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Water, Poverty Reduction, and Sustainable Development
Water, Poverty Reduction, and Sustainable Development

Introduction
Water is a key element of Brazil's strategy to promote sustainable growth and a more equitable and inclusive society. While Brazil's achievements over the past 50 years have been closely linked to the development of its water resources, new challenges that urgently require policy attention have emerged.

Brazil's recent accomplishments in developing its water resources are significant. For instance, access to electricity has increased from less than 500 kilowatt hours (KWh) per capita in 1970 to more than 2,000 KWh per capita in 2000. These impressive results have been achieved in large part through the development of hydrogeneration, which currently accounts for 81 percent of Brazil's installed capacity (64 gigawatts of a total of 79). In water supply and sanitation, the results are no less impressive. Over the last 40 years Brazil has expanded water supply and sanitation services to an additional 100 million and 50 million Brazilians, respectively. Today, 77 percent of the population has access to potable water service and 47 percent to sewerage service. The area under irrigation has grown from 2.6 million hectares in 1995 to approximately 3.5 million hectares in 2002. Although the Amazon has been used for inland navigation for more than 80 years, river transportation has increased steadily in recent times and has been integrated into a multimodal transport system. Since 1991, 19 states and the Federal District have adopted legislation to modernize water resources management. A federal law governing the administration and management of water resources was passed in 1997. The National Water Agency (ANA) was created in 2000 with the mandate to implement the National Water Resources Policy. Indeed Brazil is recognized internationally as an innovator and an emerging leader in water resources management.

The draft of this chapter was completed by Abel Mejia and Luiz Gabriel Azevedo; with contributions from Martin Gambrill, Alexandre Baltar, and Thelma Triche in October 2002. The analyses and suggestions contained in this chapter are based on the international technical experience of the World Bank and are presented as a contribution to the debate and formulation of public policies.
Despite these remarkable achievements, serious challenges remain to be addressed by the next generation of policymakers. Brazil faces a dual crisis in the management of its water resources—droughts in the Northeast and water pollution near large urban centers. Almost all rivers crossing urban areas are highly polluted, causing serious health problems in poor populations, environmental damage, and higher water treatment costs for downstream users. Water supply and sanitation services are unevenly distributed—service coverage is particularly low in the North and Northeast—and the poor are less likely to have access to adequate service than are other consumers. Most irrigation, water supply, and sanitation services are inefficient and financially unviable. It is the poor who suffer most from scarce and poorly managed water resources, inadequate water supply services, and the unhealthy environment that exists in the absence of adequate water supply, sewerage, and wastewater treatment. Good management of water resources and access to basic water and sanitation services promote employment generation, improved health, and better environmental quality in human settlements, all of which are critical for the alleviation of poverty. Progress will require reform and innovation on several fronts: legal, institutional, financial, and technical.

This policy note focuses on water resources management and water supply and sanitation services. Although they are distinct activities that require different institutional management models and funding mechanisms and water supply and sanitation is only one of the water-using sectors, water resources management and water supply and sanitation are interdependent, have closely linked implications for poverty alleviation, and face many similar challenges. Because water issues and policies cut across numerous other sectors, occasional reference will be made to Policy Notes in this series that deal with municipal and urban management and housing, rural development and natural resources management, and environmental conservation.

In fact, a recurring theme in these notes is the need for mechanisms to promote coordination between the water sector and other related sectors such as urban planning and management, solid waste collection and disposal, health, land-use planning, and environmental protection. Inconsistent policies across sectors result in wasted resources and prevent the coordination of interventions and the consequent reaping of their cumulative benefits. Several sectors face the same constraints that are blocking progress in the water sector (for example, the weak institutional capacity of small towns and the lack of appropriate arrangements for the coordination of policies, planning, and management of operations in metropolitan regions). Coordinated interventions will have multiple benefits.

The financial challenge of expanding water services to the poor and increasing wastewater treatment and water pollution control in Brazil is considerable. The cost of deve-
Developing new water resources is increasing due to the scarcity or contamination of nearby sources and the distant location of alternative sources. The cost of providing services to marginal areas, where access is problematic, or to small towns, where the population is more spread out, is higher than in the more densely populated center cities. Moreover, expansion of services to the poor (who have a limited ability to pay and lower consumption habits) could result in lower average revenue unless perverse tariff structures are reformed. As population increases and more water-using amenities are introduced, the volume of wastewater increases relative to the capacity of the environment to dispose of it naturally, necessitating the costly expansion and improvement of wastewater collection, transportation, and treatment capacity. Treatment costs could also rise with the adoption and enforcement of increasingly stringent drinking water quality and environmental standards.

A strategy for dealing with the financial challenges of the water supply and sanitation and water resources management sectors will require reforms to ensure that subsidies are carefully targeted to the poor, realistic environmental and engineering standards are adopted, tariff regime and bulk-water pricing reforms are implemented to promote water conservation practices, innovative financing programs are established to create incentives to improve operational efficiency, and a clear legal framework is set up to turn around the investment climate.

**Recent performance of the sectors**

**Water resources management**

The 1934 Water Code was the first relevant water resources management legislation in Brazil. However, not until the 1988 Constitution was a national water resources management system established. The Constitution divided the country's waters between the union and the states, and states began to implement their own water resources management systems. São Paulo pioneered this process and approved a water resources management act in 1991. Since then 18 other states and the Federal District have adopted water laws. After negotiating for six years, Congress adopted a national water policy (Federal Law 9433) in January 1997 that incorporates most modern water resources management principles and instruments.

The remarkable progress in the development of legal frameworks and policy instruments was not followed by widespread progress in effective implementation. One of the few exceptions was the introduction of bulk water charges in Ceará. In July 2000, Federal Law 9984 created the National Water Agency (ANA) with the mandate to implement the
national water policy. The central role of ANA in finding solutions to the many challenges of water resources management cannot be overstated.

Among the many water resources management challenges in Brazil, two stand out for their enormous social impact and the pressure they exert on governments for the development of large investment programs: droughts in the Northeast and water pollution in and near large urban centers. About 2 million households in the Northeast, most in extreme poverty, lack adequate water supply. Almost all rivers crossing urban areas are highly polluted, compromising the health of poor populations, creating environmental damage, and increasing the cost of water treatment for downstream users. Finding effective solutions to these two challenges will require close coordination between water resources management and the provision of water supply and sanitation services.

As in many other countries, water resources management in Brazil has historically relied on heavy investments in basic infrastructure for irrigation, hydropower, water supply, flood control, and navigation. The contribution of many of these investments to the country’s development cannot be questioned. Brazil has made impressive progress in hydropower production and the extension of water supply and sanitation services. However, the overall return on water infrastructure has not been consistently positive. Projects have been abandoned or have taken so long to complete that the original goals have been overtaken by new circumstances. Even where projects have stimulated regional economic growth or met the demands of growing cities, the lags between investment and downstream benefits have greatly reduced the present value of those benefits. Finally, a heavy emphasis on large investment projects has been accompanied by neglect of the administration, operation, and maintenance of water infrastructure.1 As a result, efficiency is low and potential benefits have not always been realized.

The contribution of investments to improved water resources management has been mixed. Progress in addressing water pollution and meeting water demands in some areas must be balanced against evidence of increasing salinity of irrigated land, greater vulnerability to floods in urban areas and to intermittent droughts and water shortages, and little to no improvement in key indicators of water quality. All of these negative effects and conditions disproportionately affect the poor.

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1 This is widely acknowledged for irrigation projects, but it is equally a problem for large investment programs in water supply and sanitation, as in the River Tietê program in São Paulo and the Guanabara Bay program in Rio de Janeiro.
Water supply, sanitation services, and water pollution control

While overall access of Brazil’s urban households to water supply service is high, at about 90 percent, coverage varies considerably from region to region and state to state, and quality differs dramatically from one part of a city to another. Some 56 percent of urban households are connected to a sewerage system and 16 percent have septic systems, but the unevenness of coverage is even more dramatic for sanitation than for water supply. Very little wastewater is treated. Coverage rates for water supply and sanitation are highest in the relatively affluent South and Southeast and lowest in the poorer states of the North and Northeast. A large part of the unserved population lives in peri-urban areas, favelas, and small towns, with mainly lower-income populations. Only 18 percent of rural households have piped water service, and 13 percent have either sewerage or septic tanks.

Growing urbanization is straining the capacity of the sector to expand. While there were large gains in the share of urban households with access to water supply and sanitation during the 1970s and 1980s, stagnation set in during the 1990s, as the number of new connections barely exceeded the number of new urban households. Growth in water supply coverage slowed from 14 percent in 1980-91 to 3.5 percent in 1991-2000. The deceleration was associated with a marked decline in sector investment: average annual investment fell from 0.34 percent of GNP in the 1970s to 0.28 percent in the 1980s and 0.13 percent in the 1990s.

The sector’s capacity to mobilize investment resources is weak. In 1999, combined receipts of all the state water companies and a representative number of municipal water and sanitation entities barely exceed combined costs. Performance varies substantially, but only 10 of the 27 state companies fully cover their costs (Bittencourt and Araújo 2002). The weak financial performance is due in part to inefficiency and the high cost of maintaining aged infrastructure. Perverse tariff structures also contribute. Low tariffs for the first block of consumption benefit many consumers who do not need subsidies, unnecessarily depressing revenues and limiting funds for services that could be more directly targeted to the poor.

During 1980-91, an additional 32.4 million urban residents got access to water supply, bringing coverage to 86.3 percent. During the last decade of the century, 28.1 million more people got water, bringing coverage to 89.8 percent.
Selected reforms have already been undertaken by various sector actors, but clearer policy direction and innovative financing mechanisms would be needed to reverse the trend of deceleration in progress. Major changes in the institutional, regulatory, financial, and incentive structures in the sector, at all levels of government, would be needed to avoid further increases in the number of poor people who lack access to basic services and continuing environmental degradation.

Message 1. Creating a sound institutional and legal framework for water resources management to enhance poverty reduction and promote efficient water use and sustainable economic growth

The development of a sound water resources management framework to ensure the sustainable use of water requires further work on three critical policy issues. One is the establishment of a secure and enforceable water-use rights system, which is essential for creating incentives for improving water management and for reducing overexploitation. Establishment of a framework for allocating and transferring water rights would make it possible to take advantage of the full benefits of a system of water-use rights. A second is the application of water use charges, which would signal the economic value of water, generate resources for managing water infrastructure, encourage more efficient use of water resources, and promote the accountability of water users. A third is clarification of the roles and responsibilities of ANA, the National Water Resources Council, the Secretariat of Water Resources, the Secretariat of Hydraulic Infrastructure, state water agencies, and decentralized river basin institutions, which is essential for developing truly cooperative institutions within a framework for resolving conflict.

Context

The legal, regulatory, and institutional frameworks for water resources management (water agencies, decentralization, river basin entities, participation of stakeholders, regulatory reforms) and the instruments for improving management of water resources present important challenges. Improved water resources management may enhance poverty

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3 There are many important instruments (river basin and state plans, information and decision support systems, water quality goals), but water rights and pricing are considered by many in the water sector as critical for the development of water resources management systems, including the introduction of all these other instruments.
reduction strategies in various ways. Social inclusion is promoted by adopting participatory and decentralized approaches. Environment-related risk and health issues are addressed, thus reducing the vulnerability of the poor. Equity of access to water resources can be promoted through appropriate legal and regulatory reforms. The burden on poor women and children, who often travel long distances to fetch water, can be relieved through facilitated access to water. The reliability and sustainability of water sources may be increased through appropriate pricing of bulk water. In addition, microcatchment approaches for jointly managing land and water resources have been successfully used with direct benefits for the poor (see Policy Note on rural development and natural resources management).

LEGAL AND INSTITUTIONAL FRAMEWORK. Many of the problems in the water sector are associated with poorly defined responsibilities within and across levels of government, unclear rules and regulations, uneven enforcement, and weak capacity for monitoring compliance. The passage of the National Water Law and the creation of ANA were important steps in improving water resources management. While further refinements to the institutional, legal, and regulatory frameworks are important, significant advances in water resources management can be accomplished by focusing now on a small number of key challenges, such as water rights and water pricing, and strengthening state and basin institutions.

ANA's mandate is to implement the national water policy by carrying out regulatory functions (water rights administration) and executive functions (such as development and operation of the national water resource information system). While ANA's regulatory function is important, it should not attempt to resolve every conflict in water resources management. Some conflicts will inevitably involve disputes requiring broader negotiation and judicial resolution. Following the general framework of Brazil's state reform, policymaking for water resources remains the responsibility of core government structures, in this case the Ministry of Environment through its Secretariat of Water Resources.

ANA has also undertaken initiatives to develop positive incentives and demonstrate good practice in water resources management. Such promotional activities should not dominate ANA's activities or distract it from its primary regulatory role. The Compra de Esgoto program, for example, which reimburses a portion of the investment cost of creating or expanding wastewater treatment plants in critical regions where river basin committees are up-to-date in paying abstraction fees, can be viewed as an important pilot initiative rather than a comprehensive solution to wastewater treatment. Once tested and refined, such programs would have to be taken over by water supply and sanitation insti-
tutions with the mandate and capacity to implement the programs on a large scale. This will require substantial reform and institutional strengthening of the water supply and sanitation sector.

The constitutional provision dividing the country’s waters between the union and the states, and the continental dimensions of many river basins in Brazil, make water resources management inherently complex, requiring considerable coordination. The forging of strong partnerships with states and river basin agencies to carry out ANA’s regulatory and executive functions and to decentralize functions, where possible, would be among ANA’s priorities.

Decentralization is a core value of Brazil’s national water policy. While attention may focus on the role of river basin committees in defining priorities and reconciling competing interests, committees cannot function properly without substantial and costly technical support. Currently, the development of river basin management is trapped in a vicious circle. New institutions must demonstrate competence to rally support and establish credibility. To do that they need resources, both human and financial, to support sound technical work and fund new investments. Getting resources requires levying charges on water users, which users will find acceptable only once agencies have demonstrated their competence.

With a few exceptions, the performance of state water agencies is generally weak. In Brazil’s water resources management system, river basin agencies are not a substitute for state agencies because state agencies have the unalienable authority to grant water rights. In addition, not every basin within a state’s territory warrants the creation of an agency. Most state water agencies, however, lack appropriate human and financial resources. Overcoming these deficiencies will require strong political support to deal with vested interests and to identify opportunities for implementing the necessary reforms.

ANA could coordinate federal support to strengthen local capacity and help local institutions break the vicious circle described above. However, the continued reliance of much of the sector on investments financed by or through the federal government means that the effectiveness of decentralization is likely to be less than expected or desirable.

Water rights. The complexity of formalizing rights for a fungible resource with deep cultural implications in an administratively weak environment should never be underestimated. Water rights and water pricing are interdependent instruments that can jointly improve the way water is managed by making explicit the mutual obligations and responsibilities of water resources management agencies and water users, preserving the interests of society as a whole, and taking environmental concerns into account. The application of the concept of transferable property rights to the use of water is controversial in Brazil, both legally and socially. Nevertheless, experience in other countries has shown that reforms
which threaten the perceived rights of existing users are unlikely to succeed unless the perceived rights are both recognized and grand-fathered. Therefore, even if reliance on market arrangements for the disposal, transfer, or use of water resources proves undesirable or legally difficult, clear definition of water use rights is still required for effective water resources management.

Although surface water and groundwater should be managed in an integrated way, groundwater has distinguishing features that require special attention. Once an aquifer is contaminated, it becomes very difficult, and often economically unfeasible, to restore it to its previous quality. Important aquifers have been overexploited, with water tables already deep and dropping every year. In urban areas, the problem is closely associated with deficient water supply services (as in the metropolitan area of Recife). In the absence of reliable water supply service, households resort to wells to complement their water supply. In rural areas, expansion of irrigated agriculture is putting major pressure on groundwater (as in the western part of the state of Bahia).

**Bulk Water Pricing.** Reforming bulk water pricing gives rise to a series of fundamental and healthy changes by giving users an indication of the economic value of the resource, thus helping to promote its more efficient use; providing financial resources to guarantee adequate administration, operation, and maintenance of water infrastructure; and funding (at least partially) water resources management and development.

Although many studies have been carried out in various states and river basins to estimate the optimum price of water that captures the economic values of alternatives uses, the two most successful initiatives have adopted values decided through broad political negotiations with the main water users. These are in Ceará, the only state currently charging for bulk water, and the Paraíba do Sul River Basin, where the introduction of bulk water pricing was recently approved by the river basin committee. The general public, however, still views paying for bulk water as yet another government tax—a serious political constraint in a period of economic and political uncertainty. The challenge is to demonstrate to users that introducing bulk water charges, developing a system for allocating secure water rights, applying participatory and decentralized management at the basin level, and developing adequate regulatory and institutional frameworks will enhance the reliability of water resources systems.
Options
Several steps would help to create a sound institutional and legal framework for water resources management to enhance poverty reduction and promote efficient water use and sustainable economic growth:

- Clearly defining the roles of ANA, the National Water Resources Council, the National Secretariat of Water Resources, and state and river basin water agencies.
- Identifying ANA’s priorities and immediately developing a strategic business plan.
- Concentrating state governments on creating properly staffed autonomous water agencies, initially with public funding.
- Basing federal support for state initiatives on demonstrated willingness to implement reforms, through a monitorable, time-bound action plan.
- Committing ANA’s finance and technical resources to ensuring that at least two strategic river basin agencies are operating within the next two years.
- Identifying priority basins for ANA’s direct intervention (for example, Paraíba do Sul, Piracicaba, Paraná, São Francisco) and establishing local partnerships for managing lower priority federal river basins.
- Strengthening the involvement of municipalities in water resources management.
- Continuing ANA’s important and active work in the international arena, exchanging experience and consolidating Brazil’s leadership position.
- Assigning high priority in ANA to promoting the adequate functioning of the national water rights system and establishing a sequenced action plan for advancing it.
- Establishing clear and simple procedures for water rights administration that can be refined as ANA matures, focusing initially on quantitative issues and progressively integrating quality concerns.
- Emphasizing selectivity and sequencing at the state level, with states concentrating on high priority basins and aquifers, adopting simple procedures initially and gradually improving them.
- Establishing a realistic transition period to give users time to comply with the new regulations and enable water agency personnel to gain the confidence of users as partners rather than police.
- Developing ways to permit the transfer of water rights among users so as to increase water use efficiency.
- Establishing clear pricing objectives in ANA and local agencies based on cost recovery first, then economic efficiency.
• Justifying and targeting subsidies, which would still be needed, mostly in irrigation; making them transparent; documenting existing levels; and not linking them to the amount of water used to avoid perverse incentives to waste water; and at a minimum, setting user fees to cover the costs of administration, operation, and maintenance.
• Creating incentives for water resources management reform at the federal level by linking funding for institutional and infrastructure development with progress in reforms, thereby strengthening local agencies that are conducting the reform and helping users see the benefits of paying bulk water charges.
• Involving stakeholders in the reform process, whatever approach to reform is taken.
• Committing politically and financially at the federal level to implement bulk water charges in at least two federal river basins within the next two years, to avoid a loss of confidence in the water resources management system.

Message 2. Clarifying the institutional, legal, and regulatory framework to modernize the water supply and sanitation sector and improve its effectiveness

The institutional, legal, and regulatory framework is now outdated and inhibits further progress. Inconsistent federal policies and a lack of clarity in the roles and responsibilities of state and local governments on the planning, ownership, delivery, and regulation of water supply and sanitation services prevent sector institutions from performing at their fullest potential. The lack of clarity on ownership of assets and rules governing the award of concessions has impeded efforts to attract private investment and other forms of private participation.

Coordinated federal interventions that consistently promote efficiency and the expansion and improvement of service for the poor are needed. So, too, are legal frameworks that minimize political interference in water utilities, and regulations that provide companies with incentives for efficiency. Training and capacity building programs could enable municipal authorities to develop policies for water supply and sanitation services, plan investments, mobilize funding, choose appropriate institutional models for service delivery (whether through public or private companies), and monitor or regulate services (once municipal roles are clarified). Better coordination of water supply and sanitation planning and development with other urban interventions would make it possible to take advantage of synergies and reduce costs. Information on, and examples of, institutional models that promote better management and efficiency need to be disseminated.
Context
Institutional arrangements at the federal level have resulted in distorted and inconsistent policies and have impaired sector performance. The controversy over the assignment of responsibilities between state and local governments for planning, ownership, delivery, and regulation of water supply and sanitation services, while intensely debated for years, has yet to be resolved. The resulting policy and regulatory vacuum means that consumers often have little or no voice, service providers are not consistently held accountable for the quality and efficiency of services, subsidies are poorly targeted, and potential investors are reluctant to enter the market.

Role of the Federal Government. The federal government's role in the sector needs to be clarified and strengthened. The roles of the many federal institutions involved in the sector—Secretaria Especial de Desenvolvimento Urbano (SEDU), Caixa Econômica Federal (CEF), Banco Nacional de Desenvolvimento Econômico e Social (BNDES), ANA, Ministério de Planejamento e Orçamento, Ministério da Fazenda, Fundação Nacional de Saúde (FUNASA)—are not clearly defined and uncoordinated, so that interventions are fragmented and lack direction. Funding criteria neither consistently give priority to services for the poor nor promote efficiency. A key role for the federal government would be to coordinate basic policies on major issues, such as subsidies and tariffs. Even if its primary role is financing, it could still promote key objectives by linking funding decisions to performance criteria (such as financial viability of systems and of utilities, preference for the poor, service quality improvements, and pollution abatement) and by designing tariff policies that enhance performance on these criteria. There is little capacity for sector policymaking at the federal level. This function is currently being performed by the Water Sector Modernization Program (PMSS), an unsustainable arrangement since this capacity will disappear when the program ends. A central institutional arrangement is needed that embraces both the urban and rural contexts and that coordinates water supply and sanitation policies with policies for urban development and slum upgrading, water resources management, and pollution control.

Incentives for Efficiency. As natural monopolies and essential public services, water and sewerage networks are not subject to competition in the market. Thus incentives for efficiency must be provided in other ways, such as through competition for the market where feasible, dissemination of performance information, consumer awareness-raising and public pressure, benchmarking, linking of public funding to efficiency and financial performance, transparent tariff reviews, and financial rewards for exceptional staff per-
Current institutional arrangements and oversight practices tend to allow political pressure, rather than incentives for efficiency, to dominate.

Substantial progress has been made in collecting and analyzing performance indicators from service providers through the SNIS. This information could become a powerful tool for comparing the performance of service providers and identifying the conditions and innovations that promote efficiency.

Legal and regulatory framework. The lack of clarity in the roles of state and local governments concerning conceding power, regulatory authority and asset ownership in the water supply and sanitation sector has created a regulatory vacuum. While in theory municipalities own assets and are responsible for providing and regulating services, the system of state water companies, a legacy of the National Water Supply and Sanitation Program (PLANASA), has resulted in misalignments in the sector’s incentive, efficiency, and accountability framework. There are no clearly established institutional arrangements for enforcing service quality standards or for setting and approving tariffs that promote financial viability and efficiency. Subsidies do not benefit those most in need. Consumers do not always have channels for making inquiries or registering complaints and are often unaware of their rights and responsibilities. The applicability of the Federal Concession Law to the water and sanitation sector remains to be established. A clear and neutral law governing competition for concessions for water supply and sanitation services, whether by public or private providers, is needed. The legal framework has no provisions for meeting the institutional needs of large metropolitan areas consisting of multiple municipalities or for dealing with the environmental stress caused by growing demand for water resources and the discharge of large volumes of wastewater. Neither need was foreseen when the legal framework was established. The lack of a legally sanctioned institutional model under which a group of municipalities, whether in large metropolitan areas or in a region with several small towns, can join together to plan, finance, and operate services, limits progress in effective service provision.

In the absence of a stable regulatory framework, clarity regarding ownership of assets, and rules governing the award of concessions, it has been very difficult to attract private investment and other forms of private participation. A federal complementary law on water supply and sanitation services that aimed to clarify the framework was proposed several years ago.

*The challenge of establishing independent regulation in Brazil also covers publicly owned or managed water utilities.
ago. This law and several variants have been debated ever since, but none has been adopted. A number of alternatives, each with advantages and disadvantages, have also been proposed: a Constitutional Amendment, interpretation law, federal ordinary law, and state laws.

Municipal capacity. In 2000, only 45 of Brazil’s 5,561 municipalities had a population of more than 100,000, almost 37 percent of the total population lived in towns of less than 50,000, and 49 percent lived in towns and cities of less than 100,000 (IBGE 2000). The capacity of towns and small cities to organize and manage water supply and sanitation services, coordinate them with other local actors, and cope with the multiple federal and state agencies involved (for example, river basin committees and environmental regulatory bodies) is limited. Rural areas that fall within the jurisdiction of small and medium-size towns pose a special set of problems. Viable financial and institutional arrangements to support the planning, development, and delivery of sustainable water supply and sanitation in small and medium-size towns and rural areas need to be identified and replicated. At the other end of the spectrum, practical and legally viable institutions for coordinating the planning and delivery of water supply and integrated sanitation services in large metropolitan areas also need to be developed.

The capacity of many municipal authorities to participate in planning water supply and sanitation services, mobilize investment financing, and supervise and regulate service delivery is also limited, as is their capacity to engage in urban planning and to coordinate and associate with nearby municipalities (in part, as mentioned, because there is no clear legal framework). When state companies provide services, municipal authorities are often not consulted and have little power to influence investment and service planning decisions. When municipal entities provide services, experience is mixed. Some municipal service providers enjoy adequate autonomy and are reasonably efficient. Others are impeded by institutional arrangements that do not promote efficiency and good financial administration and may encourage political intervention in day-to-day management. Municipal authorities need training and capacity building to make appropriate policies for water supply and sanitation services, participate effectively in planning and mobilizing funding, choose proper institutional models for service delivery (whether through public or private companies), and regulate services (once their regulatory role is clarified). Information on institutional models that promote better management and efficiency needs to be disseminated.

The Association of Independent Municipal Water and Sewerage Service Providers (ASSEMAE) has a relatively strong training program and the size and influence needed to be an important partner in strengthening municipal capacity. In addition, organizations
and training approaches that address a broad range of municipal services and interventions could be used in training and capacity building. A multisector approach to capacity building and technical assistance could promote better integration and coordination across sectors.

Options
Several measures could help to clarify the institutional, legal, and regulatory framework and improve the effectiveness of the water supply and sanitation sector:

• Creating an appropriate institutional structure at the federal level to guide policy-making and interventions in water supply and sanitation. One possible model is a national water supply and sanitation council with representatives of states, municipalities, service providers, and users, that is coordinated by the federal government through an independent executive agency.

• Linking federal funding to improvements in performance (as proposed by the PMSS program managed by the federal government, BNDES, and CEF), and applying output-based aid and other approaches to federal transfers and credit programs that promote efficiency, particularly for discretionary financing through federal budget allocations.

• Reaching agreement in Congress on key sector legislation that clarifies the roles of different levels of government on the conceding power for concession award in metropolitan areas and the institutional framework for regulating water supply and sanitation.

• Establishing federal and state programs to develop the capacity of local governments to formulate water supply and sanitation policies, participate and develop incentives to foster cooperation in investment planning and financing, collaborate with nearby municipalities, and regulate services in accord with a clarified role for municipalities.

• Using federal and state matching grants and other technical and financial support to municipalities to provide incentives for multisector interventions and to develop integrated approaches for upgrading favelas and (where appropriate) regularizing and upgrading illegal settlements.

• Legislating federal rules and mechanisms to promote appropriate forms of municipal association.

• Disseminating information, at federal and state levels, on principles and institutional models that promote efficient public delivery of services and efficient regulatory structures.
• Disseminating information by federal, state, and municipal governments on the potential advantages, limitations, and challenges of private sector participation; the conditions necessary for success; and ways to avoid mistakes, as well as studying and disseminating best practice in regulating both public and private operators.

**Message 3. Introducing appropriate and flexible tools to more effectively manage urban water pollution**

Water pollution from inadequate urban wastewater collection and treatment has become a major problem that undermines quality of life, health and economic development, particularly in large metropolitan areas. It has a disproportionate impact on the poor in the slums surrounding Brazil’s largest cities. Adoption of environmental standards from Europe and the United States has not led to improvements in environmental quality, because the cost, affordability, and the timing of the introduction of standards were not evaluated, nor were practical approaches developed for implementing them. It was assumed that the cost of investments in sewerage and wastewater treatment would be reflected in the consumer tariffs for sanitation services, but tariffs did not rise to cover these costs, nor did sufficient outside funding become available.

Realistic federal and state programs are needed that give a high priority to mobilizing the large investment resources that are required. The federal government could promote effective pollution control by providing investment finance or guarantees for innovative and financially viable projects. Three issues need to be addressed. First, analysis of the health and environmental benefits, and of consumer willingness-to-pay, will help to justify the cost of investments and serve as a basis for establishing public funding levels and cost recovery objectives. Second, in the absence of adequate funding, more flexible standards or a phased approach to attaining standards may be needed to avoid blocking provision of basic sanitation services to the poor. Third, a more integrated approach to urban development and slum upgrading, including an aggressive program to regularize land ownership in slums, would promote more effective pollution control and increase residents’ willingness to pay for services; a major effort is required to promote cooperation among agencies and levels of government in such integrated urban development approaches.
Context
Less than 10 percent of the wastewater produced in urban areas is treated, not only causing significant environmental degradation, but also immediately and seriously reducing the quality of life and harming the health of urban populations, particularly the poor. The adoption of ambitious environmental standards has not had much effect, because the cost and affordability of the standards were not evaluated, practical approaches to implementing them were not developed, and, in any case, the necessary finance is not available to meet them. Many factors contribute to water pollution: untreated wastewater, lack of adequate drainage, poor solid waste management, erosion due to run-off, and seepage of hazardous substances. Effective management of the brown environmental agenda requires coordination of interventions that are now divided among several sectors and tiers of government.

Integrated water pollution control and urban upgrading. An integrated approach is likely to enhance the benefits of a wide range of interventions to improve the brown environmental agenda and upgrade slums. Poor households will be more willing to contribute to the cost of sewerage if they have some security of tenure. The health benefits of effective solid waste collection and disposal complement those of water supply and sanitation, and effective solid waste management is an essential component of water pollution control. Integrated approaches to tackling urban water pollution and urban upgrading depend on cooperation among a variety of sectoral and governmental actors and require a serious look at the role of effective metropolitan government in planning and implementing basic infrastructure services for the brown environmental agenda in Brazilian cities. Models for effective metropolitan governance and for other cooperative programs need to be developed, and state and municipal authorities need training and support to undertake such programs. This requires better definition of the roles and responsibilities of state and municipal governments, a subject treated in Message 2.

Health and environmental costs and benefits. Analyses of the health and other quantifiable benefits of sewerage and wastewater treatment generally demonstrate that the benefits justify the cost of basic services. Nevertheless, the cost, particularly of wastewater treatment, is high. Full cost recovery may double the water bill and require tariffs that are beyond the willingness and ability to pay of many poor households. Some cost recovery, even if only symbolic, is important because it establishes the concept that sanitation services are economic goods, but it should not be a barrier to access. Partial public funding is justified by the savings in public health costs and other externalities. Systematic analysis of the potential savings in public spending on health care, and of the willingness and abil-
ity of households to pay, is therefore useful for setting initial fees and subsidy levels. Examination of policies and mechanisms for subsidizing sewerage and wastewater treatment in the United States and the European Union might identify useful models.

**Appropriate standards.** The cost of sewerage and wastewater services can vary substantially depending on the technical standards adopted for construction and the quality of the wastewater effluent. High standards may not be affordable and could even block provision of basic services to the poor if adequate public funding is not available. Lower cost options, such as condominial sewerage combined with decentralized primary and secondary wastewater treatment plants, may not meet existing standards everywhere in Brazil. For example, the requirement that treatment plants be placed at a minimum distance from dwellings is problematic in congested settlements. To make the introduction of basic sewerage and wastewater treatment feasible, standards may need to be made more flexible or phased in gradually.

**Options**
Appropriate and flexible tools for more effectively managing urban water pollution could include:

- Coordinating a program at the federal level for developing urban environment infrastructure for priority metropolitan areas that incorporates the lessons of the last 10 years for improving institutional and financial models.
- Establishing federal partnerships with state and municipal governments on integrated approaches to tackling urban water pollution, the brown environmental agenda, and urban upgrading through cooperation across sectors and tiers of government, promotion of effective metropolitan governance, capacity building and technical assistance to metropolitan stakeholders, development of effective policies and strategies, and dissemination of best practice approaches.
- Developing indicators and methodologies at the federal level for valuing the health and environmental benefits of wastewater treatment, and carrying out cost-benefit analysis, as feasible.
- Continuing the Compra de Esgoto program and refining it as needed to promote expanded implementation.
- Encouraging ANA, CEF and BNDES to pilot other innovative project financing and guarantee systems to leverage private financing for expanding environmental infrastructure.
Prioritizing integrated and phased brown environment agenda programs with strong slum upgrading components, and identifying and disseminating best practice approaches, at federal, state and municipal levels.

Having the National Environment Council (CONAMA) conduct cost-benefit analyses and evaluate the affordability of river water quality standards and environmental discharge standards to determine whether they are consistent with progress in water pollution abatement. If appropriate, CONAMA would adjust standards or issue guidelines for more flexible or phased compliance, particularly in cases where this will expedite investments in new wastewater collection, transportation, treatment, and discharge capacity.

Message 4. Introducing a consistent water policy that promotes equity of access to water and sanitation services as a means of reducing poverty and promoting economic development in less developed regions

Delivering adequate water supply and sanitation services to the poor would have significant health benefits and would promote Brazil’s inclusive-development agenda. Development of water infrastructure and services in the underserved regions in the North and Northeast would contribute to a more equitable society, greater social cohesion, economic development, and job creation.

More coherent sector policies and interventions would help to achieve these objectives. The relatively large fiscal resources spent by the federal government through dozens of programs and discretionary budgetary allocations could be more effectively targeted to underserved populations and regions. Coordination of the interventions of key infrastructure and service sectors at both policy and program levels, and a more integrated approach to urban planning and slum upgrading, would result in greater synergies and less waste. A transparent framework of federal investment funding policies with well defined priorities and criteria could promote efficiency and target the poor. Tariff policies could be adjusted to reduce the large distortions created by cross-subsidies and eliminate disincentives to serve the poor. Transparent subsidies could guarantee access to service for poor customers only rather than subsidizing all residential users. Alternative technologies, realistic and affordable technical standards, and innovative institutional models that incorporate strong community participation could help to bring services to poor people within a reasonable time frame.
Context
Disparities in service coverage (between rich and poor, north and south, urban and peri-
urban, and small and large municipalities) and quality (from satisfactory in the large city
centers to intermittent, unreliable, and unsafe in peri-urban areas, small municipalities,
and rural areas) constrain progress in reducing poverty and achieving broad based eco-
nomic and social development. Municipalities, particularly the very small and those in the
North and Northeast, are ill-equipped to address this problem alone. Recent federal inter-
ventions do not appear to be well-targeted, with spending based on considerations other
than economic criteria. Even social programs with water supply and sanitation compo-
nents, such as the Ministry of Health's Programa Alvorada, have not been used effectively
to promote economic efficiency, improve health, reduce poverty, and improve service sus-
tainability. Poorly designed regulatory regimes often disadvantage the poor. Regional data
on children with fecal-oral illnesses in Brazil show a clear correlation between hospital-
ization and lack of adequate water supply and sanitation services (Conselho Nacional dos
Organization/World Health Organization studies have shown that water supply and san-
itation services reduce the incidence of typhoid fever by at least 80 percent, trachoma and
schistosomiasis by 60–70 percent, and gastrointestinal infections and diarrhea by 40–50

An integrated approach to poverty reduction. A more consistent approach to
poverty reduction would promote better cooperation among different service providers.
The federal government could articulate poverty reduction policies, priorities, goals,
funding criteria, and guidelines that would apply to all interventions aimed at reducing
poverty (funding for basic services, institutional strengthening, and so on.). Thus, for
example, if eligibility criteria for subsidies for several services were the same, applications
could be combined and services could be developed and managed jointly. This could
lighten the management burden for small towns and encourage an integrated approach to
upgrading favelas. The challenge would be to get the representatives and promoters of vari-
ous services to agree on common priorities and criteria.

In planning improvements in services to the poor and overall upgrading of favelas and
other forms of informal urban settlements, there are tradeoffs and synergies to be consid-
ered among different types of infrastructure and services. For example, constructing
straight roads is usually more costly and requires reconfiguring more households than con-
structing roads aligned with the existing physical environment. But straight roads reduce
the cost of installing piped water and sewerage networks and collecting solid waste.
Integrated planning would consider such tradeoffs and synergies within and across sectors, as well as the perceived needs of the community, and select options accordingly, developing a desirable sequence for the gradual introduction of infrastructure and services.

Integrated planning is particularly important in light of the 2001 federal law establishing the Estatuto da Cidade, which provides a comprehensive framework for urban development, including legalization of land titling to address informal land use. While implementation of the law is expected to remove legal impediments to charging tariffs in the affected areas, legalization will impose additional financial strains on water utilities (and other service providers) for the enormous investments in infrastructure that the legalized settlements will require.

**Sector Financing Policies.** Brazil spends more than R$ 2 billion a year on water supply and sanitation, but these allocations do not appear to be targeted consistently to improve services for the poor or to promote more efficient service delivery. Investments of about R$44 billion will be needed over the period 1999–2010 to meet the universal service goals for water supply and sanitation proposed by the government. Generating the required funding is not the only challenge; a more important issue is how funding is allocated and used to promote improvements in efficiency and financial viability. There are a number of sources of funding for the sector—including the federal budget and the Severance Fund (FGTS, which is administered by CEF and BNDES), BNDES investments, Programa Alvorada (administered by FUNASA), ANA, international lenders, and bilateral aid—but their criteria for allocating funds are not consistent. As a general rule, water utilities with the greatest need to improve performance and expand services cannot access funding. In addition, political pressure has occasionally driven hasty preparation and implementation of funding programs. Finally, many utilities that need funding do not know how to access it, because of weak institutional capacity. As a result, federal funding initiatives are less effective than they might be.

To make funding criteria more consistent, the federal government could establish financing policies that better target the poorest regions and provide incentives for efficient and sustainable delivery of services to the poor. Where feasible, output-based aid could replace or complement input subsidies (output-based aid links funding to desirable and quantifiable outputs, such as a baseline volume of water actually delivered to poor consumers or the number of new sewerage connections in low-income areas). The challenges of a policy of targeted funding are both technical and political. The technical challenge is that while output-based aid is potentially very useful, it is not always easy to design and implement. Approaches would need to be pilot tested, evaluated, and, if appropriate,
refined before introducing them on a large scale. An example of an output-based aid pilot is ANA’s Compra de Esgoto program, described above. The political challenge would be to minimize allocations based purely on political interests rather than poverty reduction and economic criteria. Strong leadership would be needed to consolidate political consensus on the importance of targeting aid to the poor and to create peer pressure to conform among decisionmakers.

To ensure that water supply and sanitation companies in the poorest regions can access funding, and as part of a more integrated approach to poverty reduction, the federal government could establish a central office to facilitate the channeling of funds for a variety of interventions that benefit the poor directly without creating perverse incentives for utilities. One potential source of funds for sewerage and water consumption subsidies might be the Federal Poverty Alleviation Fund.5

Tariff Policy. In most parts of Brazil a low tariff applies to the first block of consumption or a minimum consumption fee applies to all domestic connections—and sometimes to commercial and institutional connections—which benefits many who do not need subsidies and reduces funds available to assist the poor. This approach creates a disincentive to expand service to low-income areas where consumption is very low. A better alternative would be a true social tariff (normally covering at a minimum the cost of operations and maintenance) that would apply to poor consumers only. All other users would pay at least the full cost of service for all water consumed and some or all would pay more than full cost so as to cover the deficit created by the social tariff. A second-best alternative is to allow residential users with moderate levels of consumption (levels high enough to cover basic sanitation needs) to pay a tariff that does not reflect full cost but is higher than the social tariff.

Another way to assist the poor is to provide direct subsidies to eligible households or to service providers on behalf of eligible households. While this alternative is economically most desirable, it is administratively more complicated. Brasília’s current scheme is an example of this type of subsidy and is worth detailed study. The government of the Federal District pays the water utility an amount equivalent to the water and sewerage bills of poor families consuming less than 10 cubic meters a month. To be financially feasible, direct subsidies would require an allocation from the federal budget or local gov-

5 Other potential sources of funds are direct subsidy programs from the federal government, such as Bolsa Escola and other social protection network programs.
ernment budgets. However, even if federal and local governments provided funding for direct subsidies to cover part of the cost of poor households’ water and sewerage bills and other consumption needs, ongoing administration of direct subsidies for monthly consumption would require greater institutional capacity than many municipalities have.

While consumption subsidies are likely to be necessary for some time, connection subsidies could substitute for or complement consumption subsidies. In some areas, connection subsidies would be sufficient to ensure that the poor get water. Thus, targeted subsidies might have to be introduced over several years, and different strategies might be needed for different services and locations, depending on local administrative capacity, the ease of identifying the poor, and the ability of the poor to pay the cost of the local service. More gradual elimination of the low tariffs for the first consumption block might also be politically more palatable.

Appropriate technologies, standards, and institutional models. A variety of technologies, institutional arrangements, and payment schemes for delivering water and sewerage services and wastewater treatment have been used in small towns, illegal settlements, and favelas, some developing spontaneously, others in a more formal manner. While piped sewers are essential in crowded urban areas, properly designed septic tank systems can be appropriate solutions in less densely populated areas. In some cases, communities have organized themselves to install, deliver, and pay for services. Evaluation of experiences with a variety of options could identify the conditions that promote success, assess the tradeoffs, and determine whether low-cost technologies are appropriate. For example, the advantages of a lower cost investment may be outweighed by higher operation and maintenance or other costs over time, or the technology may be inconsistent with other urbanization and upgrading interventions.

Technologies that are otherwise appropriate may not be consistent with stringent drinking water and environmental standards. For example, in very crowded low-income settlements, it may not be possible to place small primary wastewater treatment installa-

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6 For example, since about 35 percent of the population in Brazil is poor and 40–60 percent of residential customers consume within the first block of consumption, the tariff applied to that first block could be replaced with a real social tariff. The challenge is to revise the current structure and introduce a real social tariff. In addition, a progressive tariff structure could provide an incentive for more efficient use of water resources and, in the case of a foreseeable scarcity, apply tariffs on higher blocks of consumption that reflect the long-term marginal cost of providing the services.
tions as far from housing units as required by law. Noncritical standards may need to be relaxed so that high standards do not prevent the introduction of basic services.

Finally, the poor may have difficulty dealing with large formal water and sanitation institutions because of low levels of literacy, problems budgeting income and expenses, lack of access to banking services, difficulty of transportation, and similar problems. Innovative, small local institutional arrangements and outreach facilities can help to overcome these barriers for low-income households and communities. This is an area where greater coordination among service sectors could produce important synergies.

Options
Several measures could promote greater equity in access to water supply and sanitation services as a means of reducing poverty and promoting economic development in less developed regions:

• Conducting federal and state public expenditure reviews of the water supply and sanitation sector to determine how well funding has been targeted toward improving services for the poor and for regions most in need, and reviewing the weighting of water supply and sanitation coverage and quality in formulas for allocating fiscal resources to states and municipalities.

• Examining at the federal level the need for and feasibility of funding targeted sewerage connection or consumption subsidies and, if appropriate, identifying a reliable source for the subsidy including the possibility of using the Federal Poverty Alleviation Fund.

• Evaluating, at the federal level, experience in Brazil and elsewhere and disseminating information on best practices to reach the poor, including appropriate technologies and levels of service, practical methods for phasing in drinking water quality and environmental standards, institutional arrangements for outreach, and demand management and other techniques for managing consumption.

• Providing technical assistance to states and local governments to develop the capacity to access funding and to design and deliver services to the poor.

• Developing national guidelines for targeted social tariffs or connection subsidies and, as much as possible, linking them to financing programs.

• Developing, through CONAMA, affordable, simplified, and phased standards for water supply sources and wastewater effluent discharge.

• Reviewing the costs and benefits and affordability of federal drinking water quality standards and the timeline for full compliance to ensure that the standards are not a barrier to improving service to the poor.
At the local and utility levels, establishing project planning teams to analyze and compare options for providing service in favelas and other low-income areas (installation costs, operating and maintenance costs, useful life, financial viability, practicality in different settings, environmental impacts, effect on social integration, and efficiency); for collaborating with planners in other sectors to identify potential conflicts or synergies with other interventions and services; and for developing decentralized, user-friendly institutional arrangements that facilitate access to service by the poor.

Targeting federal and state investment funding to less developed regions and towns for well-designed and sustainable programs that directly benefit the poor. Output-based aid approaches, aimed at promoting efficiency and service to the poor, could be pilot tested and, if effective, mainstreamed.

Piloting at local and utility levels a variety of methods for directly subsidizing services (through both connection and targeted consumption subsidies) for poor households in selected communities.
Message 5. Increasing the provision and expansion of affordable, good quality services by improving the efficiency of water and sanitation companies

Although utility tariffs are at a level that could cover operation and maintenance costs and leverage substantial investments, half of all utilities in Brazil present operational deficits that require fiscal support to avoid bankruptcy. Reliable information about the performance of service providers, a powerful tool for promoting efficiency, can be used to educate consumers, benchmark best practices, and develop yardstick competition among service providers. Substantial progress in collecting and analyzing performance indicators has been made over the last seven years through the National Water Supply and Sanitation Information System (SNIS), which makes it possible to compare the performance of state, municipal, and private service providers throughout the country.

Analysis of key benchmark comparators confirms the need for a number of policy reforms and incentives to improve performance on several key indicators. Reducing excess staff to improve productivity while preventing political interference in hiring would be key elements of a reform policy since most public utilities are heavily overstaffed and remain captive to special interests. High unaccounted-for water losses—as much as 40 percent in many utilities—compromise financial performance and waste a scarce resource; abstraction charges, pollution fees to finance river basin investments, tariffs that reflect the full cost of service, and other financial incentives are essential to reduce unaccounted-for water losses and wastage by users. Revenue collection is a serious problem in many companies, but improving collections is difficult when service is poor. Innovative funding programs that provide up-front resources in poor states and reward sustained improvements could help. Private sector participation—if well designed—could improve efficiency, but it has been controversial in Brazil and has not always been used wisely. Efforts to promote private sector participation could focus on good preparation of transactions that promise to improve the efficiency of existing services and generate investment funding for high priority projects, such as improved service for the poor and for wastewater collection and treatment.

Context

Public water supply and sanitation utilities predominate in Brazil, and most investments are funded by public resources or publicly channeled resources. State and municipal authorities tend to politicize decisionmaking in water and sewerage utilities and thus to interfere in day-to-day management. Even privately operated utilities are sometimes subject to politically motivated terms and conditions. As a result, utility management frequently lacks the autonomy to operate efficiently and either cannot be or is not held accountable for outputs and costs.
Although utility tariffs are high enough to cover operation and maintenance costs and leverage substantial investments, half the utilities in Brazil present operational deficits that require fiscal support. Collection rates and staff productivity are too low in many utilities, and water losses are too high almost everywhere. Utility managers need the incentives, autonomy, and resources to improve the efficiency of investments, management, and operations, and the efficiency gains should be allocated to improve service coverage and quality and to maintain affordable tariffs. More efficient and autonomous utilities will be better able to mobilize the internal and external investment resources needed to pursue higher levels of service coverage and quality for the poor and to expand wastewater collection and treatment.

**Productivity.** The international standard for the ratio of utility staff to connections is about 2 per 1,000—although the ideal number depends on local conditions, such as the density of connections. In 2000 in Brazil, the ratio in state utilities (including utility employees and those of contracted services) varied from a respectable 1.7 per 1,000 to a high of 9.0. The average was 3.7 for state utilities, 5.8 for municipal utilities, and 6.4 for privately operated utilities (SEDU and IPEA 2001, p. 11). There are a number of strategies that can be used to improve productivity. Some are relatively painless. Since political interference and special interest pressure are at the root of excess staffing, political leadership needs to be committed to rationalizing staffing and to ending the political pressure to hire excess staff. To ensure the success of any plan to improve productivity, labor representatives could be involved in designing the strategies and presenting them to affected staff.

An important first step is to determine the desirable staffing profile and pursue it steadily over several years. If services are expanding, some of the excess staff can gradually become more productive. Most excess staff are unskilled and have few alternatives in the labor market. An intensive staff training program could eliminate the problem of idleness and improve employment options. If large numbers of unskilled staff are near retirement, they could be offered early retirement with appropriate compensation. For skilled staff, a generous severance package might be sufficient to generate voluntary departures. All these

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1 The unexpected high staffing levels in privately operated utilities may be due to the fact that SNIS classifies local utilities owned by the public sector but operated under corporative law as private utilities.
strategies involve costs, and many would have to be funded from fiscal sources or external assistance to avoid a financial drain on already stressed utilities. In the long run these strategies can be very cost-effective—but only if there is strong political commitment to avoid politically motivated hiring.

There are several choices to be made. A vigorous effort to reduce excess staff in a short time may be politically difficult. A more restrained approach using the least controversial strategies could yield moderate improvements and is less likely to encounter political and labor resistance. Contracts with private operators guaranteeing employment for several years should be carefully reconsidered. It may be more productive to postpone private sector participation until staffing levels have been rationalized. Finally, the failure to recognize skills acquired by sector staff contributes to labor market rigidities. Recognition of skills through formal training and certification would increase workers' flexibility to move among utilities or to other sectors.

**Unaccounted-for water.** One of the most egregious indicators of inefficiency is the high level of water losses, measured as the ratio of the volume of water billed to the volume placed in the distribution system. Although several service providers in Brazil have achieved important improvements, average losses are still very high. In 2000, 3 of the 26 state companies had losses of less than 30 percent, and 7 had losses greater than 50 percent; the average was 39.4 percent. For municipal utilities, losses ranged from less than 20 percent to more than 70 percent and averaged 40.3 percent overall and 30.2 percent for privately operated utilities (SEDU and IPEA, p. 12).

These high water losses not only affect the companies' financial performance, but also waste a valuable and scarce resource. Faced with the rising cost of developing new water sources, sometimes at great distances, and the growing competition for water among various users, service providers cannot afford to waste water. While water resources management policies that favor allocations for human needs exist and may seem necessary, they should not encourage waste. Bulk water pricing is an excellent example of the type of mechanism that river basin committees could establish to promote efficient use of water.

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* In Brazil, where some utilities with very good productivity indicators have more outsourced employees than direct employees, a review of outsourcing strategies and results is needed. Successful cases such as CAGECE (the Ceará state water company) should be assessed to determine the most effective approaches.

* SNIS data classify local utilities owned by the public sector that operate under corporative law as private utilities.
REVENUE COLLECTION. Overall revenue collection losses for state utilities are about 12 percent, but this masks large variation among utilities. Of the seven utilities with losses greater than 25 percent, five are in the North, one in the Northeast, and one in the Southeast. State utilities in the Mid-West and South have consistently good collection ratios. While the data for municipal utilities present some analytical problems, a number of municipal utilities appear to have serious collection problems. Improving collection is difficult where service is unreliable, but most surveys indicate that where service is good people are willing to pay. It is almost impossible to achieve big improvements in service quality without adequate resources. One strategy is to pursue improvements that do not require costly investments while resolving administrative problems of billing and collection. Innovative funding programs that reward sustained improvements in performance would be useful, but to get the process started, substantial up-front funding would be needed for utilities in the poorer states.

PRIVATE SECTOR PARTICIPATION. Private sector participation has been promoted as a means of improving efficiency and attracting investment finance. Experience in Brazil and elsewhere shows that private sector participation can result in better performance when contracts are well prepared and awarded on the basis of transparent criteria, incorporate incentives for the private operator to achieve clearly specified performance targets while obligating the public authorities to set reasonable tariffs, and are enforced fairly and effectively. These criteria are not easy to meet, and poorly prepared and implemented private sector participation can do more harm than good.

Much of the debate over private sector participation in Brazil has been motivated by ideology rather than more neutral financial and economic considerations. Concessioning water utilities to private operators and selling water company shares have both been promoted as a means of generating fiscal resources to pay off debt or to use for other public purposes. Such approaches do not necessarily serve the interests of the water supply and sanitation sector and its customers. In developing an approach to private sector participation, funding agencies and policymakers at federal, state, and municipal levels could focus on improving efficiency and generating investment funding for high priority projects (particularly expansion and improvement of service for the poor, and wastewater collection and treatment).
Options
Several measures could expand affordable, good quality services by improving the efficiency of water supply and sanitation companies:

- Developing mechanisms for river basin committees to promote efficient use of water and reduce unaccounted-for water. Educational campaigns on the value of water resources for water company staff and the general public would create public awareness and a better appreciation of the cost of water losses.
- Linking the funding and lending decisions of federal and state funding agencies to efficiency and financial performance criteria and giving priority to well-designed programs to serve the poor and underserved regions, including establishing federal policy to direct lending by CEF and BNDES. The criteria adopted by PMSS (which include targets for selected financial indicators, staff productivity, and metering) could be adapted as a framework for evaluating utility performance.
- Introducing further discipline to the sector through regular assessments by recognized credit risk rating agencies, based on detailed criteria for their introduction.
- Eliminating minimum consumption levels, which contribute to inefficiency and poor collection performance, from tariff structures.
- Using SNIS data as a benchmarking tool for federal and local funding agencies and policymakers, as well as for service providers generally.
- Encouraging research institutions and the media to use information from SNIS and other sources to analyze and compare the performance of utilities, and publishing the results in the media to promote public awareness and create pressure for improving efficiency.
- Using service providers and professional associations to provide courses to managers and staff on strategies and methods for improving efficiency.
- Authorizing and encouraging service providers to reward managers and staff who make exceptional contributions to improving efficiency.
- Conducting research and disseminating best practices and guidelines at the federal level on private sector participation, aimed specifically at avoiding costly mistakes, capturing potential efficiency gains for consumers, and generating investment resources.
- Conducting research and disseminating best practices and guidelines at the federal level on best practices in the efficient management of publicly owned utilities.
- Collecting and analyzing data at the federal level on the cost of service in small towns and rural areas, similar to SNIS data on urban areas.
Message 6. Identifying priority investments in water resources infrastructure and improve management of existing infrastructure, as prerequisites of further investments

In 1998 and 1999, governments in Brazil spent US$3.3 billion (US$875 million of it by the federal government) on emergency drought alleviation in the Northeast for an affected population of some 10 million. Natural cycles of drought could be addressed more effectively through better management of water resources, including sufficient storage and distribution capacity to carry the region through dry cycles. Irrigated agriculture is an intense, employment-generating activity, but Brazil exploits barely 15 percent of its irrigation potential. Expansion of water supply in many cities of Brazil faces increasing costs since nearby water sources have already been used by utilities or are polluted. Utilities tend to expand supply rather than make optimal use of existing capacity by reducing water system losses (which exceed 25 percent in most cities) and using metering and price signals to encourage users to reduce waste. The 2001 energy crisis reduced anticipated GDP by an estimated 2 percent; Brazil has developed only 42 percent of its hydropower potential.

Funding for two complementary types of investment could help to minimize the escalating cost of droughts and take fuller advantage of water resources: rehabilitating infrastructure and developing institutional and financial arrangements that promote sustainable operation and maintenance, and constructing new hydraulic infrastructure based on sound social, environmental, economic, financial, and institutional criteria. Community-managed infrastructure could be encouraged where feasible, but the large amount of funding needed and current government budgetary constraints suggest the need to foster public-private partnerships.

Context

A strategy to minimize the escalating cost of droughts and take fuller advantage of water resources must address two issues. One is weak administration, operation, and maintenance of water infrastructure and the associated deterioration and poor financial performance of existing systems. The other is a tendency to allocate funding to new hydraulic infrastructure on the basis of political criteria and short-term expediency rather than sound social, environmental, economic, financial, and institutional criteria. Community-managed infrastructure should be encouraged wherever feasible, but the amount of funding required and current government budgetary constraints suggest the need to foster public-private partnerships. In the semi-arid region of the country, infrastructure development should be contingent and part of a broader drought management strategy that
includes other aspects such as watershed management, early alert systems, insurance mechanisms, contingency plans, and better use of economic instruments for managing water demand. Such a strategy could also encompass aspects related to the income and livelihood of the poor and vulnerable groups during periods of extreme drought.

Making better use of existing infrastructure. The tendency of federal and state governments to emphasize new investments rather than proper administration, operation, and maintenance of existing systems—common in water resources management around the world—has resulted in infrastructure degradation, poor service delivery, and stranded investments.

The framework and measures necessary to achieve better utilization of existing infrastructure are both widely agreed and familiar to policymakers in Brazil. A movement to create accountability by transferring management responsibility to local users has been under way since the 1990s. The river basin approach, the creation of irrigation districts under federally funded infrastructure programs, the transformation of water supply and sanitation service providers into more autonomous and financially viable companies, and the growing use of private sector participation are among the measures that have been used. But this effort remains incomplete.

The critical issues are autonomy, financial viability, and accountability of institutions and service providers. The cost of administration, operation, and maintenance is small relative to the initial investment in infrastructure, but failure to allocate adequate resources for this purpose can rapidly undermine the benefits of an investment. Service providers that depend entirely on revenues from user charges to cover the full cost of efficient service have a strong incentive to operate and maintain their infrastructure properly and ensure continuity of supply—otherwise users would not be willing to pay.

Collective infrastructure for irrigation, navigation, flood control, and related purposes presents a more complex problem. The beneficiaries are more diverse, and it is difficult to charge directly for the services. In addition, this infrastructure is often more redistributive than productive in character, and the promoters are often more interested in the profits and political benefits that accrue during construction than in the longer term rewards of mobilizing water as a factor of production. Projects that serve an identifiable group of commercial farmers or other users, with a clear interest in better services and the ability to exert pressure on the institutions responsible for administration, operation, and maintenance, are more likely to be operated efficiently.

In 2001 an estimated 100,000 hectares of land in public irrigation projects was not in production in the Northeast. The reasons extend well beyond water infrastructure and
include issues of credit, insurance, guarantees, market development, strategic planning, extension support, and off-farm technical assistance for marketing, commercialization, financing, and business planning.

The most reliable way of ensuring better use of existing infrastructure is to require that the institution that builds the infrastructure share significantly in the risks associated with future operations. It is also important to ring-fence each system with its own accounts and to require periodic audits, so that financial performance is transparent and resources cannot be transferred to new investments at the expense of the performance of existing systems. However, practical experience with public services suggests that separating responsibility for investments from responsibility for operations (while a second-best solution) is often the only way to create incentives for adequate administration, operation, and maintenance—particularly when regulation is not well established and investments are influenced by political considerations.

Despite growing acceptance for the principle of charging water users, there is still strong resistance to implementing cost recovery, especially for small and medium-size farmers. Many users consider access to free water an established right, even though the services are unreliable or the quantity of water delivered is insufficient. Many studies demonstrate that current arrangements tend to benefit the large water users who are not required to pay for water but can exert more pressure on the operator and thus receive better service than smaller users. These large users would thus stand to gain relatively less from cost recovery and other arrangements that promote better management, although even they are likely to be better off. All users are understandably reluctant to support changes that introduce or increase charges unless they are confident that better services and higher incomes will result. Thus building confidence and credibility is essential.

Defining priorities for new infrastructure. The pressure to fund new investment projects is strong and often results in projects that are large and highly visible; are designed to meet too many needs and are thus highly complex and difficult to manage; include components that lack justification on their own; are based on unrealistically high estimated rates of return; do not take risks into account; do not incorporate recovery mechanisms to cover the full cost or even just the costs of administration, operation, and maintenance; and are based almost entirely on engineering and investment studies, with inadequate attention to sustainability.

The politically and institutionally contentious São Francisco interbasin water transfer project, as currently conceived, reflects many of these features and is aimed at meeting a
The multiplicity of needs. The value of urban water demand is critical to the claim that the project is economically viable, but a more comprehensive study of options for meeting these demands would probably identify lower cost options that rely either on local sources or on better management of water currently used for irrigation.

To address these issues, ANA has been asked to certify whether projects proposed for federal assistance contain reasonable provisions to ensure adequate funding and management capacity for administration, operation, and maintenance after completion. Recognizing the problem is a significant step forward, but it is not clear how effective this scrutiny can be, and it places a huge responsibility on ANA. Unfortunately, plans put forward by states or other project sponsors often have limited credibility.

Even so, difficulties familiar to any capital-intensive project remain. Since the effects of failure to operate and maintain infrastructure are not immediately visible, potential or actual water users may argue that zero or minimal charges will encourage rapid take-up of newly available resources. Public bodies responsible for the construction or regulation of the infrastructure will probably waive charges or set them at a level well below the long-run cost of administration, operation, and maintenance. This makes economic sense in the short term provided charges are increased as demand builds up. But it is common for low initial charges to be converted to quasi-property right: users believe they should never have to pay realistic charges for their water.

There are two, possibly irreconcilable, perspectives on the nature and design of water management projects: the need to meet many competing demands and objectives, and extensive evidence that clear and focused objectives are essential to effectiveness. The first perspective tends to result in overly complex projects, shelves of unused studies, or protracted delays as the basics are reexamined in an effort to improve the final outcome—a recipe for an unsatisfactory portfolio of investments. Serious choices have to be made among competing demands and objectives because both water and financial resources are limited.

Options
Several measures could help to identify priority investments in water resources infrastructure and improve management of existing infrastructure:

- Transferring water infrastructure to financially autonomous, accountable organizations once construction is complete.
- Appointing independent regulators to set water charges (whether covering full costs or only administration, operation, and maintenance costs), and resolving disputes over the coverage and quality of service.
• Recognizing the undeniable need for new water infrastructure to promote economic growth and poverty alleviation.
• Selecting and prioritizing public investments in water infrastructure on sound social, environmental, economic, financial and institutional criteria; targeting the poor; and incorporating wide social participation, especially by project beneficiaries and other affected people.
• Before implementing new irrigation infrastructure, developing a comprehensive irrigation strategy to rehabilitate and optimize the return on viable existing systems.
• Planning and implementing hydraulic infrastructure projects based on systematic assessments of the returns from existing systems.
• Using infrastructure funds with clearly defined criteria for project design, selection, and implementation to impose economic and financial discipline on investments.
• Encouraging private investment in the development and administration, operation, and maintenance of water infrastructure within a publicly established long-term development strategy supported by an adequate legal and regulatory framework, without crowding out community-managed infrastructure and beneficiary participation in design and management of water systems.
• Developing public sector initiatives to promote a more collaborative public-private partnership approach. These should include assessing options based on upstream hydrologic, economic, environmental, and social conditions; using public funding for components that produce public benefits (such as flood protection); assisting the private sector to manage foreign exchange risk (when long-term fixed rate local currency financing is not available, and when short-term financing does not match the economic life of the assets); blending public and private sector funding to lower the overall cost of capital; using more output-based aid, disbursing funds on the basis of actual services delivered; and creating adequate legal and regulatory frameworks at national, state, and local levels.
References

World Bank projects

World Bank reports

This chapter summarizes the content of the following World Bank reports. Those, in turn, draw heavily from a wide range of literature on the subject from experts in Brazil and beyond, which are referenced in the mentioned Bank reports.


Other references


