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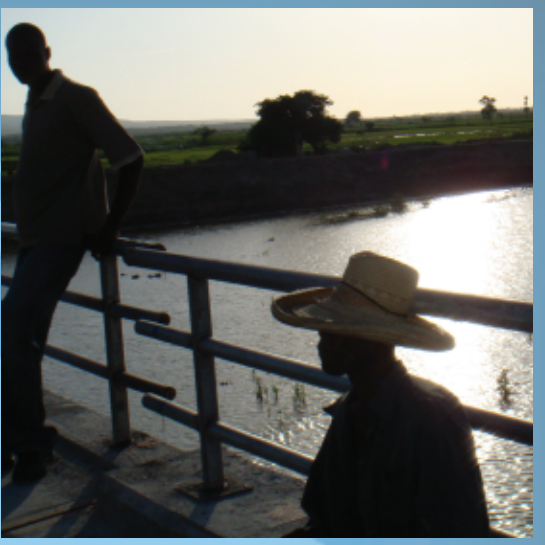

Sector and Thematic Evaluation

The challenge of integrated watershed management:

Analysis of the IDB's action in watershed management programs 1989-2010

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This evaluation was directed by Verónica Gonzalez Diez, under the general direction of Cheryl Gray. The evaluation team consisted of Lourdes Álvarez.

ABBREVIATIONS

CAN	Country Department Andean Group
CCB	Country Department Caribbean Group
CID	Country Department Central America, Mexico, Panama, and the Dominican Republic
CORSAN	Companhía Rio-Grandense de Saneamento [Rio Grande Sanitation Company]
CSC	Country Department Southern Cone
DMAE	Departamento Municipal de Agua e Esgotos [Municipal Department of Water and Sewerage]
FAO	Food and Agriculture Organization of the United Nations
FEPAM	Fundação Estadual de Proteção Ambiental [State Environmental Protection Foundation]
GIS	Geographic information system
GWP	Global Water Partnership
IWM	Integrated watershed management
IWRM	Integrated water resources management
LAC	Latin America and the Caribbean
MDGs	Millennium development goals
OVE	Office of Evaluation and Oversight
PBL	Policy-based loan
PCR	Project completion report
PPMR	Project performance monitoring report
REG	Regional
TC	Technical cooperation
UN	United Nations
UNESCO	United Nations Educational, Scientific, and Cultural Organization
WB	World Bank
WWAP	World Water Assessment Program

EXECUTIVE SUMMARY

The objective of this thematic note, prepared by the Office of Evaluation and Oversight (OVE), is to analyze the Bank's action in integrated watershed management during the period 1989-2010, based on a desk review of the Bank's portfolio in the sector and intervention guidelines, the international literature on watershed management, and a case study of one IDB project in Brazil with an integrated approach.

The study reviews the literature on the evolution of water resource management systems toward an integrated management approach, and how a number of institutions and agencies at international level have moved in that direction. The literature on how this issue has evolved emphasizes the challenge of a crosscutting approach to integrated water resource management, and reaffirms the vulnerability of water resources to climate change, and the need to build climate change adaptation into sustainable watershed management in both policy design and implementation of institutional solutions at different watershed scales.

Within that frame of reference, this study reviews the evolution of operations approved by the Bank under the category of "watershed management," based on the Bank's own guidelines. The Bank's loan portfolio in the sector has been limited, and its approach has shifted from an emphasis on resource management and conservation in the 1990s toward financial support for actions to promote sustainable development and improve the population's quality of life, concluding the evaluation period with projects targeting institutional reforms through the use of programmatic policy-based loans. Moreover, in recent years the Bank has concentrated its support on the use of technical cooperation operations, in particular targeting institutional issues, the outcomes of which are not measurable. In general, the evaluability of the projects is low, the main limitation being the lack of effective outcome indicators to measure their impact.

A case study is also presented on the Guaíba watershed environmental management program I (1993, US$132 million). This was the only program with an integrated water resource management approach, and OVE selected it as a candidate for impact evaluation using modeling techniques. However, the program's execution problems, combined with the weaknesses of the baseline hydrological model, made the impact evaluation unviable. The analysis of this program in the field confirms the difficulties of implementing crosscutting programs given the absence of an integrated strategy and the limitations on building political and technical consensus for program implementation, and the objectives of improving water quality in the watershed were not met.

On the organizational front, the Bank is working to create a specialized watershed management group, in order to update the guidelines established in 1996 and identify new methodologies to meet the new challenges of project formulation in this sector. This technical note is intended as an input to that process.

I. FRAME OF REFERENCE

A. The watershed as management unit

1.1 The literature regards the watershed as the most meaningful territorial unit for integrated water resources management (IWRM) (Dourojeanni et al., 2002b).[1] This is one of the recommendations repeatedly stressed in the conclusions of major international conferences on water resources management.[2] [3] The term "watershed" or "hydrographic basin" refers to the area of surface or underground water produced by a natural hydrographic network with one or more natural flows, whether continuous or intermittent, which converge in a larger watercourse that in turn can flow into a major river, natural lake, or swamp (endorheic watersheds), or else directly into the sea (exorheic watersheds) (Moreno et al. 2007). Geographically, watersheds are normally divided into: (i) the upper watershed (the headwaters of the river); (ii) the middle watershed (where there is a balance between the solid material transported by the current and the effluent material); and (iii) the lower watershed (the part of the watershed where the material extracted from the upper zone is deposited in the "cone of dejection").

1.2 Watersheds are an area where natural resources and the socioeconomic system interrelate; they can provide essential environmental services such as irrigation, and drainage, drinking water supply, and sanitation, as well as waterborne transport and hydroelectricity. Other important services in some subregions and countries include navigation, the prevention of natural disasters such as flooding and droughts, fishing, recreation, tourism, nature conservation and the conservation of freshwater, brackish water, and saltwater ecosystems (García, 1998).

1.3 In recent decades the growing complexity of water management has intensified disputes over the use of this resource. Factors making water systems more complex include the expansion of land occupation, greater competition for water in terms of both quantity and quality, pollution problems, modification of natural flooding cycles caused by the construction of reservoirs, inefficient water use,

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[1] The original Spanish version of this study notes that it uses the terms "gestión" and "manejo" interchangeably to mean "management."

[2] The United Nations Water Conference (Mar del Plata, 1977), the International Conference on Water and the Environment (Dublin, 1992), the United Nations Conference on Environment and Development (Rio de Janeiro, 1992), the meeting of the World Water Task Force (Stockholm, 1996), the International Conference on Water and Sustainable Development (Paris, 1998), the Millennium Development Goals (New York, 2000); the International Conference on Freshwater, Dublin+10 (Bonn, 2001), the World Summit on Sustainable Development, Rio+10 (Johannesburg, 2002); the Latin American Congress on Watershed Management (Arequipa, 2003); the World Water Forum (Marrakesh, 1997; The Hague, 2000; Kyoto, 2003; Mexico City, 2006; Istanbul, 2009); and the International Conference on Water Resources (Malaysia, 2009). The San José Declaration (Costa Rica, 1996) and the Buenos Aires Declaration (Argentina, 1996) ratify the international declarations adopted in the Dublin Principles (1992) for the Latin American and Caribbean region (IDB, 1998).

[3] Much of the Spanish-language literature reviewed uses the terms "manejo" and "gestión" interchangeably to mean "management." This report uses "manejo" because it is the term most used in Bank documents, including the *Guidelines for the preparation of watershed management projects* (Basterrechea et al., 1996).

overexploitation of groundwater, and the increasing deterioration of water catchment basins and groundwater recharge areas (Dourojeanni et al., 2002a; WWF, 2003). These conflicts are accentuated by watershed vulnerability to climate change impacts, especially in relation to the availability of water for irrigation and power generation, flood risks, and other issues.

1.4 The watershed concept was originally used in agronomy and engineering in their attempt to solve problems of erosion, declining agricultural productivity, or the reduction in the useful life of water infrastructure (Natenzon et al., 1989). The first specialist public policies on watershed management were formulated in the 1930s in the United States, from the perspective of the hydroelectric power industry and regional economic development.[4] The shift toward management criteria to protect watersheds came about in the 1960s, when reforestation efforts to prevent soil erosion began, along with oversight and surveillance, and the promulgation of watershed conservation regulations. Based on this new approach, in the late 1980s, the concept of integrated water resources management began to develop, particularly in France, England, and Russia, where the first water agencies, councils, and committees were created (Perevochtchikova, 2008), with water as the organizing factor rather than land. This integrated approach was reaffirmed internationally at the United Nations Conference on Environment and Development (Rio de Janeiro, 1992) and the International Conference on Water and Environment (Dublin, 1992).[5]

1.5 Chapter 18 of Agenda 21 (the program of action approved at Rio 1992) defines integrated water resources management (IWRM) as the integrated management of water resources based on the perception of water as a central part of the ecosystem, and a natural resource and social and economic good, whose quantity and quality determine the nature of its use (United Nations, 1992). The International Conference on Water and the Environment held in Dublin that same year defined basic principles for the subsequent reform of the water sector (GWP, 2005). These introduce the concepts of integrated management, the economic value of the resource, the right to a reasonable and fair use of water, valuing its real cost and promoting its efficient use, participation of all stakeholders in planning and decision-making processes, the distribution of responsibilities, and the gender perspective.[6]

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[4] The first such experience was the Tennessee Valley Authority in 1933, which is considered a crucial step toward integrating the management of water resources (UNESCO, 2009; Natenzon et al., 1989).

[5] Downs et al., 1991; Pérez, 2006; Moreno et al., 2007.

[6] The principles enunciated in the Dublin Statement on Water and Sustainable Development were as follows: Principle 1: Fresh water is a finite and vulnerable resource, essential to sustain life, development, and environment. Effective management links land and water uses across the whole of a catchment area or groundwater aquifer. Principle 2: Water development and management should be based on a participatory approach, involving users, planners, and policymakers at all levels. Principle 3: Women play a central role in the provision, management, and safeguarding of water. Principle 4: Water has an economic value in all its competing uses and should be recognized as an economic good, and also as a social good.

1.6 In 2000, the Global Water Partnership (GWP) defined the concept of integrated water resources management (IWRM) as "a process that promotes the coordinated development and management of water, land, and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems" (GWP, 2000). This is the definition most widely used in the international IWRM literature. In that same year, the United Nations created the World Water Assessment Program (WWAP), which produces the World Water Development Reports, with the aim of developing IWRM and efficiency plans for water use in relation to the MDGs and sustainable development (United Nations, 2008).[7]

1.7 Since then, various institutions and organizations have defined programs, methodologies, technical instruments, good practices, and indicators for implementing IWRM. Programs include the Water Framework Directive in the European Union,[8] as the most successful example of IWRM (Dourojeanni et al., 2001; Lankford et al., 2007; UN-Water, 2008b). The technical instruments available include hydrological modeling techniques for monitoring and predicting impacts on watersheds, computerized decision-making models (AIRES, NAIDAE, DRASTIC, InVEST), geographic information systems (GIS), and others (for examples, see Lee et al., 1995; Kite and Droogers, 2000; Maingi et al., 2001; Kojiri 2008; Kok et al., 2008). Although these models are increasingly accurate, no significant progress has been made on IWRM, owing to a lack of commitment among political jurisdictions, overlapping institutions involved in the management of the resource, technical capacity limitations, and other shortcomings (UN-Water, 2008a, in UNESCO, 2009).

1.8 In a study for Latin America and the Caribbean (LAC), San Martín (2002) identifies four main causes of the shortcomings in water management in the region; (i) the lack of an integrated picture of the water resource and its low replacement capacity; (ii) the heterogeneous quantity, quality, and availability of water; (iii) not enough consideration given to its economic value; and (iv) low levels of public awareness of the problems of water resources, resulting in a lack of political commitment among decision-making institutions to address these problems.[9] In recent years advances have been made in integrated water resource management in LAC, especially in Colombia, Ecuador, and Peru, where land management programs have been strengthened, and investments made in government structures, environmental education and community participation programs, creation of public-private partnerships for protected area management, and implementation of

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[7] World Water Development Report, presented in Morocco, 1997; The Hague, 2000; Kyoto, 2003; Mexico, 2006; and Istanbul, 2009.

[8] Directive 2000/60/EC of the European Parliament and Council, of 23 October 2000, establishing a Community-wide framework for action in water policy.

[9] For a detailed survey of the social, economic, financial, environmental, and institutional challenges of water resources management in the LAC region, see San Martín, 2002; GWP, 2001; CEHI, 2001; GWP-SAMTAC, 2000; ECLAC, 1999; and Dourojeanni, A, 1994.

programs to pay for environmental services that enhance integrated watershed management, etc.

1.9 UN-Water (2008a) identifies a set of necessary conditions for successful implementation of IWRM, including political will and commitment, the existence of participation and coordination mechanisms, adequate investment, and ongoing monitoring and evaluation. Lastly, indicators of IWRM implementation include the Roadmapping Initiative (United Nations, 2008; GWP, 2009; INBO, 2009; Jones et al., 2006; ADVISOR, 2003), which emphasizes the crosscutting nature of the IRWM challenge as a new approach, relating watershed management to other crosscutting issues such as climate change and the MDGs (Hassing et al., 2009). The policy report on approaches to watersheds published by the Food and Agriculture Organization (FAO) (Llambi et al., 2010) reaffirms the vulnerability of water resources to climate change, and the need to build climate change adaptation into sustainable watershed management in both policy design and implementation of institutional solutions at different watershed scales.

B. Integrated watershed management

1.10 Integrated watershed management (IWM) allows for the integration of all important environmental and socioeconomic relationships at the watershed level, through integrated management plans and regulatory decisions (UNESCO, 2009). Regulatory decision-making at the watershed level requires knowledge, data, simulation models, and good environmental practices to be brought together so as to effectively implement integrated management models (Cate et al., 2007). In recent years, hydrogeological models have been developed for the physical, spatial, and temporal study of the multitude of processes that occur in the watershed, based on GIS. These water management models make it possible to predict the system's reactions to certain events and on different timescales, evaluating uncertainty and integrating different hydrological models, water quality, land management, among other factors (Herrero et al., 2006),[10] although the existence of a hydrogeological model does not in itself ensure effective watershed management. The most common shortcomings of these models include the lack of information, the low quality or partial nature of the data needed to execute the model, or difficulty in measuring uncertainty, particularly in the projection of climate change response models, which is still in an experimental phase on the regional/local scale.

1.11 Although various international institutions have documented their watershed management experiences, this is a recent practice and the information is still insufficiently coordinated (Kennedy et al., 2009). UN-Water is one of the organizations that has fostered IWM, and promotes the coordination, collection, and dissemination of data and experiences internationally. Founded in 2000, and comprising 24 agencies and entities, UN-Water manages the WWPA, which

[10] Water management models are divided chiefly into models based on events (for example HEC-1, TR-55 or HydroCAD) and continuous models (SWAT, EPIC, AGWA or GWLF). The latter, although more complex, allow for a more accurate simulation and ongoing monitoring of the watershed.

formulates guidelines and indicators for evaluating the development of water management worldwide, as well as compiles good practices. Other institutions, such as the World Bank (WB) or the GWP, have their own water management manuals, which are based on their experiences over recent decades and incorporate the principles and good practices published in the international literature.

1.12 The analysis of various IWM implementation experiences (GWP, 2000; Jones, 2004; WB, 2006; UN-Water 2008b; UNESCO, 2009; WB, 2009) suggests a number of common features that constitute good practices in successful IWM implementation. These include a long-term view of the watershed, agreed upon among all stakeholders; the creation of an institutional framework at the watershed level that is common to all administrations operating in it; the integration of policies, decisions, and costs, taking account of the interests of the various sectors involved (industry, agriculture, urban development, navigation, fishing industry, conservation, etc.); the integrated development of policies, strategies, and sector decisions, with clearly defined and time-bound objectives and targets; active stakeholder participation through well-informed and transparent decision-making and planning; adequate investment in the planning process by governments, the private sector, and civil society organizations; knowledge of the conditions and behavior of natural and socioeconomic resources and their modeling; systemization of a monitoring and evaluation system; political leadership and commitment; and other features.

1.13 One of the keys to IWM is the institutional framework. Since the first United Nations Conference on Water (Mar del Plata, 1977), institutional, administrative, and economic reforms have been recommended with the aim of creating watershed organizations (committees, councils, commissions) and national or regional regulatory authorities (WB, 2006; Dourojeanni, 2009). Some LAC countries have taken steps to consolidate integrated water resources management systems. Legally, Chile was the first to amend its water code in 1981, followed by Mexico in 1992, Colombia in 1993, and Brazil in 1997 (Dourojeanni et al., 2001). Brazil, with the creation of water committees and water agencies, and Mexico, with the creation of watershed councils, were the first countries to create entities for integrated watershed management. An analysis of IWM in 28 LAC countries performed by UN-Water in 2008 shows that 10 of the countries analyzed had not implemented any IWM program or water efficiency plans, or had done so without achieving significant results; and five countries had implemented them partially. None of the countries analyzed had fully consolidated the IWM model.[11]

1.14 Although there has been a paradigm shift in the theoretical approach to water resources management, the change has occurred partially through a series of fragmented actions. Some critics of the model point to the vagueness of the IWM concept, and the lack of technical and financial capacity to fully implement an

[11] The remaining 13 countries had no information on IWM. For further details on IWM implementation in selected LAC countries, see UN-Water 2008b.

approach of this type (Biswas, 2004, and Mitchell, 2004, in Lankford et al., 2007). Other authors question whether IWM strategic plans can be translated into operational plans, owing to a lack of economic, social, institutional, and ecological information, physical barriers related to irregularities in the watersheds, difficulties in dividing the watershed into manageable subwatersheds, difficulties in managing international watersheds, and institutional and technical capacity constraints, among other factors (Lee, 1995; Perevochtchikova et al., 2008). Shah et al. (2005) also highlight the social, physical, institutional, and economic heterogeneity of each watershed, which makes it impossible to develop a common IWM model, or transfer lessons learned from one case to another, so a flexible model is needed that can be adapted to each situation.

C. The IDB and integrated watershed management

1.15 Environmental protection and water resources management in the Bank's policies and strategies has evolved along with the state of the art and practice in the countries of the region, and have been marked by the aforementioned international agreements. Until 1990, hydroelectric projects accounted for almost 50% of the total approved for Bank-financed operations in the water sector, followed by sanitation projects (García, 1998).[12] Since 1990 there has been recognition of the need to work not only on infrastructure but also on environmental and social issues and technical and economic considerations. Watershed management projects do not appear in the Bank's portfolio until 1989, when project EC0149 was approved for management and conservation of the Paute River basin in Ecuador, in response to growing concern about the effects of poor land-use practices in the upper watershed (García, 1998).[13] Four more projects were subsequently approved in the early 1990s.[14]

1.16 Despite the approval of projects of this type in the first few years of the 1990s, none of the Bank's strategic or policy documents contained definitions of IWRM models until 1994 during the Eighth General Increase in the Resources of the Bank

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[12] Hydroelectric power projects (49%) were approved for a total of US$13 billion, followed by sanitation projects (32%) for US$8.695 billion (1961-1990). During the 1990s, investment in hydroelectric infrastructure fell drastically, with only four projects being approved. Since 2004, the Bank has again been investing in hydroelectric plants, of smaller size and in heavily targeted watersheds.

[13] The main objectives of the project, approved for US$19.2 million in 1989 were: (a) initiating the management and conservation of the renewable natural resources of the Paute River basin by establishing appropriate production and protection systems; (b) helping to prolong the service life of the Paute hydroelectric plant; (c) compiling the technical and socioeconomic information needed to readjust and derive the most benefit from the project's soil management and conservation activities and expand similar activities elsewhere in the river basin and other areas of the country; and (d) developing the institutional and legal structure needed for tapping renewable resources in a rational fashion.

[14] GU0064 Management and conservation of renewable natural resources in the upper Chixoy River valley (1991); VE0063 Watershed conservation and management program (1992); HO0035 Program for management of the renewable natural resources in the watershed of the El Cajón reservoir (1993); BR0073 Guaíba watershed environmental management program (1993).

(IDB-8). IDB-8 identifies the environment as one of the four priority areas for the Bank's operations, either through the direct financing of projects to protect the environment and strengthen natural resource management, or through building environmental components into loan operations. In relation to the water sector, the Bank proposed to *develop and implement guidelines on water resources management which support an integrated approach to watershed management based on consideration of all sources and uses of water in a particular river basin* (IDB, 1994; IDB, 1998a).

1.17 The report on *Guidelines for the preparation of watershed management projects* (Basterrechea et al., 1996), approved in 1996, is the key reference in relation to water resources management at the Bank.[15] This was the first Bank document to incorporate the concept of integrated watershed management, which it defines as the *process of formulating, implementing, and evaluating structured sets of actions and measures aimed at controlling environmental degradation processes, and exploiting natural resources for productive purposes*. The document describes the Bank's experience in watershed management projects, and defines conceptual foundations for management, guidelines for project preparation, and a series of indicators for evaluating watershed management projects in accordance with the state of the art as documented in the literature up to 1996. The indicators included in this document relate both to the achievement of outputs (indicators of physical and financial execution or institutional development) and to outcomes (socioeconomic and sustainability indicators).[16]

1.18 One year later, in 1997, the Bank published *Freshwater ecosystem conservation: Towards a comprehensive water resources management strategy*, which analyses the benefits and functions of freshwater ecosystems in LAC, as well as their current status and critical problems and priorities in their management. The document also describes the concept of sustainable water resources management and constraints on its implementation, and concludes with three case studies (the Network of Private Nature Reserves in Colombia, Restoring Mississippi River wetlands, and Hidrovía: The Paraguay-Paraná waterway). The study concluded that developing a sustainable water resources management policy for the Bank should be based on three leading principles: (i) a holistic, ecosystem-based approach is required in order to ensure the long-term sustainability of the region's ecosystems;

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[15] See Annex H for a summary of the document.

[16] The proposed indicators are as follows: Indicators of physical and financial execution (number of beneficiaries added to the project each year, number of contracts approved); indicators of beneficiary response (number of seedlings obtained and planted, type and sequencing of crops, frequency of maintenance operations vs. repair and replacement operations per unit of time); indicators of institutional development (number of farmers trained in conservationist practices of resource management, number of grassroots organizations promoted by the project); economic and social indicators (changes in land value, percentage of income reinvested in improvements for the farm and family group); sustainability indicators (proportion of agricultural areas in relation to reforested areas, changing the flow of sediments in suspension); and others.

(ii) freshwater resource management should be part of a comprehensive approach to long-term planning and monitoring for the sustainable use of natural resources, including ecological, economic, and social aspects; and (iii) a new balance is required between the growing tendency toward privatization and globalization of the economy and the role of both civil society and the State in preventing the degradation of water resources.

1.19 The IWM concept is taken up again in *Strategy for integrated water resources management* (ENV-125), approved in 1998.[17] The strategy's main goal is to support water resources conservation through a process of change regarding water resources issues; namely, a shift from development to management and from a sectoral to an integrated approach. It is also sensitive to other goals that individual countries may have regarding water resources management, such as strengthening regional trade, reaching agreements on the use of transboundary water resources, and strengthening subregional links among groups of countries, among others. These goals also highlight the importance of a supranational, integrative approach, an area where the Bank also has comparative advantages.

1.20 From strategy approval in 1998 to December 2010, the Bank approved 15 loans for watershed management; and it also produced various studies and reports on the conservation, use and regulation of water resources.[18] These include a study by Van Hofwegen et al. (2000), commissioned by the Bank's Environment Division, which highlights the importance of evaluating institutional frameworks for IWM (the capacity development concept, the intervention process, capacity development models, human resource development and training, etc.), and provides guidelines for doing so. Watershed management institutions in LAC countries have generally been part of sector ministries, which makes managing integrated and crosscutting (social, environmental, economic) projects more difficult. Moreover, the fact that natural resource management processes extend beyond political terms of office often impedes the continuity of programs when different governments have divergent priorities.

1.21 In 2006, the Bank's Environment and Safeguards Compliance Policy was approved, as part of implementation of its Environment Strategy (document

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[17] The strategy defines IWRM as involving activities or projects aimed at increasing the conservation of water and the efficiency in its use and increasing complementarity or decreasing conflicts between competing uses, both in quantity and in quality, in a given subsector, or between subsectors.

[18] "Prácticas recomendables para la elaboración de leyes y regulaciones relacionadas con el recurso hídrico" [Recommended practices for drafting laws and regulations on water resources] (1998), "Gestión de los recursos costeros y marinos en América Latina y el Caribe" [Coastal and marine resource management in Latin America and the Caribbean] (1998), "Uncertainty in the economic appraisal of water quality improvement investments" (2000), "Water and poverty: Report on the progress of the Latin America and Caribbean Regional Initiative" (2003), "Aspectos de la estrategia de agua en Latinoamérica y el Caribe: Agenda para la acción" [Aspects of the water strategy in Latin America and the Caribbean: Agenda for action] (2003), "Financial structuring of infrastructure projects in public-private partnerships: An application to water projects (2006), "Water resources: Support from the Inter-American Development Bank Group 1990-2005" (2006), "Water and sanitation initiative" (2007), and others.

GN-2208-4) in 2003. Although the Environment Strategy indentifies watershed management and water resources as sectors for special attention, it provides no new guidelines on methodologies, criteria, and proposals for the sector. Nor does the policy include elements of this type, although it proposes financing investments to improve water resources management, based on the strategic priorities agreed upon with the borrowing member country, and the management of international watersheds, under the directives for "supporting environmental and natural resources management operations" and "supporting regional initiatives and international agreements."

1.22 More recently, in 2010, in the framework of the Cancún Declaration, the Bank made priorities of addressing sustainable energy and climate change issues, and promoting regional integration. Although the declaration does not make specific reference to integrated watershed management, the Bank has been working since mid-2010 to create a multisector team within its internal structure to address the integrated management challenges of such projects and facilitate the integration of different sector specialists in a single working group.

II. THE BANK'S ACTION IN WATERSHED MANAGEMENT

2.1 The "watershed management" category does not coincide with any sector or subsector defined by the Bank for classification of its operations. However, the document *Water resources: Support from the Inter-American Development Bank Group 1990-2005* (IDB, 2006) does include it among the five categories in which water-sector projects are classified.[19] The present analysis was based on an initial list of the approved (active or completed) loan projects for watershed management included in *Guidelines for the preparation of watershed management projects* (Basterrechea et al., 1996) and *Water Resources: Support from the Inter-American Development Bank Group 1990-2005* (IDB, 2006). This list was augmented by seven loan operations approved since 2005, which include components and activities targeting watershed management.[20] In addition, 52 technical-cooperation operations (TCs) on IWM approved during the evaluation period were also analyzed.

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[19] The document *Water resources: Support from the Inter-American Development Bank Group 1990-2005* (IDB, 2006) classifies the Bank's projects in the water sector in five categories: (i) infrastructure; (ii) modernization; (iii) planning; (iv) watershed management; and (v) urban drainage. The watershed management category includes both direct interventions in the field (soil conservation projects, protection of water resources, reduction in the use of agrochemicals, biological pest control, etc.) and operations involving structural changes and institutional and technical capacity changes in national, binational, and trinational watersheds (creation or strengthening of watershed committees, commissions, and councils, aspects of environmental education, etc.).

[20] Only operations exclusively targeting watershed management are considered; those related to specifically to natural disasters, water and sanitation, or other issues are excluded.

A. Operations approved

2.2 During the evaluation period (1989-2010), the Bank approved 27 loans for watershed management totaling US$1,149,227,000, with projects in the following sectors: agriculture and rural development, environment and natural disasters, and sanitation,[21] and disbursed 70% (US$801,759,230). The watershed management portfolio had a high rate of cancelations, totaling around 16% (US$184,262,975).[22] In Venezuela and Guatemala, 61% and 56% of the initial amounts approved were cancelled, respectively; whereas in Brazil, El Salvador, and Ecuador, the corresponding cancelation rates were 38%, 29%, and 25%. These high rates generally reflect problems of counterpart financing and uncertainty over resource availability. The cancelation reports also cite lack of institutional commitment, shifts in political and budgetary priorities of the governments that caused delays in fulfilling the conditions precedent, and changes in execution units as the main reasons for project cancelations. Of the 27 loan operations approved, one was canceled completely, 11 are currently active, and 15 are fully disbursed (see Annex A).

2.3 In addition, 52 TCs for watershed management were approved during the evaluation period[23] for a total amount of US$35,063,599, of which 44.53% has been disbursed (US$15,612,769) and 5.29% has been cancelled. Of these 52 TCs, 19 are currently active, two have been cancelled completely, and 31 are fully disbursed (see Annex B).

2.4 Annex C presents the project fact sheets of the loans approved during the evaluation period, providing information on the technical features of each operation, the diagnostic and justification, objectives, components, actions, and their classification according to the Bank's guidelines,[24] as well as indicators and outcomes for completed projects that have information available.[25]

B. Temporal and regional distribution

2.5 The loans approved during in 1989-2010 were unevenly distributed throughout the period. Approvals totaled over US$200 million in 1993, 1997, and 2007, but levels in the rest of the period were no higher than US$83 million. The average annual amount approved was US$52.2 million, with an average of 1.2 projects approved per year.

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[21] This represents 0.79% of the investment operations approved by the Bank in 1989-2010 (2,013 operations totaling US$146,174,571,153).

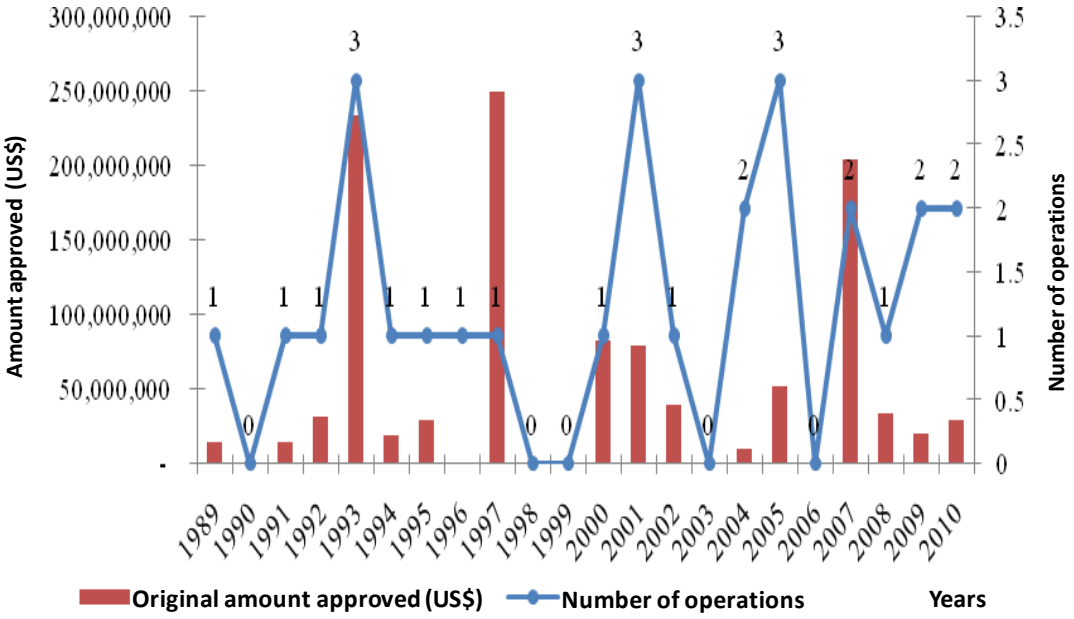
[22] The total portfolio of the environment and natural disasters sector approved in the period 1989-2010 (119 loan operations), accounting for 19 of the 27 watershed management projects analyzed in this sector note, had a cancellation rate of 4%.

[23] Only TCs for over US$150,000 were included.

[24] Basterrechea et al., 1996. *Guidelines for the preparation of watershed management projects*.

[25] The information available on the outcomes of technical cooperation operations approved in the area o watershed management does not permit analysis of their impact on the portfolio.

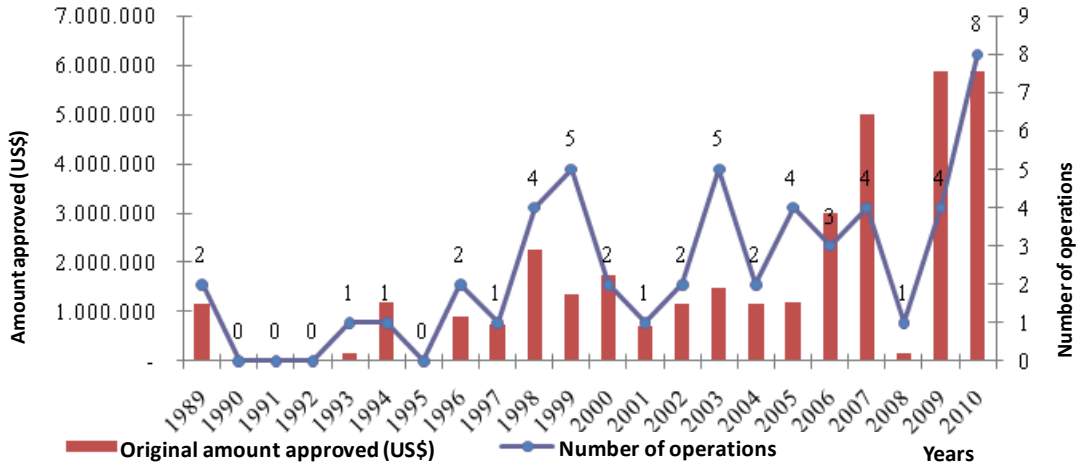
Figure 1. Temporal distribution of IWM loans, 1989-2010



Source: OVE, 2011.

2.6 In the case of TCs, the number of operations approved has trended slightly upwards since 1998. The average amount approved per year is US$1,389,662, with a significant increase in 2007, 2009, and 2010, when there were approvals of over US$5 million. During the evaluation period, an annual average of 2.4 TCs were approved for an average amount of US$674,299.98.

Figure 2. Temporal distribution of IWM TCs, 1989-2010



Source: OVE, 2011.

2.7 Loans for IWM have also been unevenly distributed across the different regions.[26] Of the total amount approved, 40.56% is concentrated in Southern Cone countries, specifically Argentina and Brazil. The countries of the Andean Group (CAN) received a similar amount of the total investment in loans (39.24%), but a larger number of operations (13), shared among all countries of the region. The CID countries accounted for the rest of the investment (20.21%), with smaller-sized operations. No loan was approved for the Caribbean countries (CCB) or at the regional level (REG). The latter is surprising given the strongly regional (or at least binational or trinational) nature of the problems of watershed management in the region.[27] Nonetheless, the Bank targets countries where the most important watersheds are located (those with greatest flow and the longest), namely Brazil, Peru, Argentina, whereas the Caribbean area has various watersheds but they are shorter than 300 km or have a smaller flow.[28] In terms of the distribution of loans by country, Argentina, Brazil, and Peru account for 62.31% of the total amount and 33% of the total number of operations approved during the evaluation period (see Annex D). The country receiving the largest number of loans is Peru, with five operations approved since 2007.

Table 1. Distribution of IWM loans by region, 1989-2010

Region	Number of operations	Total by region (US$)	%
CAN	13	450,900,000.00	39.24%
CCB	0	0.00	0.00%
CID	10	232,250,000.00	20.21%
CSC	4	466,077,000.00	40.56%
REG	0	0.00	0.00%
TOTAL	**27**	**1,149,227,000.00**	**100.00%**

Source: OVE, 2011.

2.8 In the TC category, both the number of operations and the amounts invested are distributed more evenly across the different regions. The CID region accounts for the largest number operations (16) and amount approved (24.96%). After this, the CAN and CSC regions account for 22.62% and 20.51% of the investment, respectively. Lastly, the Caribbean countries and regional operations each account for less than 20% of the total (17.54% and 14.36%, respectively). The countries

[26] The regions are: CSC (Southern Cone: Argentina, Brazil, Chile, Paraguay, and Uruguay); CAN (Andean Group: Bolivia, Colombia, Ecuador, Peru, and Venezuela), CCB (Caribbean: Bahamas, Barbados, Guyana, Haiti, Jamaica, Suriname, and Trinidad and Tobago); and CID (Central America: (Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua), Belize, Dominican Republic, Mexico, and Panama.

[27] 75% of surface water resources exist in watersheds shared by several countries.

[28] Of the 19 main watersheds in LAC, none is located in the Caribbean zone; seven are in Central America; and the rest are in South America, particularly Brazil.

with the highest amount in TCs are Peru (14.6%, eight operations), Haiti (14.4%, five), and Brazil (11.4%, five) (see Annex D).

Table 1. Distribution of IWM TCs by region 1989-2010

Region	Number of operations	Total by region (US$)	%
CAN	14	7,933,000.00	22.62%
CCB	5	5,036,364.00	14.36%
CID	16	8,753,235.00	24.96%
CSC	9	7,191,000.00	20.51%
REG	8	6,150,000.00	17.54%
TOTAL	**52**	**35,063,599.00**	**100%**

Source: OVE, 2011.

C. Objectives of the operations

2.9 Loans approved in the watershed category can be classified in three main groups according to the general objective described in their respective loan documents (see Annex E):[29] (i) management and conservation of natural resources; (ii) improvement of the population's quality of life; and (iii) institutional reforms.

2.10 The generic objective of "management and conservation of natural resources" accounts for 52% of all loans (14 operations) and 66% of the total amount approved (US$1.03 million). All IWM loans approved in the 1990s have this objective, as do four operations approved in the first few years of the new millennium and one in 2010. These are mainly operations in watersheds associated with hydroelectric power generation projects (in the Paute, Sixoy, Cajón, and Misicuni rivers), where water resource management is a basic prerequisite for the proper functioning of the power plants.

2.11 The group of operations under the objective of "improvement of the population's quality of life" through rational use of natural resources or actions that foster sustainable development of the target area comprises five loans (18% of the total number) for US$194 million (12% of the total amount), all approved during the first half of the decade of 2000, except for the Guaíba watershed environmental management program (1993). That program took a more integrated view of the watershed with a focus on sustainable development, with components relating to the management of protected areas, soil conservation, industrial and domestic pollution, environmental education, and institutionalization. However, this type of program was not replicated in subsequent years, and partial action on a sector basis continued.

[29] Only one of the projects (BO-L1021) falls outside this classification, since its main objective is to improve agricultural income (increase agricultural income for rural households by expanding the area of farm land under irrigation and improving efficiency in the use and distribution of water for agricultural purposes).

2.12 Lastly, seven loans (26%) were approved with the general objective of "institutional reforms" and strengthening of resource management with government and community participation, for a total of US$322.4 million (20%), mainly in the last few years of the evaluation period (from 2005 to 2010), except for one approved in 2001. The last four loans approved during this period have been policy-based loans (PBLs) in Peru. These loans include components to support national water resource policy reforms, reforms in the institutional framework of country management and information systems, changes in regulatory frameworks for operation and maintenance, quality standards, and support to the decentralization process for the preparation and implementation of water resource management plans.

D. Analysis by components according to Bank guidelines

2.13 The document *Guidelines for the preparation of watershed management projects,* approved by the Bank in 1996, classifies watershed management actions in two broad categories: direct actions and indirect or supporting actions.[30] Direct actions are subdivided between management (preservation, recovery, and protection), and conservation. Indirect or supporting actions encompass institutional, financial, and evaluation and supervision, and other aspects:[31]

I. Direct actions

a. *Preservation, recovery, and protection*

i. Creation of protected areas

ii. Actions to control concentrated erosion processes (e.g. construction of small-scale levies)

iii. Reforestation and live barriers

iv. Torrent and flood control (e.g. construction of transverse and longitudinal levies in diversion channels)

v. Practices for the rehabilitation of degraded areas

b. *Rational use and exploitation*

i. Soil conservation (e.g. management and improvement of grazing land, agroforestry, management and exploitation actions, control of pollution by agrotoxins)

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[30] According to the document, direct actions aim to maintain the natural resource base, physically altering the watershed and its temporal and spatial resource endowment. Indirect or supporting actions are considered necessary for the execution of direct actions, and include institutional, legal, and financial aspects that support technical aspects.

[31] The category of "administrative actions" was added for this evaluation, and includes finance charges (interest, credit fee), administrative expenditures (per diems, contingencies), and other costs related to project management and administrative implementation.

ii. Forestry management and vegetation (e.g. reforestation, management of protection forests, exploitation of productive forests)

iii. Pollution prevention and control (e.g. sanitation, water treatment, dredging)

II. Indirect or supporting actions

i. Institutional aspects

ii. Financial aspects

iii. Legal aspects

iv. Monitoring and evaluation

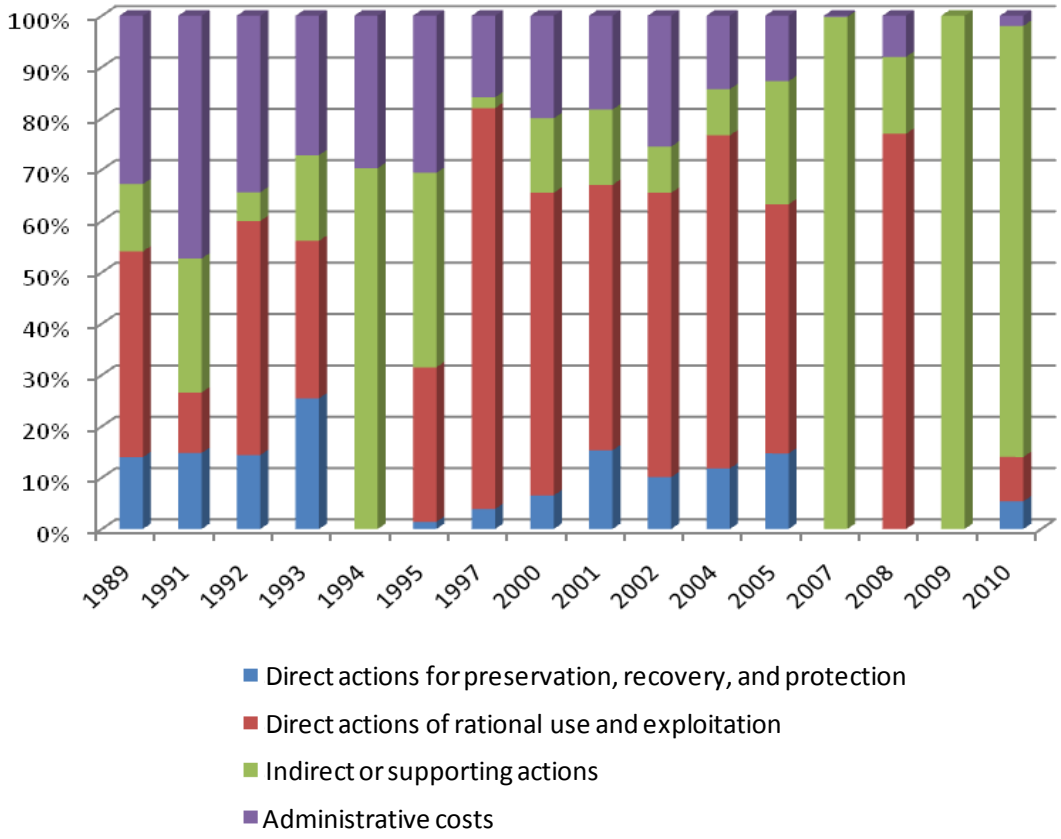
v. Environmental education

2.14 Figure 3 shows the distribution of costs by type of action and year, as indicated in the design documents for watershed management projects approved during the evaluation period. In total, 48% of the proceeds of the Bank's lending in 1989-2010 was originally intended for direct actions on rational use and exploitation of resources, 26% for indirect or supporting actions (principally institutional aspects), and 9% for direct actions on preservation, recovery, and protection. The projects also allotted a high percentage of resources (the remaining 17%) for administrative costs.[32] Direct actions of preservation, recovery, and protection were concentrated in the initial years of the evaluation period, with a brief upturn in the first few years of the new millennium. From 1997 onward, direct actions of rational use and exploitation began to dominate the IWM project portfolio, and this remains the case today, although in the last few years 100% of approvals have been for operations focused on institutional issues.[33] The recent reduction in administrative costs reflects the approval of PBLs over the last few years, and the features of this type of instrument.

[32] For the analysis by project, see Annex F.

[33] This targeting in PBL programs could be related to a new Bank strategy for integrated watershed management, working with institutions that possess greater expertise in water resource management.

Figure 3. Distribution of amounts approved for IWM actions, according to the Bank's guidelines, %, 1989-2010



Source: OVE, 2011.

E. Evaluability of operations

2.15 The ex ante evaluability of the watershed management operations is low. Of the 27 loans approved during the analysis period, nine lacked outcome indicators. In these nine projects, which were approved during the first phase of the evaluation period (1989-1996), indicators were to be defined during program execution, either by external consultants, or by monitoring and evaluation units, or by the execution unit itself. However, the corresponding project completion reports (PCRs) do not describe or evaluate them. Since 1997, all loans have presented a logical framework matrix, specifying the outcome indicators for each program, although most of these are output indicators.[34] In other cases, the indicators do not have a baseline or are not quantifiable, which makes it difficult to evaluate them and perform an ex post analysis of the impact of programs approved by the Bank in the sector.

[34] For example, indicators such as the participatory creation of a regulatory framework and plans for forestry management and protected areas (HO0179), elimination of the five largest garbage dumps in the watershed (AR0136), and others.

2.16 There are also weaknesses in monitoring and supervision. Some of the project performance monitoring reports (PPMRs) for active projects have different outcome indicators than those proposed in the logical framework matrix of the loan documents, in some cases because the original definition in the logical framework was insufficient or incomplete. For example, the environmental management program for the Matanza-Riachuelo river basin (loan AR0136) defined five indicators in the loan document: (i) ongoing and functioning basin committee; (ii) reduction in discharges in 65 individual plants and 1,000 smaller industries; (iii) reduction in number of floods and reduction in property damage; (iv) five of the basin's largest dump sites are eliminated; and (v) eight new public spaces are developed and utilized. Some of these indicators are really output indicators, not outcome indicators. Moreover, the most recent PPMR available (June 2009) relied on "the human development index (HDI) rises in the beneficiary areas" as the only outcome indicator, to be evaluated at the end of the project (2015).This does not coincide with any of the indicators proposed at the time of project design, and is difficult to attribute to the program.

2.17 Similarly, the outcome indicators reported in several PCRs present inconsistencies in outcome indicators, compared with the loan documents. In other cases, although provision is made for the monitoring of indicators, they are not measured. Thus, for example, in project BO0028 for institutional strengthening and development of an environmental strategy, the loan document proposes that the follow-up and evaluation committee created by the program should design outcome indicators during the first phase of the project. The PCR states that it was difficult to monitor the impacts achieved over the roughly 10 years of program execution owing to a lack of a systematic mechanism for monitoring and evaluation, compounded by turnover among the Bank's supervisory staff.

III. GUAÍBA WATERSHED ENVIRONMENTAL MANAGEMENT PROGRAM

3.1 The Guaíba watershed environmental management program, approved in 1993 in the state of Rio Grande do Sul, Brazil, is the only example of an integrated approach to watershed management in the portfolio of projects approved by the IDB during the evaluation period.[35] This chapter describes the program, its background, and other operations related to the watershed. It also presents the study's findings and the conclusions of its analysis of water quality and watershed management. OVE had originally intended to conduct an ex post evaluation of the program. That was ruled out after data compilation, the field visit, and interviews with various program stakeholders and watershed management experts in the

[35] Although the Program for Integral Management of the Caroní River Watershed (VE-L1006), approved in 2005, does consider integrated watershed management factors in its design, it is less than 10% disbursed due to institutional problems that have caused delays and jeopardized execution. The Guaíba River Project was therefore considered more suitable, not only for its design, which included a hydrogeological model to assess the program's impact on water quality, but for the fact that it had been completed within the study analysis period.

country. The main reason was that the predictive model on which the prioritization of activities and their location would theoretically be based was defined in the long term (2025), and the program had only executed the first phase. Furthermore, the activities ultimately executed were unrelated to the prioritization of the model, and the prior data on program outcomes clearly showed that the activities had a low impact. Lastly, the costs of the ex post evaluation exceeded the study's original budget, due mainly to the reformulation of a hydrogeological model to calculate the impact of the activities ultimately executed. The main findings of this program are presented below.

A. Program background

3.2 The Guaíba river basin is the largest watershed in the State of Rio Grande do Sul, covering 85,950 square kilometers, or over 30% of the state's total area. Over 70% of the state's total population of six million were living in the watershed area when the program was implemented, and the state's most important productive activities were found there: iron and steel, cement, pulp and paper, leather industries; agricultural activities; production and processing of coal and petroleum; and power generation. The main environmental problems detected in the diagnostic study were deforestation and soil depletion, accompanied by intensive agriculture concentrated in the northwestern and central region of the basin; the lack of a consolidated and representative system of protected areas to guarantee preservation of the basin's biodiversity; and residential and industrial pollution produced by urban concentration in the metropolitan region of Porto Alegre.

3.3 In the late 1980s, an ecological movement emerged in Porto Alegre that was opposed to the problems of pollution caused by agrotoxins and chemical companies producing pulp in the Guaíba river basin since the 1970s. Various institutions (the Municipal Department of Water and Sewerage (DMAE), municipal governments, etc.) and civil associations reported health and environmental problems that alerted the state government. In 1989, the government of Porto Alegre introduced the *Guaíba Vive* [Guaíba Lives] program targeting waste management in the Porto Alegre area, where the Bank financed part of its activities. Before then, the Bank had worked on watershed management in other countries of the region, concentrating essentially on hydroelectric power projects. The Guaíba program, however, sought to expand the concept of watershed management beyond the energy sector. Based on *Guaíba Vive*, the Bank began to prepare an environmental cleanup program for the Guaíba river basin. Initially, the project was structured with two components: sanitation and urban solid waste treatment, targeting the metropolitan region of Porto Alegre. In the early 1990s, the project was reformulated to prioritize not only the metropolitan region but also other sources of pollution in the river (agricultural, industrial), and to address institutional issues. Thus, sanitation and waste treatment actions were supplemented by others relating to industrial pollution, the management of agricultural areas, the recovery of parks and forests, and institutional and monitoring aspects.

3.4 Various problems arose between the identification of the project, its final approval in 1993, and the activities and works ultimately executed. These related mainly to political changes and the budget constraints of each município involved, which limited the ability to conduct the priority activities of the hydrological model developed. In addition, there were three institutions monitoring and evaluating water quality in the Guaíba River (DMAE, FEMAC, and the Rio Grande Sanitation Company (CORSAN)), using different methodologies. This situation posed a challenge for the program, to unify methodologies and data, and to achieve transparency in processes and in the information obtained.

B. The program

3.5 The Bank approved the Guaíba watershed environmental management program I (loan BR0073) in 1993, for US$220.5 million (US$132.3 million from the Bank and the rest in local counterpart funding). The program was proposed as a first stage to finance priority works and conduct the studies necessary for subsequent phases. To achieve the ultimate objectives of integrated watershed management, the program projected an investment of US$1 billion over 20 years. The design of the first stage included long-term planning for the subsequent phases, in which a hydrographic plan would be defined, and activities prioritized. The general objective of loan BR0073, was to "improve the environmental quality of the Guaíba River watershed by reducing rural and urban pollution and preserving its natural resources." Five specific objectives were set: (i) monitor and reduce urban pollution from residential and industrial sources; (ii) introduce soil conservation practices and improve the management of toxic agricultural chemicals in priority microwatersheds; (iii) support consolidation of the system of conservation units; (iv) support the setting up of formal and nonformal programs for raising awareness of, and education on, environmental issues; and (v) strengthen the environmental management capacity of the state institutions. The program was structured in five components: (i) prevention and control of industrial and residential pollution; (ii) soil conservation and control of toxic farm chemicals; (iii) consolidation of parks and conservation units; (vi) environmental education and raising of public awareness; and (v) institutional management and strengthening.

3.6 The actions proposed in the first phase of the program (see Annex G) were to be prioritized on the basis of the bidimensional model produced in the preparatory phase of the program.[36] Given the multiplicity of institutions acting in the watershed and the heterogeneous nature of the activities proposed, the predictive model was used as a tool to resolve conflicts between competing interests and to prioritize the activities objectively. Nonetheless, the prioritization was ultimately based mainly on the prior existence of identified projects for which there was no budget. Most actions were concentrated in the urban area of Porto Alegre.

[36] The water quality prediction model was developed in the context of the Porto Alegre Sanitary Sewerage Master Plan. One of the aims was to forecast the conditions that would exist (measured through the fecal coliform indicator) in the conditions with or without the projects in the long term (2025), taking account of the first stage of the program and the complete program.

3.7 In 2008, the Bank approved loan BR-L1081, the integrated socioenvironmental program for Porto Alegre, for US$83.27 million (currently 5% disbursed), which is considered the second stage of the Guaíba watershed management program. The program's objective is to improve the quality of life of the population of Porto Alegre, and its general purpose, to restore urban environmental conditions. The program's main component (US$82.6 million) aims to improve the water quality in Lake Guaíba and the Cavalhada River through the construction of collectors and interceptors for sewage treatment and final disposal. The program also includes actions to develop urban infrastructure, improve environmental management, and promote efficient municipal water, sanitation, and storm drainage services.

3.8 The loan document for program BR-L1081 drew on lessons learned from the Guaíba I program and describes how these were implemented in the newly approved operation. They include:

a. Water and sanitation improvement projects for urban streams should include the installation of public-use areas and scenic restoration of the urban environment, *to foster community participation sustainability efforts* (in the new operation, public-use facilities, roads, parks, and recreation areas are included in the drainage projects);

b. *Detailed designs, or alternatively, advanced basic designs*, are needed in order to avoid problems at the bidding stage and during project execution, and to streamline costs and execution time (in the new operation, the Bank requires final designs and plans for environmental mitigation to cover at least the works to be executed in the first year of the program);

c. *Environmental and sanitation educational activities* should be included in the works execution, so as to encourage citizen participation and cooperation in accepting the tariffs and fees that will finance the operations. These activities will also promote proper use of public areas in parks and green spaces constructed under the program (in the new operation, it was agreed with the executing agency to conduct an ongoing program awareness and promotional campaign that includes an environmental education component);

d. *Interagency participation and coordination* of the local entities in the program should be fully delineated. This is an especially important lesson for this program because of the number of participating entities (the new operation includes as a condition precedent to the first disbursement that the cooperation agreements are to be signed with the subexecuting agencies).

C. Results

3.9 Although the program was approved in 1993, the debt problems of the State of Rio Grande do Sul and political changes meant that it only became eligible for disbursement three years later. Its last disbursement was made in 2003, and not all the priority activities were implemented, so the expected impact was not achieved. One of first considerations to be taken into account is that the predictive model, on

which the prioritization of activities and their location would theoretically be based, was defined in the long term (2025) for implementation of the entire program (not just the first stage). According to the PCR, completed in 2003, although the indicator of progress during project execution was rated "satisfactory," and the attainment of development objectives was rated "very probable," a number of problems arose during program execution. Firstly, there were activity execution difficulties arising from design problems (the design was based on the prediction model, but lacked preinvestment technical and feasibility studies for works, the identified works were not ready for execution and lacked the necessary financing and political consensus), implementation delays and cost overruns, weakness of the executing agency, etc.

3.10 The **component for prevention and control of industrial and residential pollution**, which included the collection and treatment of residential wastewater, was incomplete (47,799 connections not made), owing to problems in connecting the beneficiary communities to the sewer network. Some 409,000 inhabitants of the cities of Cachoerinha, Gravatai, and Porto Alegre were benefitted. Industrial pollution controls were implemented in 32,400 industries, resulting in a 90% reduction in the organic load generated, thus exceeding the original 50% reduction target, although this estimate is based only on the analysis of a few specific firms. With regard to the environmental monitoring network, 90 sampling points were implemented in Lake Guaíba and in the Gravatai, Sinos, Cai, and Taquari-Antas rivers, together with 369 underground water sampling bore holes, and the installation of 19 rainfall stations and 26 pluvio-pluviometric stations, and an air quality measurement system. Nonetheless, delays in equipment procurement hindered completion of the program's activities.

3.11 The component on **soil conservation and control of toxic farm chemicals** encountered the most problems in implementation, owing to a lack of incentives for producers to participate in the program; the complexity of its implementation mechanism; other programs being executed at the same time, thus overloading the executing agencies; and local cultural issues, among other reasons. The targets were partially achieved. Although actions were implemented in more municípios than originally intended, fewer properties were covered and the indicators for attainment of the component objectives (correction of soil acidity, reforestation, etc.) were not met. None of the activities, studies, or works envisaged for the component on **consolidation of parks and conservation units** was fully completed. In the program's component on **environmental education and raising of public awareness**, a pilot plan was implemented for nine environmental education centers; 980 teachers were trained (750 originally envisaged) with suitable materials and training. Nearly 11,000 students and 1,000 community and NGO representatives are expected to benefit. With the **institutional management and strengthening** component, computer hardware and software were purchased, but modeling and mapping activities were not conducted. The contracting of basic studies and institutionalization of the watershed master plan remained pending. These were

ultimately completed with a local budget, despite being one of the program's objectives.

3.12 Lastly, the analysis of project cost and financing identifies final costs that are well above those originally envisaged, in the case of program management and administration (US$11,771,000 compared to US$2,208,000), and also in financial expenses (US$23,218,000 compared to US$19,102,000). Nonetheless, the total cost of the program did not vary, and the amounts allotted to each component were redistributed, reducing in particular those allocated to the environmental monitoring network, control of industrial pollution, geographic information system, environmental education, preparation of the Guaíba watershed master plan, and land purchase, among others. In general, the delays in works execution were partly the result of incomplete projects, which meant that these had to be developed in greater detail during the period intended for execution. In addition, the complexity of certain works implementation processes (sanitation, soil conservation actions, etc.) discouraged the population from participating in the program.

3.13 According to the stakeholders interviewed, the program's main successes were the institutional arrangements achieved among the various actors, particularly in monitoring water quality in the Guaíba river. Thus, the three institutions involved in monitoring (DMAE, CORSAN, and the State Environmental Protection Foundation (FEPAM)) defined a common methodology for the monitoring process, although they did not succeed in creating an integrated network. The Bank contributed significant value-added in defining this new methodology, and in coordinating the initial meetings between the various institutions. The innovative aspect of the program also needs to be highlighted, both for the Bank and for the country, in terms of integrating environmental, social, and economic dimensions in watershed management. The use of a predictive model to control long-term water quality and prioritization of program activities represented value-added to the project, although the model was not fully implemented owing to political interests concerning the prioritization of activities (mainly in Porto Alegre) and the lack of program monitoring. The creation of watershed committees and environmental education programs for the population were, without doubt, one of the program's most important achievements. Nonetheless, this type of activity needs to be continued to maintain public awareness of the environmental problems of the watershed and the importance of participation in the activities proposed.

3.14 One of the program's main problems was long-term financial sustainability. The difficulties caused by the indebtedness of the State of Rio Grande do Sul and the município of Porto Alegre, compounded by political divergences during the program execution period, caused significant delays in activities and a lack of ownership of the project, which stalled once the first stage was complete. Another constraint was the lack of strategic vision. Although an attempt was made to define an integrated program, no analysis was performed on the causes of pollution in the watershed; work was done in very specific zones, with no long-term vision linking activities and thus allowing for a greater impact on water quality.

3.15 The PCR warns of the difficulty of documenting and demonstrating the level of achievement of some of the program's main objectives, such as creation of conditions for rational use of the natural resources of the Guaíba watershed, restoration of environmental quality, or improvement in the quality of life of people living in the watershed area. Thus, lack of data and failure to define suitable indicators to measure the impact of the program's objectives, hindered their analysis.

IV. CONCLUSIONS

4.1 The Bank approved the *Guidelines for the preparation of watershed management projects* in 1996 (in this report, the "guidelines document"),[37] based on work being done by the former Environment Division of the Bank's Social Programs and Sustainable Development Department, in order to standardize the features of the integrated watershed management projects approved by the Bank. Since then, although the Bank has published several documents on water resource management,[38] these guidelines have not been updated to keep pace with advances and new proposals at the international level, nor the Bank's own experience in the design, implementation, and evaluation of water management projects, as the 1996 document suggested.[39]

4.2 The lack of a clear definition of "integrated water resource management" has made it difficult to classify projects in this subsector. Falling within this "category"—established in the document, *Water resources: Support from the Inter-American Development Bank Group 1990-2005* (IDB, 2006)—are projects that had the watershed as the physical boundary for their activities, yet are not integrated projects but projects for sanitation, first and foremost, or agriculture, institutional reform, irrigation and drainage, etc. Moreover, the Bank's internal/sector structure would appear to have limitations for progress toward the consolidation of teams to

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[37] Prepared Manuel Basterrechea, Axel Dourojeanni, Luís E. García, Juan Novara, and Rómulo Rodríguez. An analysis of the document and the proposed guidelines can be found in Annex F.

[38] "Conservación de ecosistemas de agua dulce: hacia una estrategia de manejo integrado de recursos hídricos" [Conservation of freshwater ecosystems: Toward an integrated water resource management strategy] (1997), "Prácticas recomendables para la elaboración de leyes y regulaciones relacionadas con el recurso hídrico" [Recommended practices for drafting laws and regulations on water resources] (1998), "Gestión de los recursos costeros y marinos en América Latina y el Caribe" [Coastal and marine resource management in Latin America and the Caribbean] (1998), "Aspectos de la Estrategia de Agua en Latinoamérica y el Caribe: Agenda para la Acción" [Aspects of the water strategy in Latin America and the Caribbean: Agenda for action] (2003), "Water resources: Support from the Inter-American Development Bank Group 1990-2005" (2006), and others.

[39] The guidelines document stated that *approaches and experiences in this area* [water resource management] *are constantly changing and evolving. Therefore,* [the guidelines document] *should not be considered final, but a working document to be periodically enriched and updated with new contributions from both the Bank and the member countries*.

meet the specific needs and challenges of multisector project management, as is the case for integrated watershed management.

4.3 Only one project fit the definition of "integrated watershed management" (BR0073, Guaíba watershed environmental management program I), with components on environmental sanitation, protected area management, environmental education, institution-strengthening, and the strengthening of policies, decontamination, and management. Analysis of this project, however, confirms the difficulties of implementing crosscutting programs given the absence of an integrated strategy and the limitations on coordinating among sectors and building political and technical consensus to identify objectives and indicators. The program revealed problems in its design, as well as in the provision of financing and institutional commitment to its implementation. Only the component on prevention and control of industrial and residential pollution made progress on the planned activities, but failed to meet the targets set. The rest of the components encountered difficulties in execution, and the objectives of improving water quality in the watershed were not met.

4.4 In recent years the Bank has concentrated its support on the use of technical cooperation operations, in particular targeting institutional issues, the outcomes of which are not measurable. The loans approved are distributed irregularly over the analysis period, and their approach shifted from resource management and conservation in the early years toward financial support for actions to promote sustainable development and improve the population's quality of life, concluding the evaluation period with projects targeting institutional reforms through the use of PBLs. In general, the evaluability of the projects is low, the main limitation being the lack of effective outcome indicators. Outcome indicators are frequently defined in such a way that they refer to output indicators, and the final reports lack baselines, monitoring information, and reliable data. On the organizational front, the Bank is working to create a specialized watershed management group within the Water and Sanitation Division, in order to update the guidelines established in 1996 and identify new methodologies to meet the new challenges of project formulation in this sector. This technical note can be regarded as an input to that process.

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