office. The project cities experienced an average of two mayoral and two gubernatorial changes over the seven to nine year lifetime of the projects. (See Annex C on Project Time Lines.) In Espírito Santo, these changes contributed to a complete bifurcation of the project into essentially two discreet periods. In São Paulo, the project documents were signed the very week that a new state government was about to take office, and according to local officials reflecting back on the project, perhaps a year was lost in bringing new administration officials up to speed on its complexities. In Paraná, virtually every phase of the project was frozen with the accession to power of the new state government in 2003. (The change of state administrations in Minas Gerais was less traumatic for the project there. However, the fiscal crisis of 1999 did engender a refusal by the Governor to meet the state's fiscal obligation, requiring substantial revisions in project implementation.)

5. The ICRs for each of the projects contain detailed accounts for these and other delays as well as the corresponding numbers in costs and outputs. This report will focus on comparative perspective afforded by looking across project cities, if only to show the important extent to which initial conditions affect implementation of widely accepted general principles.

3.3 Turnover and policy discontinuity is not uncommon in decentralized governmental administrations, yet the risks posed to project implementation by changes in local government were not specifically identified during appraisal.[6] Bank teams took steps to smooth the transitions, for instance through briefings and dialogue during "lame duck" periods for outgoing and incoming administrations. But these transitions can be political blind spots and potential pitfalls for Bank teams already dealing with a large set of complex issues.

Social Issues and the Poor

3.4 A second reason for disruptions in the rhythm, if not delay, in the cluster of projects was the attention to the detailed needs of the poor. The participatory techniques of consulting, explaining, and winning the cooperation of residents were indispensable in gaining access to work sites, to formulating small scale solutions and neighborhood approaches, and to the smooth sequencing of work. Each of the stages of work involved repeated neighborhood, block, and household cluster meetings to confer with residents, provide for temporary shelter, organize work gangs, and follow up with trouble shooting and corrections. All of this entailed extensive participation of beneficiaries and attention to details of individual and block-by-block engineering and construction to retrofit long-standing dwellings.

3.5 In Vitória, working with low income neighborhoods was a more central feature of the critical path to project objectives – the poor constituted nearly half of the project beneficiaries, even though the target was higher (World Bank 2004b) – but managing work in slum areas was not the most important reason for delay. In Vitória, intentions to reach the poor with water and sanitation hook-ups were, for reasons unrelated to the poor, diverted into programs to build treatment plants. So skewed was the process – because of the inappropriately large scale, financial improprieties, and mismanagement by state agencies – that the initial years of the project resulted in seriously underutilized treatment plants that were unconnected to households, low and middle income alike.[7]

3.6 With the 1997 restructuring of the project in Espírito Santo, attention was once again directed to slum areas. Direct contact and educational efforts were mounted to explain to low income households the reasons for a 70 percent tariff increase, as well as the benefits and responsibilities of sewerage connections. But these efforts were not successful in convincing large numbers of low income customers to meet additional hook-up costs charged by the water company. Instead, many residents continue to use storm drains for sewage. Municipal government, not the water company, has responsibility for enforcing hookups, and political will in the municipality needed for enforcement has wavered over the years. Accordingly, while the poor are better off because of water connections, the watershed continues to absorb sewage.

6. The appraisal report does mention political considerations, but does not specifically identify change in state government as a source of disruption.

7. See the ICR, World Bank 2004, for detailed accounts

Discovery, Learning, and Innovation

3.7 The innovative nature of the urban basin approach was one of the main reasons why notable insights, lessons, and innovations emerged during the course of implementation. Some of these insights – techniques for on-site upgrading in São Paulo, the conversion of floodplains into parkways and ball fields (for instance for soccer and volleyball) and the swapping of land to complete ribbons of parkway along urban riparian areas in Curitiba, and citizen groups in Guarapiranga – were converted directly into project gains in the form of short cuts or innovations that are being used more widely today. São Paulo also produced advanced educational materials about solid waste and sanitation. The materials are in use today in the environmental education center for school-aged children financed by the project and built near slum areas. The rehabilitation of poor urban areas in Guarapiranga is a 2004 award winner in the UN Best Practices.[8]

3.8 Curitiba was inventive during this period as well. The city focused on education in schools to raise children's awareness as a technique to educate their parents, the voting citizens, about the importance of rivers in the city. Curitiba's program "Trash that is not Trash" is an ingenious system that provides incentives and support to youngsters in low income areas to bag and recycle trash where collection trucks are unable to circulate.

3.9 Another insight on the nature of water quality and pollution in river ways in Curitiba (and in Belo Horizonte) resulted from research conducted during the course of implementation. These studies generated solid evidence that the problem of water quality was due just partly to industrial waste. To the contrary, water quality issues were almost entirely the result of human sewage. These findings reaffirmed the strategy of incorporating the poor into project objectives and design. Water quality could not be achieved in these basins without attending to sewerage generated by low income settlements.

3.10 At the national level, the project also developed a practical application of results-based outcomes in the form of grants for pollution reduction (See accompanying Box).

Changing Behaviors by Buying Reduction Rather than Paying for Treatment

One of the best examples of new techniques that arose from the basin approach is the change in incentives for local government officials concerning pollution control. The former head of the Agência Nacional de Águas (ANA), the national water authority, championed a legal provision to dramatically shift incentives of local officials in relation to water quality. Grants were offered to cities in proportion to reductions of pollutants in nearby water bodies. The effect of this provision radically changed behavior of state and local officials. Rather than maximizing costs of treatment plants for which mayors sought financing from federal authorities, mayors were now induced to minimize pollutants in order to win pollution reduction grants (Margulis, et. al. 2002).

8. United Nations Best Practices Awards are selected on a biannual basis by UN-Habitat to recognize outstanding practice in different fields of economic and social development. Award winners compete with hundreds of nominees submitted by governments, NGOs, and private sector. See www.unbestpractice.org.

Institutions, Rules, and Agencies

3.11 Bringing the new institutional apparatus to life was to begin with studies, analytical work, and data gathering to be implemented under the national component of the São Paulo and Paraná Project. Data and information on hydrologic regimes were synthesized in atlases and other documents to help inform committee deliberations.

3.12 In the course of implementation, new perspectives and findings prompted a shift in the specific topics to be covered. The urban circumstances and uses of water varied widely from basin to basin. Some were heavily agricultural, others had industrial demands, still other stretches were primarily residential. Importantly, officials began to realize that not all basins needed committees. Analytical work also developed an overall framework of the water resource system for Brazil. The structure eventually became the basis for the national water act, Law 9433 of 1997.

3.13 The national component also established a bridge to future projects by investigating the status and circumstances of selected water basins. Perhaps the most important of these is the Paraíba do Sul, a water basin that connects São Paulo, Rio de Janeiro, and Minas Gerais states. Other basins included were in São Paulo (Piracicaba), Pernambuco (Recife) and Bahia.

Borrower and Bank Performance

3.14 On the whole, these projects might serve as poster ads for the Bank maxim of sensitivity to client demand and comparative advantage. Since their inception, Bank staff working with sector specialists in Brazil formulated the approach and worked together through turbulence and adversity. For example, Brazilian interlocutors were uncertain about the institutional home for the project, and country officials were divided about how to handle the legal status of squatters in the protected watershed. Both country officials and the Bank were patient; both endured delays and setbacks; both made good judgments in technical and tactical areas. They changed course when necessary, for instance in the discovery that pollution was mainly from residential, rather than industrial, sources and in restructuring the project in Espírito Santo. They agreed to split off Minas Gerais, making it a separate project, when it moved forward quickly in the first year. Extensive supervision (337 staff weeks) was required and supplied by the Bank.

3.15 At the same time, the Bank sometimes jumped around inconsistently on matters of priority in policy. For instance, in the middle of project implementation, the Bank began to show a predilection for a greater role for the private sector in infrastructure and services. This came as an unwelcome surprise to counterpart agencies struggling to finish works under pressure of difficult circumstances of intergovernmental political struggles, policy change, and the complexities of low income settlements. Next from the Bank came a new emphasis on poverty. And as implementation was already well advanced, introduction of new prescriptions and requests for data was more of an irritant than a new policy insight.

3.16 In comparison to engineering solutions, the Bank gave too little attention to educational and behavioral issues of low income residents affected by the projects.

Though it is difficult to measure this by spending alone, social and educational programs range from a few percentage points in some projects to nearly a quarter of total project costs in present day poverty reduction and municipal reform projects such as the *Viver Melhor* in Bahia.

4. Outcomes – Legacy Framework

4.1 The outcomes of the project can be seen in large and small perspective, including policy gains at the national and local levels, completion of project components in keeping with design, as well as with respect to poverty, greater local government sensitivity and sustained action along with effective participation by the poor in upgrading, relocation, and sanitation services. The evaluative outcomes are summarized in Table 4.1 and, together with overall outcomes, explained later in this section.

Table 4.1. Evaluative Outcomes

	São Paulo	***Paraná***	***Espírito Santo***
Efficacy	Policy measures achieved; water quality improved; services improved	Policy measures achieved; flood control achieved	Water company efficiency improved; coverage improved; sanitation improved
Efficiency	Post hoc data on property values suggest higher returns than estimated originally. No unforeseen costs	Likely that property and recreational values are higher than estimated. No unforeseen costs.	No data to add to ICR.
Monitoring/ Evaulation	National component financed data acquisition; state basins using data; quality measures also being routinely tracked by each state.		
Sustainability	Strong evidence of sustained action in policy and basin management.		
Institutional Development	Legal and agency reforms in all three states suggest that basin approach and institutional systems have taken root and are maturing		

Efficacy

4.2 The cluster of projects achieved its over-riding objective of addressing issues of water quality and poverty from the standpoint of urban watersheds. In doing so, the Bank helped to launch an innovation that presaged the focus on Millennium Development Goals (MDGs). Water resource management, water quality, and poverty alleviation were tied together into a single package of interventions. The multiple social and natural resource objectives are so tightly intertwined that these projects have come to represent archetypes for each individual sector. Guarapiranga for instance is seen by the Cities

Alliance as one of the great success stories in squatter upgrading, even though the project is much more than that. Similarly, the river basin approach is a bellwether in the Bank's water resource literature (it is cited frequently in World Bank 2004a) even though much of its success depends on having dealt effectively with low income settlements.

4.3 It is also important to note that the concept and design of these projects emerged from a long and rich dialogue with policy specialists and practitioners in the sector. The IEG Evaluation Mission encountered numerous observations by Brazilian specialists who compliment the Bank for its steady partnership and risk-taking in this cluster of projects.

4.4 At the national level, Brazil has experienced a sea change in attitude and debate about water resource management. The issue is not whether, but how, and under what circumstances to take decisions and action on water resource allocation and pricing. Senior government officials and Bank field staff point out that the current administration has adopted a distinctly *municipalist* interpretation of federalism, meaning that political support and benefit of the doubt are accorded to municipal governments in disputes between cities and states. This federal position in some ways weakens the basin approach, because many issues — for instance, rights to water, disputes over charges, production of municipal waste — spill over from one municipality to another, and the advantage of exerting a leveling influence of states is reduced under the *municipalist* orientation. In favoring local authorities, the present administration reduces the mediating influence of states and accentuates the inherently unequal data, expertise, power, and responsibility of municipal stakeholders on water boards.

4.5 The institutional "freeze" in Paraná — that is the complete suspension of legal and institutional steps to create a water basin board by the present state administration – can be seen as a reaction to the problem of asymmetries in data, knowledge, and expertise. State authorities felt that they needed to strengthen the hand of cities and communities on the water board. With time, the information and other gaps will be narrowed, but the disparities complicate the business of basin committees and threaten to compromise the quality of outcomes. These problems of asymmetries will not be solved easily under the current approach of federalism nor, as suggested in Mexico, Colombia, and Argentina, will they go away quickly with a retrenchment in central powers (see chapters by Mizrahi and Selee in Tulchin and Selee 2004 and Campbell 2003).

Sustainability

4.6 But while a new policy approach is being institutionalized, the view of senior officials and sector specialists is that much work remains to be done. Many committees have been formed and authorized, but they have not begun to function routinely. Water charges for abstraction and pollution remain to be refined, appropriate arrangements are still being worked out for public-private partnerships in infrastructure, and some observers feel that rules need to be agreed regarding tradable rights. Others feel that more focus is required on heavy consumers of water and to managing demand (Porto 2003). The current long term policy goals in Brazil — tradeable water rights and greater private sector roles — are logical extensions of the original set first address with this cluster in the early 1990s.

4.7 At the state and local levels, the sustainable aspects of the projects can be measured in part by a growing focus on environmental, educational, and planning activities. Each of the states and main cities involved in this cluster has completed the major civil works and other physical goals in connections and treatment. Attention has turned to educating consumers about demand (Espírito Santo), the importance of using water correctly (Paraná, São Paulo), of keeping solid waste separate from the drainage system (Paraná, São Paulo, Minas Gerais). São Paulo city officials are continuing the upgrading program, extending it to more slum areas. And all the states have begun action or taken steps to further implement the basin committees or planning on a regional basis. (See Table 4.2 for an update of the situation in each state since the time that ICRs were completed.)

Table 4.2. What is New and Different: Updating ICRs

Project	Espírito Santo	Paraná	São Paulo	Minas Gerais
Physical Works				
Water, Sewerage, flood, and SW	Continued improvement	More attention to education		
Environment				
Parks, reforestation	Incorporation into plan making	Consolidation of park lands	Environmental education	
Poverty				
Urban Rehab	Municipal government education program	N/A	Continued progress on upgrading. Owner occupier improvements	Owner Occupier Investments in shelter and neighborhoods
Management				
Basin	Long term planning underway	Revived basin approach under state umbrella	Expanding scope of approach to entire metro watershed	Attention shifting to operational aspects of basin management

4.8 Development of the legal framework for water has evolved further in some states. For instance, in São Paulo, special state laws were passed in 2000 and 2005 concerning Paraíba do Sul in connection with water charges and a special law was enacted to further amend regulations in Guarapiranga (Law 12.233). State water legislation related to basin development has also been enacted in Paraná (Government of Paraná 2005) and Espírito Santo (Government of Espírito Santo 2004).

Efficiency—View from the Slums

4.9 It appears likely that residents in Guarapiranga have helped take corrective and preventive actions to maintain water quality, and evidence shows that low income residents perceive the value of these investments. Velez et. al. (2006) report data on willingness to pay is well above average tariffs. Also, during un-announced IEG Mission visits to slum areas in Guarapiranga, residents could be seen caring for community spaces

(sweeping streets, attending to or using public spaces like plazas and community centers), using trash containers appropriately, and making substantial use of community facilities in which individual and community education were conducted.[9] It is important to note that design techniques, such as creating drivable carriageways over formerly garbage-strewn arroyos, make it easier for residents to dispose of trash and for municipal trash vehicles to collect it.

4.10 Samples of property values based on reported sales demonstrate substantial increases since project completion in Guarapiranga. A private consultant familiar with the project compared sample residences immediately affected by works within the *favela* with a group of residences 100 m from favela works, and a third group outside the project area but in equivalent *favelas*. The results demonstrate property value increases of between 25 and 50 percent for those within the affected zone compared to equivalent properties not subjected to upgrading (COBRAPE 2006). If these values were to hold for the general population of affected areas, the economic rate of return would be substantially higher than estimated at appraisal or at the completion report stage. Similar but anecdotal evidence (see photos of slum areas in Annex D) is visible in Paraná (and Minas Gerais).

Monitoring and Water Quality

4.11 Monitoring of water quality has been maintained in all the states. Water quality records for all three project areas demonstrate sustained levels, if not minor improvements, despite population increases far exceeding those projected at the times of appraisal. In Espírito Santo, though treatment plants are still operating well below capacity, water quality along coastal shores has been maintained in keeping with project objectives. Similarly in Guarapiranga, the population is 50 percent higher than when the project started, yet water quality has remained constant or slightly improved over that period. Table 4.3 includes data on drainage in Curitiba because those civil works were central to flood control in that city.

Table 4.3 – Water Quality Index* (and Drainage) by City

	1995	***2000***	2005
Guarapiranga Water Intake			
Actual	79	Na	Na
Target	82	63	N/A
Curitiba Alto Iguaçú			
Actual	50	82	63
Drainage Actual**	9.6	26.8	N/A
Drainage Target	8	17.3	N/A
Vitória* Coastal waters**			
Camburi Beach	46	90	86

* : Water Quality Index Rankings:
0-25 = poor; 26-50 = bad; 51-70 = reasonable; 71-90 = good; 91-100 = excellent
** : Drainage in kilometers completed (Brazil Water Quality ICR, p. 53)
*** : Percent of time acceptable averaged over four sampling areas (Espírito Santo ICR, p. 55)
N/A: Not applicable; Na not available

9. Of a half dozen community centers visited on a mid week morning, computer stations were filled with young people focused on the screens.

Institutional Development

4.12 Hindsight now suggests that, at least to some degree, the patience shown by borrower and the Bank was rewarded. At the local level, state and municipal governments have uniformly taken on board increased responsibilities for water quality improvement, although the capacity to improve conditions is uneven. Of equal importance is the effort, engaged in by state and local governments in each of the three states (four counting Minas Gerais), to manage difficult environmental sanitation issues in low income settlements.

4.13 It appears that sensitization of municipal governments to their responsibilities in managing sanitation and solid waste has been effective, if not completely successful. More data will be needed for Espírito Santo to be sure of this. But there is little doubt in São Paulo and Curitiba. The City of São Paulo has institutionalized the slum-upgrading approach it helped to develop in Guarapiranga and has transformed it into a major pillar of its shelter strategy (Franca 2000).

Additional Notes on Espírito Santo

4.14 Partly or perhaps largely because a follow-on project is being implemented, many operational objectives have been achieved. For example, unaccounted for water has been reduced by a quarter (to 30.8 percent), sewerage coverage is over 26 percent, and financial targets are being met. Despite the focus on individual household and system inter-connections, however, the treatment capacity in Vitória is still under-utilized by more than a third. Further work is required to educate low income users about the reasons for and necessity of sanitation connections. Consumers are confused or unaware that the 70 percent increase in water tariffs was for this purpose. A persisting problem is that the water company, CESAN, is dependent on the municipality to enforce sewage hookups, especially on the periphery of the city. By its own admission, CESAN is not good at cutting service to consumers delinquent in payment. Completion of the follow-on project appears to be bringing these imbalances into line.

4.15 The somewhat more operational objectives in Vitória did not prevent the state from advancing on the basin approach, due perhaps to the momentum generated by the progress in the national regulatory system, as well as by the existence of the follow-on project currently being implemented in the state. The state has moved ahead with working basin committees, contemplation of charges, and the elaboration of 30 year plans in key areas, particularly for maintenance of forested areas and the creation of reservoirs for future water supply.

4.16 It should also be noted that the socio-economic and political environment in Espírito Santo is much different today than it was at project closure. In relative terms, the state has changed a great deal more than any of the other states examined. Today, partisan political influences appear to be greatly reduced. The economy has improved with the onset of petroleum royalties, and the financial standing of the state and its water company are much stronger than when the project was being implemented. Water supply is not as important an issue. Rather, the central issues now are connecting households to sewerage, completing system integration, and turning to basin management.

Balancing the Ledger

4.17 Balanced against these positive findings is a continued pressure on water resources generated by continued immigration and settlement in protected areas in São Paulo, Curitiba (and Belo Horizonte). These circumstances are complicated by uneven topography in São Paulo and disorganized settlement patterns in nearly all the cities. Although interventions in older parts of the settlements have rectified the worst of these problems, new settlers (not necessarily in the same basins) create the same kinds of problems that prompted the water basin and poverty approach launched with these projects. Wastewater from new settlements, as well as from vast, as yet un-served, areas, still enter the stormwater drainage system, eventually reaching supply areas downstream.

4.18 At least one observer interviewed by the PPAR Mission commented that control over invasions could have been more effective, but at the time the Federal Water Resources Law (9433 of 1997) was being debated, a multitude of interests and lobby groups (federations of industries, associations, cooperatives, academia, and others) crowded out discussion on control of new settlements. Mechanisms to help local governments avoid such problems were either not developed or not in place.

Paraná: Breach of Contract Remedied

4.19 In Paraná, the implementation of virtually all of the policy elements central to the project was frozen in 2002 with accession to power of a new state government administration. Even though these actions were entirely within the prerogative of the state, freezing the policy and institutional apparatus was tantamount to breach of contract with the Bank. The state offered no justification for taking this action.

4.20 In IEG field visits, state officials explained that the incoming administration took a quite different view of water than its predecessor, seeing it as a social, rather than economic, good. From this perspective, state policy also placed stronger emphasis on water and sanitation as rights of citizens. Social tariffs have been strengthened to buttress this view and to ensure that all citizens are able to afford water. Conversely, it was seen as improper for the private sector to be as heavily represented on the basin committee as originally proposed, because this would open the way for the private sector to “make money off of natural resources.”

4.21 The Paraná state government has now resuscitated the basin approach, reconfiguring the basin committee to give greater weight to public interests, particularly the state itself. The state has passed legislation authorizing basin committees, and four such committees are working. Water charges are authorized for 2007, and a statewide plan is in the works for completion in May of 2007.

5. Ratings

5.01 Although outcomes have been sustained, or even exceeded those set in the appraisal documents, none of the outcomes compels a change in the principal ratings for either of the projects. A gray area, however, emerges in the case of Espírito Santo, where

a follow-up project is presently underway. The current project is addressing some of the issues that were cited in the ICR and ES, notably with respect to institutional development. A key issue in the "negligible" institutional development rating was the poor performance of CESAN, the state water company. Updated figures indicate much improved institutional strength compared to the starting point in 1998.

Principal Ratings

	*ICR**	*ES**	*PPAR*
WATER QUALITY AND POLLUTION CONTROL PROJECT (LOANS 3503-BR, 3504-BR, 3505-BR TO THE STATES OF SÃO PAULO AND PARANÁ)			
Outcome	Satisfactory	Satisfactory	Satisfactory
Sustainability	Likely	Likely	Likely
Institutional Development Impact	Substantial	Substantial	Substantial
Bank Performance	Satisfactory	Satisfactory	Satisfactory
Borrower Performance	Satisfactory	Satisfactory	Satisfactory
ESPÍRITO SANTO WATER COASTAL POLLUTION MANAGEMENT PROJECT (LOAN 3767-BR)			
Outcome	Satisfactory	Moderately Satisfactory	Moderately Satisfactory
Sustainability	Likely	Likely	Likely
Institutional Development Impact	Negligible	Negligible	Negligible
Bank Performance	Satisfactory	Satisfactory	Satisfactory
Borrower Performance	Unsatisfactory	Unsatisfactory	Unsatisfactory

* The Implementation Completion Report (ICR) is a self-evaluation by the responsible operational division of the Bank. The Evaluation Summary (ES) is an intermediate IEGWB product that seeks to independently verify the findings of the ICR.

6. Lessons in Development Effectiveness – Small Bricks and Giant Steps in Urban Infrastructure

6.01 Many themes mentioned in this assessment have been covered previously in ICRs, and for the most part, those observations hold up in light of the data and findings from this review. For instance, the ICRs have mentioned: (i) the importance of treating the institutional and environmental objectives as long term program areas, rather than projects, and this requires persistence, patience, and follow up by the Bank; (ii) that integrated approaches work well, for the most part, with low income settlements; (iii) that the hybrid approach represents a useful model for Brazil and elsewhere; and (iv) that metropolitan planning in Brazil requires urgent attention. Additional observations are covered in the ICRs relative to the operational side of project units and basin committees, the need to improve public information, and the importance of baseline data and

monitoring. The present evaluation aims to gauge the appropriateness of the hybrid approach and to draw lessons about the next steps for the Bank in these sectors of Brazil.

6.02 The projects reviewed here suggest that for a large, technically competent borrower like Brazil, the nature of the policy objectives set in this cluster – i.e., fundamental, wide-reaching, and long term – were appropriate for the country. The outcomes of the project show that Brazil responded by setting in motion a process of institution building. Much has been achieved, including an emerging agreement of what comes next for Brazil in water resources, for instance tradeable rights and a stronger private sector role. But decades more work is needed to realize the full potential of the present basin approach without taking on larger issues. And though the hybrid model developed with this cluster of projects presaged the focus on Millennium Development Goals, it is much less clear what is next for urban poverty in relation to water and sanitation.

6.03 Because this cluster of projects was implemented in complex metropolitan settings, the policy achievements are all the more noteworthy. Parallel achievements in water resource management in Spain, France, and the United States took place largely before urbanization had become as pronounced as it was in Brazil when these projects were launched. China, India, and Mexico have yet to tackle the issues of metropolitan water quality in a frontal way. All of these countries and scores more are facing growing pressure to find solutions to metropolitan management. The water basin approach is one method, urgent, convenient, and operationally relevant, to address area-wide issues. The experience of this cluster demonstrates some of the key features, as well as successes and limitations of this approach.

6.04 The singular feature of the hybrid approach is the extent to which the projects integrated, even depended upon, low income settlements. This cluster demonstrates that the solution to improved quality of water resources in urban areas is highly synonymous with solutions for poverty, at least in the project cities. Reaching objectives in water resources and in poverty alleviation required improvements in the environmental circumstances of the urban poor and vice versa.

6.04 The drawbacks of the hybrid approach, in turn, are the complexity of management and possible tradeoffs in depth and scope of policy reform. For instance, employment and economic development are central to poverty alleviation in urban settings, but these objectives lie mostly outside the scope of basin approaches so far. In the water sector, though much work remains to be completed to consolidate reforms, new and emerging issues also require attention, such as the proper private sector role in water management and tradable water rights. These issues may draw attention and resources away from poverty issues in future generations of hybrid projects.

6.05 At the same time, no separate project approach – neither slum upgrading, nor water supply and sanitation alone – has succeeded any better on purely water quality objectives as this cluster of hybrids. More importantly, the cluster experience contributed to a better understanding of how to manage difficult inter-sectoral issues involving the many actors in metropolitan cities of Brazil. For example, the projects suggest it is important to maintain a division of labor between states and localities in the planning,

capital investment, and maintenance. Also, the projects illustrate the importance of maintaining a prudent distance between technical issues of planning and economics on the one hand, and the political sphere in which priorities and budgets are decided, on the other, although this is not always possible. Long term dedication to large goals, however, has nevertheless helped to move Brazil into a prominent position with respect to water resource management in large urban areas among leading Bank clients – China, India, and Mexico among them.

6.06 These and other countries are in search of policy and practical solutions to complex coordination and governance issues that involve competing agencies and blurry institutional rules in metropolitan areas. One of the most important lessons from this review is that the fusion of poverty and water basin components into a single approach created a new stage on which technical and policy agents could work out complex problems in a coherent framework. The hybrids brought key actors, each technically competent in their own domain, but with little or no prior experience in the allied sectors such as social work, anthropology, and community organization, into a common problem-solving mode.

6.07 In tackling technical planning issues, the projects solved one of the two big problems in metropolitan governance. Large metropolitan areas must solve the technical issues of economic evaluation and planning. Second, they must decide priorities and budgets. This cluster of projects managed the technical issues of economics, for instance of pricing water and evaluating project options. But in the second, political sphere, this experience in metropolitan planning was not encumbered with political representation of democratic assemblies in priority setting and budgeting making. The main business at hand was problem solving of engineering, design, logistics, and construction. The circumstances in the project cities — broad agreement on the definition of the problem, a collaborative working environment — allowed technical agents to succeed. It is worth considering whether and how this hybrid approach can be exploited in the current and prospective conditions in Brazil and elsewhere.

6.08 In these sectors at least, the country is at a strategic crossroads. It has moved beyond the simple split of water projects that include the poor or slum upgrading projects that emphasize water. What is more, the developmental issues for Brazil are defined by the country team in terms of paradigm change, for instance, shifting the regulatory framework to accommodate wider array of property rights and private sector involvement in development. The cluster of projects took important steps in this direction and constitutes a feasibility test showing that policy issues linking poverty reduction, the provision of basic services, and environmental improvement at the regional scale or larger can be successfully tackled together.

6.09 The projects also show that complex undertakings do not have to be Christmas trees. But to keep projects from becoming unmanageable or broken, clear policy objectives are needed, and the Bank and borrower need to be committed for several, even many, decades. The cluster of projects ran longer than expected and Brazil is still far from consolidating its institutional objectives of water allocation machinery. Accurate technical judgment was provided by expert, senior professionals in Brazil and in the Bank, and both parties were patient in project implementation. All of this illustrates a

point made earlier in ICRs, that the route to meet borrower demand for large scale issues entails a higher order of intensity in consultation and higher than usual preparation and supervision costs.

6.10 Also, a wider array of project management skills and analytical expertise, for instance in political economy, is needed to manage risks of long term engagements. These contextual factors – and particularly the approach to federalism in Brazil – will continue to influence the policy choices and speed of advance of the Bank partnership with Brazil. The Bank can take steps to keep political transitions and partisan disruptions from becoming blind spots. Bank management should provide guidance to task managers about gauging these risks, to help spot the likelihood of disruption, and to provide techniques – such as multi-party briefings during and immediately before project launch at mid-term reviews – to educate opposition groups and the public on the issues, difficulties, and merits of the project.

6.11 One of the richest lessons from this assessment, finally, concerns the perceptions and judgments of high level professionals who managed the course of project implementation. Institutional actors were given the scope to form and agree on core values. They were given or took the power to carry forward lessons learned, modifying or sustaining the course of work, or redefining the objective as new problems and circumstances arose. Focus group members, reflecting on this process, pointed out that players started with drastically uneven levels of information. The same point can be made for the newly formed basin committees. This asymmetry in participant knowledge and information required repeated cycles of learning, especially for the state project units after new administrations took office. But little structured learning was available to them, and virtually none was provided for basin committee members struggling with decisions over resource allocation and pricing. More structured learning may be useful in the course of preparation and implementation for both project units and basin committees.

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Annex A. Basic Data Sheet

WATER QUALITY AND POLLUTION CONTROL PROJECT, SÃO PAULO AND PARANÁ (LOANS 3503-BR, 3504-BR, 3505-BR)

Key Project Data *(amounts in US$ million)*

	Appraisal Estimate	*Actual or Current estimate*	*Actual as % of Appraisal estimate*
Total project costs	261.9	338.6	129
Credit amount	119.0	118.9	99
Cofinancing	-	-	-
Cancellation	-	-	-

Cumulative Estimated and Actual Disbursements

	FY93	*FY94*	*FY95*	*FY96*	*FY97*	*FY98*	*FY99*	*FY00*
Appraisal estimate (US$M)	20.5	52.4	84.6	107.8	119.0	119.0	119.0	119.0
Actual (US$M)	0.6	2.6	11.6	42.5	71.7	94.5	110.5	118.9
Actual as % of appraisal	3.1	4.9	13.8	39.5	60.2	79.4	92.9	99.9
Date of final disbursement:	11/20/2002							

Project Dates

	Original	*Actual*
Initiating memorandum	05/02/1991	05/02/1991
Negotiations	05/26/1992	05/26/1992
Board approval	07/02/1992	07/02/1992
Signing	06/28/1994	12/17/1992
Effectiveness	09/28/1994	05/17/1993
Closing date	09/30/1997	12/31/2002

Staff Inputs (staff weeks)

	Actual/Latest estimate	
	No of staff weeks	***US$ ('000)***
Preappraisal	n.a.	n.a.
Appraisal	n.a.	n.a.
Negotiations	n.a.	n.a.
Supervision	299.26	1,101.802
Other	n.a.	n.a.
Total	336.66	1,190.476

Mission Data*

Date (month/year)	No. of persons	Specializations represented	Performance Rating	
			Imple. progress	Dev. objective
Identification/Preparation				
Feb 1991				
July 1991				
Sept 1991				
Oct 1991				
Appraisal/Negotiation				
Feb 1992				
Supervision				
Feb 1993	1	Engineer	1	1
Apr 1993	4	Economist, Engineer, Env Sp, Procurement Assistant	2	1
Oct 1993	3	Engineer (2), Economist	2	1
Dec 1993	1	Engineer	1	1
Feb 1994	2	Division Chief, Engineer	2	1
May 1994	2	PR Engineer, Engineer	2	1
Aug 1994	3	Economist, PR Engineer, Engineer	U	S
Dec 1994	3	Sr. Anthropologist, PR Engineer, Engineer	U	S
Feb 1995	1	PR Engineer	U	S
Sept 1995	2	Anthropologist, Water Engineer	U	S
Dec 1995	5	Water Engineer (3), Financial Analyst, Procurement Analyst	U	S
June 1996	4	Engineer (2), Financial Analyst, Procurement Analyst	S	S
Oct 1996	2	Economist, Engineer	S	S
Dec 1996	2	Engineer (2)	S	S
Sept 1997	1	Engineer	S	S
May 1998	5	TTL(SP), PSP, Social Specialist, Engineer, TTL (P)	U	S
Sept 1998	1	TM (Economist)	S	S
Dec 1998	3	TM, Social Scientist, Water Economist	S	S
May 1999	3	TM, Engineer, Social Expert	S	S
Oct 1999	4	TM, Water Engineer, Engineer	S	S
Jun 2000	3	TM, Engineer, Social Specialist	S	S
Dec 2000	5	TM, Co-TM, Social Dev. Sp. Sector Manager, Sr Water Resources Engineer	S	S
June 2001	2	TM, Engineer	S	S
Nov 2001	2	TM, Engineer	S	S
ICR				
June 2002	1	TM	S	S

* Data from PSRs.

ESPÍRITO SANTO WATER COASTAL POLLUTION MANAGEMENT PROJECT (LOAN 3767-BR)

Key Project Data *(amounts in US$ million)*

	Appraisal Estimate	*Actual or Current estimate*	*Actual as % of Appraisal estimate*
Total project costs	308.0	182.9	59
Credit amount	154.0	112.5	73
Cofinancing	-	-	-
Cancellation	-	-	-

Cumulative Estimated and Actual Disbursements

	FY95	*FY96*	*FY97*	*FY98*	*FY99*	*FY00*	*FY01*	*FY02*	*FY03*	*FY04*
Appraisal estimate (US$M)	41.4	72.0	104.6	134.6	149.6	154.0	154.0	154.0	154.0	154.0
Actual (US$M)	4.0	14.5	45.6	71.7	77.0	81.7	81.7	95.5	109.6	112.5
Actual as % of appraisal	9.6	20.1	43.6	53.3	51.5	53.1	53.1	62.0	71.2	73.1

Date of final disbursement: 2/6/2004

Project Dates

	Original	*Actual*
Initiating memorandum	03/15/1993	03/15/1993
Negotiations	04/11/1994	04/11/1994
Board approval	06/28/1994	06/28/1994
Signing	10/28/1994	10/28/1994
Effectiveness	01/31/1995	12/19/1994
Closing date	12/31/1999	06/30/2003

Staff Inputs (staff weeks)

	Actual/Latest estimate	
	No of staff weeks	*US$ ('000)*
Preappraisal/preparation	63.6	316.0
Appraisal/negotiation	49.5	179.9
Supervision	185.8	946.0
Completion	13.2	41.2
Total	312.1	1483.1

Mission Data

Date (month/year)	*No. of persons*	*Specializations represented*	*Performance Rating*	
			Imple. progress	*Dev. objective*
Identification/Preparation				
Identification November 1992	*4*	TM(Ec), WP Sp, SecSp, Env.Eng.		
Preparation February 1993	*1*	EnvEng.		
Preparation April 1993	*2*	TM (Ec), Ec		
Preparation May 1993	*4*	TM (Ec), EnvSp, FA & Ec., EnvEng.,		
Preappraisal July 1993	*6*	TM (Ec), WR Eng., EnvSp, FA & Ec., EnvEng., Ec		
Appraisal/Negotiation				
Appraisal November 1993	*7*	TM (Ec), FA., Ec.,EnvSp., FA & Ec., EnvEng.,		
Supervision				
November- December	*3*	TM (Ec), P, D	HS	HS
Launch Workshop				
March 1995	*3*	TM (Ec), Eng. EnvS	HS	HS
July 1995	*2*	TM (Ec), P	S	S
February 1996	*1*	TM (Ec)	U	S
April-May 1996 (Wash. DC)	*2*	TM (Ec), Eng	U	S
August 1996	*3*	TM (Ec), FA, SanEng	U	S
November 1996	*2*	TM (Ec), Eng	S	S
June 1997	*1*	TM (Ec)	U	S
October 1997	*3*	TM(Ec), SanEng, Eng	U	S
March 1998	*2*	TM (Ec), Eng	U	U
May-June 1998	*7*	TM (Ec), Eng, EnvSp, Ec, PSD, FA, P	U	U
Mid-Term Review				
September 1998	*1*	TM (Ec)	U	U
November 1998	*3*	TM (Ec), Eng, FA	U	U
February 1999	*3*	TM (Ec), Eng, PSD	U	U
May 1999	*2*	TM (Ec), Eng	S	S
October- November 1999	*2*	TM (Ec), Eng	U	U
January-February 2000	*3*	TM (Ec), Eng, P	S	S
May-June 2000	*3*	TM (Ec), Eng, SS	S	S
November 2000	*2*	CoTM (Eng), P	S	S

Date (month/year)	*No. of persons*	*Specializations represented*	*Performance Rating*	
			Imple. progress	*Dev. objective*
January-February 2001	*3*	SecM, TM (Ec), Eng	S	S
June 2001	*2*	TM (Ec), CoTM (Eng)	S	S
October 2001	*3*	TM (Ec), CoTM (Eng), Eng	S	S
March 2002	*3*	TM (Ec), CoTM (Eng), Eng	U	U
December 2002	*2*	CoTM (Eng), Eng	S	S
March-April 2003	*3*	CoTM (Eng), Eng, P	S	S
June-July 2003	*1*	CoTM (Eng)	S	S
ICR				
June-July 2003	*3*	CoTM (Eng), Ec, Eng		
October 2003	*2*	Ec, Eng		S

TM=Task Manager; CoTM=Co-Task Manager; WR Eng=Water Resource Engineer; P=Procurement; D=Disbursement Officer; EnvSp=Environmental Specialist; Eng=Engineer; EnvEng=Environmental Engineer; SanEng=Sanitary Engineer; FA=Financial Analyst; Ec=Economist; PSD=Private Sector Development Specialist; SS=Social Scientist; SecM=Sector Manager; SecSp=Sector Specialist

Annex B. Focus Group Recalls – Conceiving an Agency for Coordination and Control in São Paulo

In the course of the field work, a group of principals engaged in the conception and design of the São Paulo component met to recall the early stages of their work. They talked about the early stages of the project and reflected on the problem of creating an agency to manage the many aspects of the Guarapiranga—water pollution, issues of illegal settlement, sanitation needs of the poor, and conditions of the slums.

The São Paulo focus group singled out the institutional conundrum facing them at the initial stages in design of the project. One of the major questions was who would take the reins of co-ordination and control of the project. Emplasa, the metropolitan planning authority, would have been a logical choice for this institutional responsibility, but it was in decline at the time in both policy and operational terms. Reflecting on this period, the group recalled a general consensus that that agency did not possess the faculties and authority to handle the problem of managing strong agencies and institutions in São Paulo like the water company, the power authority, environmental agencies, the state bureaucracy, and the city.

Fortunately, virtually all of the highly qualified technical people in the principal agencies recognized that the situation called for a special solution. In effect, the various players agreed that the core of the problem was water quality, but the solution would require inputs from many actors, the federal government, agencies of the state, the municipality, and residents themselves. The group emphasized the importance of the Bank as an honest broker. The opinion shared among interviewees was that at the time no other financial entity in Brazil (for instance, Caixa Econômica or Banco Nacional de Desenvolvimento Econômico e Social (BNDES), nor international agencies such as JICA, the Japanese International Cooperation Agency) would have been able to bridge the wide and complicated set of issues that were present in Guarapiranga. With the help of the Bank, agency working groups created workable solutions to these problems through dialogue and exchange.

Annex C. Project Time Lines

1. Water Quality and Pollution Control Projects (São Paulo and Paraná): Time Line

1982	Popular elections of governors begins
1986	Popular elections of mayors begins
1988	New Constitution
1990	State government and Ministry of Social Affairs start discussion with WB about basin level arrangements for projects
1991	Roberto Requião de Mello e Silva becomes Governor of Paraná
	Luiz Antônio Fleury Filho becomes Governor of São Paulo
May 1991	Project identification Document
May 1991	Pre appraisal.
	MG moved to separate project
June 1992	Appraisal
July 1992	Loan Approved
May 993	Effectiveness Original date
Sept 1994	Effectiveness Final date
1993	Bank publishes Water Resources Management Policy Paper
Apr 1994	Mario Pereira (acting Governor) in Paraná
Jan 1995	Jaime Lerner, becomes Governor of Paraná
Jan 1995	Mário Covas Jr. becomes Governor of São Paulo
Dec 1995	MTR Original
June 1996	MTR Final
1996	Resettlement begins
	New government takes power
1997	Federal Water Resources Law enacted
Jan 1999	Devaluation of the Real[10]
	Minas Gerais declares moratorium on debt obligation to federal government
	Bank suspends all loans to the state
June 1999	Borrowers final project progress report
Mar 2001	Geraldo Alckmin Filho becomes Governor of São Paulo
Jan 2003	Roberto Requião de Mello e Silva becomes governor of Paraná (second term)
June 2004	ICR
Mar 2006	Cláudio Lembo becomes Governor of São Paulo

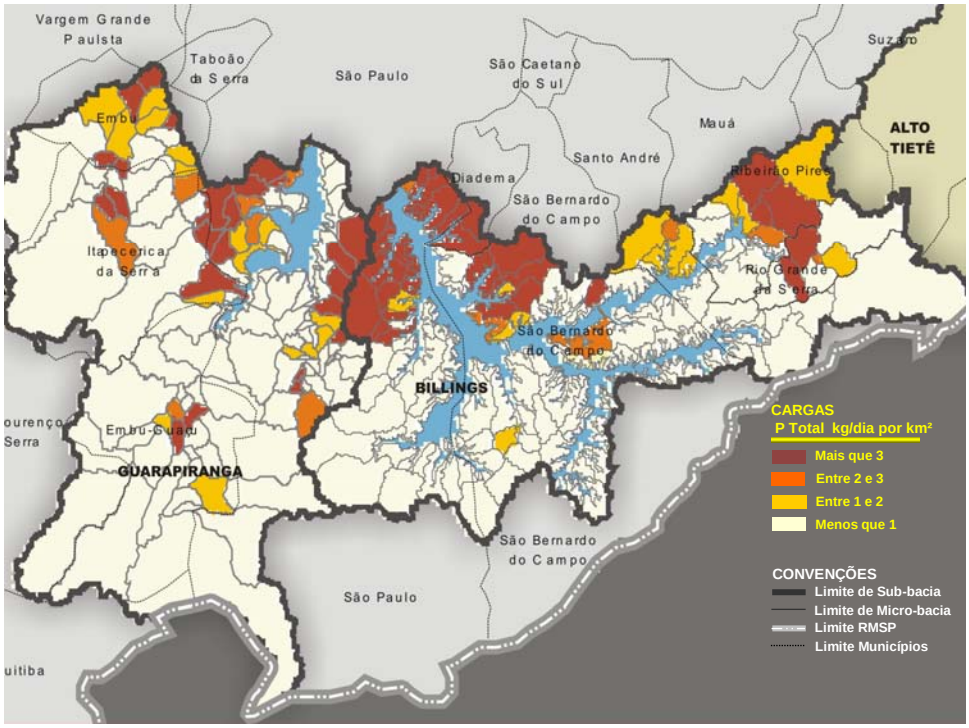
10. Following Korean (1997) and Russian (1998) crises, Brazil's fiscal crisis grows. Debt in primary plus interest rises to 8% of GDP, making Brazil vulnerable to "contagion". Investors were pulling money out at the rate of $350m per day. Treasury could not continue to buy Reals to maintain peg to the dollar.

2. Espírito Santo Water Quality and Pollution Control Project: Time Line

1982	Popular elections of governors begins
1986	Popular elections of mayors begins
1988	Brazil adopts new constitution
1990	Discussions begin on financing regional initiatives in several states
Mar 1991	Albuino Cunha de Azeredo becomes governor
1993	Project Concept Document
1993	Bank publishes Water Resources Management Policy Paper
Dec 1994	Prodespol Effective
1994	Plan Real begins (goes until 1998)
Jan 1995	Vitor Buaiz becomes governor (1995-1998)
	state counterpart contributions reduced
1997	Federal Water Resources Law enacted
Jan 1999	Devaluation of the Real (see footnote 7, above)
Jan 1999	Jose Ignacio Ferreira becomes governor (1999-2003)
2000	PRODESOL restructured, becomes PRODESAN
	US$50 m cancelled; execution to SEDIT and turnkey solution
June2003	Loan Closed
Jan 2003	Pablo Cesar Hartung becomes governor (2003-2006)
2006	Treatment plants being used at 35 percent capacity

Annex D. Maps of Basins and Photos of Slum Area Improvements in São Paulo, Curitiba, Vitória, and Belo Horizonte

Schematic map of Guarapiranga Basin nested in the metropolitan area of São Paulo



São Paulo, Guarapiranga Basin:
Typical view, pre-upgrading.

São Paulo, Guarapiranga Basin:
Typical view, upgraded street.

São Paulo, Guarapiranga Basin:
Post upgrading, refuse collection.

Annex D

Curitiba, Alto Iguaçú:
Flood gate controls.

Curitiba, Alto Iguaçú:
Typical view, neighborhoods formerly subject to flooding on outskirts of city.

Vitória:
Typical low income neighborhood.

Vitória:
Sewage pumping station designed to appear as park furniture

LEGENDA:

- ETE - ESTAÇÃO DE TRATAMENTO DE ESGOTO - EXISTENTE
- E.T.E. PROJETADA
- PV - POÇO DE VISITA
- TUBULAÇÃO DE RECALQUE - EXECUTADO
- TUBULAÇÃO DE RECALQUE - A EXECUTAR
- COLETOR TRONCO - EXECUTADO
- COLETOR TRONCO - A EXECUTAR
- EMISSÁRIO DE ESGOTO TRATADO
- ESTAÇÃO ELEVATÓRIA DE ESGOTO EXISTENTE
- ESTAÇÃO ELEVATÓRIA DE ESGOTO A SER CONSTRUIDA

BACIAS:

- BACIA B2
- BACIA B4
- BACIA B5
- BACIA B6
- BACIA B7
- BACIAS B1, B3 e B8

CAIXA DE PASSAGEM
EESB 7.6B
EE RESISTÊNCIA II
NOVA PALESTINA II
EESB 7.6A
NOVA PALESTINA I
RESISTÊNCIA
E.T.E. SANTO ANDRÉ
EESB 7.5
JOANA D'ARC
ETE MULEMBÁ
VISITA TÉCNICA 09/06/2006
EESB 7.8 (EE RESISTÊNCIA I)
BAIRROS REGIÃO GRANDE SÃO PEDRO
VISITA TÉCNICA 09/06/2006
EESB 7.4
REDENÇÃO
ILHA DAS CAIEIRAS
SÃO PEDRO
EESB 7.3
SÃO JOÃO
SANTOS REIS
DIFUSOR
EMISSÁRIO
Bacia 8
E.T.E. MULEMBÁ Q=210,00 l/s
EE 05
JOANA D'ARC
AMPLIAÇÃO DA E.T.E. Q=210,00 l/s
BAÍA DE VITÓRIA
Bacia 7
EEGV I
GRANDE VITÓRIA
E.T.E. GRANDE VITÓRIA
EEGV II
ANDORINHAS
EE 04B
PV 1028
SANTA MARTA
PV 49
PV 50
SANTA LUIZA
EE 04C
TABUAZEIRO
PV 1037
SÃO CRISTÓVÃO
EE 03 NOVA
Bacia 5
SANTA LÚCIA
EE 04A
ESTRELINHA
EESB 6.4 (EEGV III)
UNIVERSITÁRIO
TABUAZEIRO
MARUÍPE
BONFIM
SANTA CECÍLIA
INHANGUETÁ
NOSSA SENHORA APARECIDA
PV 1034
MARUÍPE
BONFIM
FRADINHOS
Bacia 3
EESB 6.3
Bacia 6
BAIRRO DE LOURDES
CONSOLAÇÃO
EEVT 03A
GURIGICA
HORTO
PV 121
EEVT 03
PV 526
SANTA HELENA
EEVT 05
PV C
SANTA LÚCIA
EEVT 03C
PV581A
PV 640
Bacia 4
SANTO ANTÔNIO
EESB 6.2
EESB 6.1
SANTA TEREZA
PRESIDENTE KENNEDY
PARQUE MOSCOSO
FORTE SÃO JOÃO
EE 02
PV 909
PV 1
ILHA DE SANTA MARIA
EE 01A
PV 916
EE 01B
PRAIA DO SUÁ
BENTO FERREIRA
ENSEADA DO SUÁ
EEVT 03B
PV 367
EEVT 02
JESUS DE NAZARÉ
Bacia 2
MÁRIO CIPRESTE
CARATOÍRA
PARQUE MOSCOSO
EE C
PV 37D
CENTRO
EE D
Bacia 1
EE A
PV 152C
VILA RUBIM
PV 41C
ILHA DO PRÍNCIPE
EE B
BAÍA DE VITÓRIA
JARDIM DA PENHA
OCEANO ATLÂNTICO
CANAL DA PASSAGEM
CANAL DE CAMBURI
VISITA TÉCNICA 09/06/2006
EEVT 04
BARRO VERMELHO
PV 730
PRAIA DO CANTO
ILHA DO FRADE
EEIF 03
EEIF 04
PV19 I
EEIF 01
EEIF 06
PV8 IV
PV13 III
PV22 V
PV22 V
EEIF 02
EEIF 05
ILHA DO BOI
EEIB 01
PV1 II
EEIB 03
PV9 III
EEIB 02
PV604
ELEVATÓRIA ENSEADA DO SUÁ
VISITA TÉCNICA 09/06/2006

TÍTULO: Arranjo Esquemático / Macro-coleta do S.E.S de Vitória
Bacias B1/B2, B4, B5/B3, B6 e B7/B8, Ilha do Boi e Ilha do Frade

CESAN Qualidade em Saneamento

Consórcio enger Etep

PROJETO águas limpas

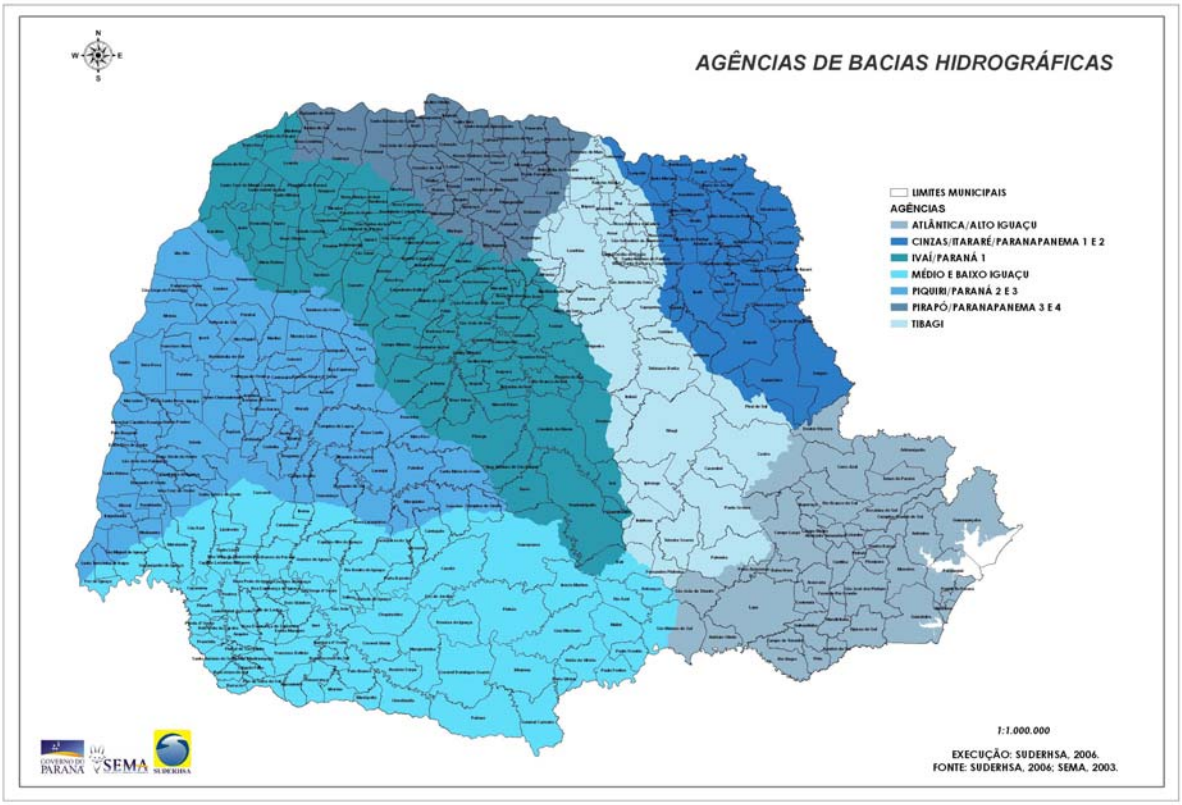
N° CONSÓRCIO: CEEAL.DS.00.X.GE.008/03

DESENHO: Daniel Lucas M. Almeida

DATA: Maio / 2006

ESCALA: Sem escala

Annex D


AGÊNCIAS DE BACIAS HIDROGRÁFICAS
LIMITES MUNICIPAIS
AGÊNCIAS
ATLÂNTICA/ALTO IGUAÇU
CINZAS/ITARARÉ/PARANAPANEMA 1 E 2
IVAÍ/PARANÁ 1
MÉDIO E BAIXO IGUAÇU
PIQUIRI/PARANÁ 2 E 3
PIRAPÓ/PARANAPANEMA 3 E 4
TIBAGI
1:1.000.000
EXECUÇÃO: SUDERHSA, 2006.
FONTE: SUDERHSA, 2006; SEMA, 2003.

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