
Water and Development

**An Evaluation of World Bank Support,
1997-2007**

Volume 2: Annexes

IEG

INDEPENDENT EVALUATION GROUP

Abbreviations and Acronyms

AAA	Analytical and advisory activities	OLS	Ordinary least squares
BNWPP	Bank-Netherlands Water Partnership Program	PAD	Project Appraisal Document
CAS	Country Assistance Strategy	PER	Public expenditure review
COM	Nile Basin Council of Ministers	PPAR	Project Performance Assessment Report
CRED	Center for Research on Environmental Decisions	PPIAF	Public-Private Infrastructure Advisory Facility
CWRAS	Country Water Resource Assistance Strategy	PRSP	Poverty Reduction Strategy Paper
DFID	Department for International Development (U.K.)	PSP	Private sector participation
DPL	Development Policy Loan/Lending	RBO	River basin organization
DSM	Demand-side management	SDN	Sustainable Development Network
EA	Environmental assessment	SIA	Social impact analysis
EFA	Environmental Flow Assessment	SMT	Social mobilization team
ERR	Economic rate of return	TDA	Transboundary Diagnostic Analysis
ESW	Economic and sector work	TEA	Transboundary Environmental Analysis
FAO	Food and Agricultural Organization of the United Nations	UfW	Unaccounted-for water
GDP	Gross domestic product	UN	United Nations
GEF	Global Environment Facility	UNDP	United Nations Development Program
GW	Gigawatt	UNICEF	United Nations Children's Fund
GW-MATE	Groundwater Management Advisory Team	WHO	World Health Organization
HD	Human Development	WPI	Water Poverty Index
HNP	Health, Nutrition, and Population	WQM	Water quality management
I&D	Irrigation and drainage	WRM	Water resources management
IBRD	International Bank for Reconstruction and Development	WSP	Water and Sanitation Program
ICR	Implementation Completion Report	WSS	Water supply, sanitation, and sewerage
ICWE	International Conference on Water and the Environment	WUA	Water user association
IDA	International Development Association	WWF	World Wildlife Fund for Nature
IEC	Information, education, and communication	WWT	Wastewater treatment
IEG	Independent Evaluation Group	WWTP	Wastewater treatment plant
IEGWB	Independent Evaluation Group (World Bank)		
IFC	International Finance Corporation		
IFPRI	International Food Policy Research Institute		
IMF	International Monetary Fund		
IPCC	Intergovernmental Panel on Climate Change		
IWRM	Integrated Water Resources Management		
MARPOL	International Convention for the Prevention of Pollution from Ships		
MCIPR	Mid-Cycle Implementation Progress Report		
MDG	Millennium Development Goal		
MNA	Middle East and North Africa		
MPA	Marine protected areas		
NBI	Nile Basin Initiative		
NGO	Nongovernmental organization		
O&M	Operation and maintenance		
OFDA	Office of Foreign Disaster Assistance		

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Annex A

Glossary

<i>Term</i>	<i>Definition</i>
Aquaculture	Farming with aquatic plants or animals, for example, fish farming, or algal cultures.
Aquatic weed	A plant dependent on an aquatic habitat, with either emergent, submerged, or floating leaves, which causes harm or is a nuisance to the natural environment or to people and their environment, that is, an undesirable aquatic plant, usually introduced and invasive.
Aquifers	Porous layers of sand, gravel, or bedrock able to store groundwater.
Basin	Drainage area of a stream, river, or lake.
Biological diversity	The variability within species, between species, and of ecosystems.
Borehole	A hole drilled vertically or at an inclination into the ground and usually fitted with a mechanical or motorized pump to draw water from the ground.
Catchment area	An area that receives or “catches” the rain that flows into a particular river.
Cost recovery	Fee structures that cover the cost of providing the service. Cost recovery is indicated by annual operating revenue as a percentage of annual operating costs.
Decentralization	A process of transferring responsibility, authority, and accountability for specific or broad management functions to lower levels within an organization, system, or program.
Deforestation	The permanent clearing of forestland for all agricultural uses and for settlements. It does not include other alterations, such as selective logging.
Demand-side management	Any attempt to encourage water users to reduce their water use. Pricing water at or near its true delivery cost can help to conserve water and encourage use of the resource commensurate with its scarcity. Another aspect of DSM is simply increasing the efficiency of current users (such as the promotion of water-efficient toilets).
Desertification	Land degradation processes occurring in dry sub-humid areas as a result of various factors, including climatic variations and human activities.
Drainage basin	Area having a common outlet for its surface runoff.
Drip irrigation	A method of irrigation when water is applied not to the land but to the plants in the root zone, in small but frequent quantities, in such a way as to maintain the most active part of the soil at a quasi-optimum moisture
Effluent	Liquid waste material that is a byproduct of human activities, such as liquid industrial discharge or sewage.
Environmental degradation	Depletion or destruction of potentially renewable resources such as soil, grassland, forest, or wildlife, by using it at a faster rate than it is naturally replenished.
Environmental flow assessment	The process of determining water that should purposefully be left in a river or released from an impoundment in order to maintain a river in desired condition.
Environmental flow requirements	The water that is deliberately left in the river or released from a reservoir for maintaining the structure and function of aquatic ecosystems downstream.
Environmental Impact Assessment	Critical appraisal of the likely ecological effects of a proposed project, activity, or policy, both positive and negative.
Eutrophication	Process of over-fertilization of a body of water by nutrients that produce more organic matter than the self-purification reactions can overcome.
Evapotranspiration	The loss of water to the atmosphere from an area as a result of a combination of evaporation from the soil and transpiration from plants.
Freshwater	Water containing less than 1 milligram per liter of dissolved solids of any type.
Groundwater recharge	Replenishment of groundwater supply in the zone of saturation, or addition of water to the groundwater storage by natural processes or artificial methods for subsequent withdrawal

**ANNEX A
GLOSSARY**

<i>Term</i>	<i>Definition</i>
	for beneficial use or to check saltwater intrusion in coastal areas.
Hydrology	Science dealing with the properties of water and its occurrence in space and time.
Hygiene education	An element of hygiene promotion concerned with teaching people about how diseases spread; for example, through the unsafe disposal of excreta or by not washing hands with soap after defecation. Although this type of awareness-raising may be part of a larger hygiene promotion program, it should not be the sole focus of the program.
Integrated Coastal Zone Management	A dynamic, multidisciplinary, and iterative process to promote sustainable management of coastal zones.
Integrated Water Resources Management	Land and water management activities as well as issues of quantity and quality need to be integrated within basins or watersheds, so that upstream and downstream linkages are recognized, and activities in one part of the river basin take into account their impact on other parts.
International watercourse	A river, stream, or canal that is shared by two or more countries.
Non-point-source	Source of pollution in which pollutants originate from over a wide area or from a number of small inputs rather than from distinct, identifiable sources.
Non-revenue water	The difference between water supplied and water sold expressed as a percentage of net water supplied. It represents the water that has been produced but is lost before it reaches the customer.
Point-source	A pollution source that is distinct and identifiable, for example, smokestacks and outflow pipes from industrial plants and municipal sewage treatment plants.
Pollution	The contamination of land, air, or water with any substance that reduces their ability to support life.
Private sector participation	A private company or investor bearing a share of the project's operating risk. Investors may range from private WSS utilities, to operators, to street vendors selling water.
Protected area	An area set aside by law for the preservation of given aspects of cultural and natural heritage.
Ramsar Convention	The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.
Reservoir	A large natural or artificial collection of water forming a small lake used as a source of water supply.
Riparian	Of or on a river bank; sharing a river basin.
Sanitation	Improvement of environmental conditions in households that affect human health by means of drainage and disposal of sewage and refuse.
Sedimentation	Deposition of river-borne sediments in a lake or dam.
Sewage	The liquid waste containing some solids produced by humans typically consisting of washing water, feces, urine, laundry waste, and other material that goes down drains and toilets from households and industry.
Sewerage	A system of sewer pipes, manholes, pumps, etc. for the transport of sewage.
Siltation	The deposition of sediments by water in a river channel or reservoir.
Soil degradation	Declining productivity of soils resulting from a combination of physical factors such as drought, management factors such as cultivation, and socioeconomic factors such as inequitable distribution of land.
Swamp	Area of waterlogged ground and the plants that grow on it.
Turbidity	The degree to which water is opaque or muddy.
Unaccounted-for water	The difference between the volume of water delivered to a supply system and the volume of water accounted for by legitimate consumption, whether metered or not.
Upstream	The direction opposite to the flow of a river, toward the source.

<i>Term</i>	<i>Definition</i>
Wastewater	Spent or used water from homes, communities, farms, or industries that contains dissolved or suspended matter.
Wastewater treatment plant	Process to render wastewater fit to meet applicable environmental standards or other quality norms for recycling or reuse.
Water resource management	WRM includes the development of surface and groundwater resources for urban, rural, agriculture, energy, mining, and industrial uses, as well as the protection of surface and groundwater sources, pollution control, watershed management, control of water weeds, and restoration of degraded ecosystems such as lakes and wetlands.
Water users association	An association of water users combining both governance and management functions (they are not the owners of the infrastructure).
Waterlogging	Natural flooding and over-irrigation that brings groundwater levels to the surface, displacing the air in the soil, with corresponding changes in soil processes and an accumulation of toxic substances that impede plant growth.
Watershed	An area from which all surface runoff flows through a common point.
Wetland	Land that has the water table at, near, or above the land surface.

Source: Human Development Reports: Glossary. Retrieved on October 9, 2009 from: <http://hdr.undp.org/en/humandev/glossary/>.

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Annex B

Methodology

This evaluation uses the IEG-World Bank (WB) objectives-based evaluation methodology, evaluating performance by measuring the Bank's progress toward its stated objectives. In a broad sense these objectives include the Bank's Mission Statement as well as the relevant strategies governing the water sector (see Annex C). In a more restricted sense, it concerns how well water-related projects attain project-level objectives. The evaluation draws heavily on completed and ongoing independent and self-evaluations, especially IEG Project Performance Assessment Reports (PPARs). The evaluation did not conduct a comprehensive review of the Bank's analytic and advisory activities (AAA). The Water Sector Board has conducted a self-evaluation of its economic and sector work in parallel with this evaluation. IEG did examine all available environmental flow assessments as part of its evaluation, and selected AAA was examined in individual issue and case study research.

Evaluative Methods and Instruments

The evaluation examined the Bank's experience from several angles. The basic approach taken was to avoid sampling by identifying a full universe of projects. Where the evaluation examined particular themes or activity types it used all the relevant projects in the analysis. The evaluation used the following instruments.

REVIEW OF THE PORTFOLIO

The evaluation conducted an issues-based portfolio review that started with identification of all projects from July 1, 1996 (the start of FY07), to December 31, 2007. IEG identified 1,864 projects approved or completed over the 11.5-year period (including the Global Environment Facility) with at least one water-related activity. The portfolio includes projects with Bank interventions involving water supply, sanitation, sewerage, coastal areas, rivers, floods and tropical storms, fisheries, water pollution, aquatic biodiversity, watersheds, irrigation and drainage, hydropower, drought and water scarcity, and groundwater. It also includes projects that affect water quality, watersheds, rivers, coastal waters, and water supply. Projects were retrieved from the Bank's Business Warehouse of project data using the following codes: AI (irrigation and drainage), TP (ports, waterways, and shipping), WD (flood protection), WA (sanitation), WS (sewerage), WC (water supply), WZ (general water, sanitation, and flood protection), 85 (water resources management). Projects with the following codes were also reviewed for inclusion: AZ (general agriculture, fishing and forestry), 52 (natural disaster management), 81 (climate change), and 84 (pollution management). Projects were added from the Water Anchor portfolio and previous IEG studies on Agricultural Water Management, Natural Disasters, an existing China case study, and Health. Projects on the GEF Web site were also reviewed and included as appropriate. Research for the individual issues added further projects through specific searches for relevant projects.

Project documents and files were also reviewed, as was the data collected for recent and ongoing IEG evaluations (see the Meta-evaluation section below for a list). Team members also

extracted relevant material from the Bank’s internal electronic resources, including the Business Warehouse, ImageBank, and the Web site for the Water Anchor, among others.

The amount of World Bank financing that has gone solely to water activities was calculated as follows.

The whole evaluation portfolio of 1,864 projects was sorted into four categories:

1. For projects totally focused on water, the actual loan amount was used.
2. In projects where at least half of the project objectives were focused on water, half the total loan amount was used.
3. Projects with water components for which project documents give a dollar value for the component, the actual amounts were used.
4. Projects with water components for which the actual water activity amounts were not found in documents or through the Bank’s BW database were calculated using the average component amount from #3 above for each relevant component.

The amounts for each of these categories are totaled (in millions of U.S. dollars) in Table B1.

Table B1. World Bank Financing in Water Sector

<i>Number</i>	<i>Category</i>	<i>Amount (US\$ millions)</i>
424	Projects focused on water	26,517.30
236	Projects with at least half objectives, half of total lending	7,348.77
351	Projects with actual component amounts	6,651.16
851	Projects with estimated component amounts ¹	13,771.62
	Total estimate	54,288.85

INTERACTIVE PROJECT DATABASE

The evaluation developed a Microsoft Access database that drew on all the available quantitative and qualitative information for water-related projects. The database was capable of responding to queries regarding the results of all completed projects and comparing those results with project characteristics. It was used to determine the degree to which objectives were attained, identify factors associated with success and failure, and compare highly successful and highly unsuccessful projects to assess whether the strategic approaches taken are different in discernable ways. For ongoing projects it was used to analyze the evolution in the nature of project activities down to the component level. Water-relevant lessons learned as identified by Bank self-evaluations and IEG independent evaluations (PPARs) were disaggregated and recategorized to determine areas of strength and weakness, and whether practice needs to be modified in certain activity areas. The relationship of the active portfolio with the identified success factors was also analyzed.

1. Average of those with actual component amounts were extrapolated to estimate this number.

ANNEX B METHODOLOGY

REVIEW OF OTHER DONORS' EXPERIENCE

The evaluation identified impact evaluations dealing with water, including work on the health impacts of water supply and sanitation and other evaluative work in the public domain, to see if the lessons from other donors' experiences are qualitatively different from those of the Bank. The evaluation examined how far other donors have moved toward an integrated approach to water resources management and water services issues. And donors were asked about their perceptions of the Bank's water-related work and its strategic and intellectual approach. Donor project results also were reviewed to identify the ways in which more integrated coverage of water resource management issues enhance and constrain results.

INDIVIDUAL INTERVIEWS AND SURVEYS

Throughout the course of the evaluation open-ended interviews were conducted within the Bank and with key informants on the outside. Various surveys of water users groups previously have been done and these findings were incorporated.

META-EVALUATION

This evaluation is in part a meta-evaluation that makes use of previous evaluations by IEG and self-evaluations by World Bank operations.

Previous IEG studies on water-related topics have been more narrowly focused than this evaluation. Those evaluations include *Rural Water Projects* (2000), *Rural Water Projects: Lessons from OED Evaluations* (2000), *Bridging Troubled Waters: Assessing the Water Resources Strategy Since 1993* (2002), *Efficient, Sustainable Service for All: An OED Review of the World Bank's Assistance to Water Supply and Sanitation* (2003), and *Ten Years of World Bank Assistance, 1994–2004 – Water Management in Agriculture* (2006). In addition, an IEG evaluation on regional programs covers the Bank's regional approach to water management.

Significant self-evaluation and policy research activities have accompanied the renewed Bank commitment to water. In recent years, the Bank produced important papers in all water-related subsectors. In the Water Supply and Sanitation subsector, the Bank published *IDA at Work: Sanitation and Water Supply* (2007), as well as *Utilities Reforms and Corruption in Developing Countries* (2006). In the Water for Food subsector, the Bank published *Reengaging in Agricultural Water Management: Challenges and Options* (2006). With respect to Water Resources Management, the Bank published the reports *Watershed Management Approaches, Policies and Operations: Lessons for Scaling-Up* (2008) and *Comparison of Institutional Arrangements for River Basin Management in Eight Basins* (2005). Other studies covered topics such as sea-level rise (2007), fisheries and aquaculture (2005), water and electricity subsidies (2005), the forest-hydrology-poverty nexus (2004), the human right to water (2004), groundwater quality (2002), sanitation and hygiene (2005), economic regulation of urban services (2007), water and sanitation impact evaluations (2006), international water and sanitation cooperation (1998), on-site sanitation (1999), World Bank lending for large dams (1996), large-scale rural water and sanitation (1997), small-scale water supply and sanitation services providers in Latin America (2007), and directions in hydropower (2009), among others.

ISSUE AND CASE STUDY RESEARCH

The evaluation carried out in-depth research for 35 issues that sifted through the relevant experience to answer the major thematic/strategic questions facing the Bank (see Table B1 for a list). To ensure that the evaluation findings are relevant to current concerns and that the lessons identified will be used, the issues to be analyzed were determined in consultation with the Water Anchor and shared with the Water Sector Board. All the research looked at the same universe of 1,864 projects. In thematic areas where there is little strategic guidance, the evaluation analyzed what was being done to distill the institution's revealed and evolving preferences. The more operationally relevant issue research will be published as freestanding evaluations or shared with sector colleagues as presentations.

Seven case studies were generated by fieldwork and desk reviews. These had a dual purpose: first, to compare work (both Bank-financed and conducted by other agencies) that is adequately integrated with earlier, more narrowly focused approaches. The field research looked at factors associated with success and failure at the project level, and assessed the overall contribution of the totality of Bank work in light of country needs and priorities. The second purpose of the case studies was to "reality test" the results of the evaluation's desk review of nearly 1,900 projects.

Case study subjects were selected using the following criteria:

- Countries identified as major borrowers for water in the portfolio review
- Countries with projects that cover innovative approaches or that deal with water issues in a particularly comprehensive way
- Countries with projects that cover issues deemed likely to be of increasing importance to borrowers. These might include: country ownership, water scarcity, transboundary issues, flood control, climate change adaptation, multi-country watershed treatment, public-private partnerships, water infrastructure, water trade, and/or complementarities with transport infrastructure
- Representation of a broad array of regions and environmental conditions
- Countries with projects or programs that involve cofinancing and coordination with other donors in global and/or regional arrangements
- Ease and access during season of visit and reasonable travel time.

On this basis, Brazil, Morocco, Tanzania, Vietnam and the Aral Sea area were selected for evaluation. In addition to these, desk cases were prepared on China and the Republic of Yemen using data collected by 2006 IEG missions to those countries.

ANNEX B
METHODOLOGY

Table B1. Issue and Case Study Research	
Managing Water Resources	
1.	Watershed Management
2.	Groundwater
3.	Demand Management / Water Use Efficiency
4.	River and Lake Basin Organizations
5.	Hydrological and meteorological monitoring
6.	Floods and Intense Rains
7.	Droughts
8.	Dams and reservoirs
Environmental Sustainability	
9.	Environmental Flow Assessments
10.	Water Quality Management
11.	Water Quality Monitoring
	Rivers and Lakes Management
12.	Coastal Zone Management
Water Use and Service Delivery	
13.	Dedicated and Non-Dedicated Water Supply and Sanitation Projects
14.	World Bank Support for Water Users Associations (WUAs) in Client Countries
15.	Urban Water
16.	Wastewater Treatment and Sewerage
17.	Subsidies for Basic Sanitation
18.	Cost Recovery and Water Pricing in Water Supply and Sanitation
19.	What Works in Water Supply and Sanitation? Lessons from Impact Evaluations
20.	The Health Benefits of Water Supply and Sanitation Projects
21.	Hygiene education
22.	Hydropower
Water Management Institutions	
23.	Challenges of Water Policy
24.	Water in Bank strategies
25.	Coverage of Water Issues in CASs
26.	Portfolio of Water-Related Activities
27.	Global Program Review of the Global Water Partnership
28.	Highly Sat and Highly Unsat Projects
29.	Private Sector Participation in Urban WSS
30.	Private Sector Participation in Rural WSS
31.	Decentralization in the Water Sector
32.	Integrated Water Resources Management (IWRM)
33.	International/ transboundary water institutions
34.	Inland Water Transport
35.	Conflict and Water
Case Studies	
1.	Aral Sea
2.	Brazil
3.	China
4.	Morocco
5.	Tanzania
6.	Vietnam
7.	Yemen, Rep.

ADVISORY PANEL

A group of external advisors was established to advise the evaluation team during the evaluative process. The Panel consisted of internationally recognized water experts and practitioners. The Panel reviewed drafts at several stages in the process and commented on the ongoing research and various intermediate outputs. The Panel members were: **Mohamed Ait Kadi**, Chair of the Global Water Program Technical Committee, President of the General Council of Agricultural Development, Ministry of Agriculture, Rural Development and Fisheries, Morocco; **Mary B. Anderson**, President of the Collaborative For Development Action, Executive Director of CDA Collaborative Learning Projects; **Judith Rees**, Professor of Environmental and Resources Management, Director of the Grantham Research Institute on Climate Change and the Environment, London School of Economics; and **Peter Rogers**, Gordon McKay Professor of Environmental Engineering in the School of Engineering and Applied Sciences at Harvard University, Senior advisor to the Global Water Partnership, Fellow of the American Association for the Advancement of Science, Member of the Third World Academy of Sciences.

Annex C

Strategies

Bank Strategy in the Water Sector

The 1993 Water Resources Management Policy Paper moved the institution away from infrastructure development. The paper also shifted the Bank from a sector-based investment planning process to a multisectoral approach to planning. The paper focuses the attention of Bank and borrower staff on three inputs: projects that will help to develop a stock of infrastructure for multiple water uses; establishing or strengthening river and lake basin management institutions; and policies for the rational use of transboundary water to more effectively manage water resources. Regional water teams were created with water specialists and advisors, although these teams never really incorporated WSS staff, who maintained their close relationship with urban development and never fully took water resources management on board. Under pressure from environmental and social nongovernmental organizations, the Bank backed away from major investments in water storage infrastructure. In addition, the private sector was expected to become a major financier in water supply and sanitation. Lending for water decreased.

In 2003, the Bank adopted a new water resources sector strategy that focuses on putting the 1993 principles into practice. Both strategic papers documented the same three entry points as key elements for successful management of water resources. These various strategies move toward an integrated approach focusing on both infrastructure development and management for both water resources and water services. In recent years, the Bank's approach has also expanded to include regional and subnational lending.

The main messages of the 2003 strategy have a strong focus on large infrastructure:

- The management and development of water resources are central to sustainable growth and poverty reduction.
- Being an effective partner requires attention to both management *and* development of infrastructure – neither alone will solve all problems.
- Take a pragmatic approach to integrated water resources management.
- Support countries in developing and maintaining “appropriate stocks of well-performing hydraulic infrastructure and in mobilizing public and private financing, while meeting environmental and social standards.”¹
- Counteract the Bank's reluctance to engage with “high-reward-high-risk hydraulic infrastructure, using a more effective business model.”
- The Bank is perceived to have a comparative advantage in water, which has created strong demand for its services. Hence, the Bank must continue to engage if it is to remain a credible knowledge institution.
- The Bank's water support must be “tailored to country circumstances and be consistent with the overarching Country Assistance Strategies and Poverty Re-

1. “Water Resources Sector Strategy: Strategic Directions for World Bank Engagement,” Summary, p. 3.

duction Strategy Papers.” The Country Water Resources Assistance Strategy concept was developed in the strategy.

The 1993 and 2003 strategy papers together have helped inform issues related to supply, institutions, economic use, the environment, and broad-based water service interventions (aimed at improving the performance of utilities, user associations, and irrigation departments (see Box C1).

Box C1. Bank Strategy and Integrated Water Resources Management

The Bank’s 2003 strategy acknowledged the central importance of water resources management to the mission of the Bank. A main message of the strategy emphasized that the Bank needed to continue its efforts toward integrated water resources management (IWRM).

IWRM calls for integration of actions affecting drinking water and sanitation supply, agriculture, irrigation, hydropower and other energy production, and maintenance of environmental water flows to protect habitats and sustain groundwater supplies. Under IWRM the results of water management programs are monitored to permit ongoing adjustments to strategies and practices. IWRM leads toward the recognition that water policy is bound together with government policies on security, economic development and food production, public health, and other essential governance missions.

According to the 2003 strategy, IWRM is not to be treated in a utilitarian manner:

“The main management challenge is not a vision of integrated water resources management but a ‘pragmatic but principled’ approach that respects principles of efficiency, equity and sustainability while recognizing that water resources management is intensely political and that reform requires the articulation of prioritized, sequenced, practical and patient interventions.”

Hence, IWRM was to be considered not for its own sake but as an adjunct to development.

Source: “Water Resources Sector Strategy: Strategic Directions for World Bank Engagement.”

The strategy says much less about water services, which are addressed in the 2003 Infrastructure Action Plan and the 2003 WSS Business Strategy as well as in Bank strategies for energy, environment, rural development, and irrigation and drainage. The Water Resources Management Sector Strategy Paper (WRM SSP) was instrumental in paving the way for Bank re-engagement with infrastructure, and the process it set in motion culminated in the Infrastructure Action Plan.

As can be seen in Table C1, the objectives outlined in the various strategic documents are highly consistent. For instance, poverty alleviation and promotion of PSP objectives are found in every one of the strategic documents reviewed. Furthermore, this Bank consensus on poverty and PSP resonates with the objectives of the broader development community (namely the Dublin Principles – see Box C2 – and the MDGs), and thus reflects the views of the Bank’s authorizing environment. Aside from the coherence in certain messages across the board, a number of documents address different priorities based on their main focus, and the importance of a given theme for the Bank’s more focused development agenda. The matrix shows that, even though the Bank receives strategic guidance from a number of documents, it is nevertheless following broadly accepted water management goals.

Box C2. Dublin Principles

Principle No. 1 - Freshwater is a finite and vulnerable resource, essential to sustain life, development and the environment.

Principle No. 2 - Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.

Principle No. 3 - Women play a central part in the provision, management and safeguarding of water.

Principle No. 4 - Water has an economic value in all its competing uses and should be recognized as an economic good.

Source: International Conference on Water and the Environment (ICWE) in Dublin, Ireland, on 26 to 31 January 1992. The Dublin Statement on Water and Sustainable Development.

The main message from Table C1 is that there is a notable interconnectedness among the various strategic documents on nearly every subject. The review shows that many of the individual strategic objectives in the various guiding documents were closely related. For instance, the 2003 Water Resources Sector Strategy objective to “assist countries in developing and maintaining appropriate stocks of well-performing hydraulic infrastructure and in mobilizing public and private financing, while meeting environmental and social standards,” consistent not only with objectives on the development of hydraulic infrastructure but promotion of private sector and improvement of environment.

Table C1. Coverage of Water Resources Management Objectives by World Bank Strategic Documents

Water management objective	<i>Number documents covering</i>	<i>1992 Dublin Principles</i>	<i>1993 WRM Policy Paper</i>	<i>2001 Environment Strategy</i>	<i>2003 WR Sector Strategy</i>	<i>2003 Infrastructure Action Plan</i>	<i>2003 WSS Business Strategy</i>	<i>MDGs</i>
Alleviate poverty	7/7	X	X	X	X	X	X	X
Promote private sector participation	7	X	X	X	X	X	X	X
Encourage women to participate in water resources management	5	X	X	X	X			X
Restore ecosystems (wetlands, swamps, coastal zones, marinas, estuaries)	5	X	X	X	X			X
Support basin-level institutions	5	X	X	X	X		X	
Enhance stakeholder participation	5	X	X	X	X		X	
Employ demand management practices (promote incentives to water conservation and establish "polluter-pays" principle)	5	X	X		X		X	X
Strengthen policies and develop economic and sector work	5		X	X	X	X	X	
Improve water institutions	4	X	X	X			X	
Coordinate water resources activities across sectors (cross-sectoral)	4		X	X		X	X	
Support for international waterways	4	X	X	X	X			
Promote improved water resources management	3	X	X		X			
Commit to environmental improvements	3	X		X				X
Create effective monitoring and evaluation units to measure results	3			X		X	X	
Protect groundwater resources	3	X	X		X			
Develop hydraulic infrastructure (dams, hydropower)	2				X		X	
Reduce natural disaster risks	2	X		X				
Prepare "high-risk/high-reward" projects	2				X	X		
Promote decentralization	2		X				X	
Improve low-cost technologies	2		X					X
Address political economy of reforms	1				X			
Enhance donor coordination	1		X					
Develop water CASs	1				X			
Themes covered		13/23	16	13	15	6	11	7

Connections with Other Strategic Influences

COUNTRY WATER RESOURCE STRATEGIES

The Bank has developed Country Water Resources Assistance Strategies (CWRASs) in select countries. These are free-standing strategies described and implemented through the 2003 Strategy. They thoroughly analyze countries' economic, environmental, and resource constraints with regard to water. They aim to bring the finance and planning ministries into the water dialogue, reveal countries' problems, and guide the Bank/borrower dialogue. Ten of these are in the Bank's systems as having been approved by the Board for countries having truly serious water problems and where there is a demand for Bank engagement (Bangladesh, Brazil, China, Ethiopia, India, Pakistan, Philippines, Tanzania, Vietnam, and the Republic of Yemen). Specifically, the CWRASs describe how the Bank can and will help improve water resources management in a given country, and they are linked upward to the Bank's CASs and Poverty Reduction Strategy Papers (PRSPs)¹ and downward to investment, bringing coherence to the Bank's support for water across the resource and service spectrum. They complement and help to shape the CASs and PRSPs. Each seeks to respond to country-specific challenges and priorities.

COUNTRY ASSISTANCE STRATEGIES

Insofar as the CASs² reveal the Bank's strategic approach to water activities, it is commensurate with the scale of its borrowers' problems. However, critical issues like groundwater, wetland protection, coastal zone management, and water marketing do not figure in the list of Bank's top priorities in the recent CASs. In contrast, the review found that community participation, stakeholder involvement, and beneficiary-related activities in water management were mentioned more frequently in the recent CASs.

With respect to irrigation and drainage, the older CASs focus on water charges (and thereby covering basic operation and maintenance costs), whereas the recent strategic documents address rehabilitation, upgrading, and/or expansion of the existing irrigation and drainage systems, presumably because the funds still have not been gathered to cover this expense.

Under the water resources management category, improved water resources management and watershed protection were the most common activity in recent strategic documents (see Table C2). In addition, the Bank stressed that client countries seek further assistance in preventing natural disasters (such as floods and droughts), thus this activity was highlighted as a core challenge in most recent CASs. Moreover, the analysis found that the more recent strategic documents do not prioritize water quality improvement activity as often as the earlier CASs. The findings from Water Quality Monitoring and River and Lake Management research (produced for this evaluation) uncovered the same pattern of practice.

1. Poverty Reduction Strategy Papers (PRSPs) describe a country's macroeconomic, structural, and social policies and programs to promote growth and reduce poverty, as well as associated external financing needs. PRSPs are prepared by governments through a participatory process involving civil society and development partners, including the World Bank and the International Monetary Fund (IMF).

2. The objective of a CAS is to synthesize the country situation, government priorities, Bank Group strategy, and Bank partner activities into a coherent program for future work together.

Few CASs (10 percent) addressed water quality improvement, even when a country highlighted poor water quality as an issue. This issue requires behavioral change and environmental restoration, a difficult topic, even when such an activity is clearly the only way forward.

Table C2. CAS Analysis—Critical Issues Have Been Left Behind

<i>Old Focus of CASs:</i>	<i>New Focus of CASs:</i>
Urban/rural WSS services	Urban/rural WSS services
Water charges	Reduction of unaccounted-for water
Water quality improvement	Decentralization of WSS services
Groundwater	Cost recovery (utilities)
Coastal zone management	Improving water resources management
Water marketing	Watershed protection
Maintenance	Natural disaster mitigation
	Community participation
	Stakeholder involvement
	Beneficiary-related activities
	Maintenance

Source: IEG water database

The Bank's Organizational Structure for Water

The Water Sector Board is responsible for all freshwater activities. The Sector Board was formed in 2007, as part of a major Bank-wide restructuring of staff with similar professional backgrounds (groupings known in the Bank as Networks). Before 2007, a WSS Sector Board existed as well as a separate and more informal Water Resources Management Group.

While the sector strategy calls for one Water Sector Manager per Region, this has not yet happened. The membership of the Board includes managers from the Regions, as well as representatives from other relevant corporate units.

The Water Anchor, a unit within the Energy, Transport, and Water Department, helps to integrate the various practices. It supports the regions on strategy formulation and implementation and serves as the Secretariat of the Sector Board. As part of its work program, the Water Anchor is responsible for Water Sector Strategy formulation, implementation, and coordination.

Staff with a range of infrastructure specializations were folded into the massive Sustainable Development Network (SDN) within the SDN Vice Presidency. About half of the Bank's water sector staff are employees of the independent Water and Sanitation Program (WSP).¹

It is worth mentioning that other donors and NGOs visited during the preparation of this report had Bank water publications close at hand, and demonstrated familiarity with their contents. Water sector professionals in partner organizations were knowledgeable about what is on the water Web site and commented that they often used available materials. The Bank's Water

1. The WSP is one of the World Bank's longest standing external partnership programs. The program follows the Bank's management and administrative processes, and it functions as an independent unit within the Department of Energy and Water in the SDN Vice Presidency. Its staff report to various donors that supply the funding for the activities they are engaged in.

**ANNEX C
STRATEGIES**

Week has become an event that draws participants from all over the world. In terms of knowledge management, the Water Anchor's Web site receives 270,000 page views per year,¹ and in 2008 it published 28 titles for international distribution.

1. Based on data provided by the Sector Board for the period October 2008 to September 2009.

Annex D

Taxonomy of Water Activities in the Portfolio

A. WATER SUPPLY

- A01 Construction of new potable water systems
- A02 Reservoirs (water resource mobilization)
- A03 Rural Water Supply and Sanitation
- A04 Urban Water Supply and Sanitation (when further detail not available)
- A05 New pipes
- A06 Wells
- A07 Boreholes
- A08 Installation of Hand pumps
- A09 Pumping stations
- A10 Water transmission line
- A11 Kiosks
- A12 Rehabilitation of water systems
- A13 Rehab Water Supply (when further detail not available)
- A14 Rehab wells, boreholes or reservoirs
- A15 Leakage detection
- A16 Water conservation
- A17 Reduction of unaccounted for water
- A18 Springs
- A19 Installation of Pipes and Household Connections
- A20 Construction of Water Treatment Facilities
- A21 Protection of the Drinking Water Supply
- A22 Expansion of Existing Water Systems
- A23 Installation of Water Filters for Surface Water, Rain Harvesting
- A24 Dam Expansion or Strengthening
- A25 Rehabilitation of hand pumps
- A26 PSP involved in rehabilitating community water systems
- A27 PSP involvement in WSS design
- A28 Continuous water services improve
- A29 Increased access to safe potable water
- A30 Increase Potable Water Supply / bulk water supply
- A31 Water supply only
- A32 Both water supply and sanitation

B. SANITATION

- B01 Construction of new sanitary systems

- B02 New sanitation (when further detail not available)
- B03 Provision of in-household installations
- B04 Household sanitation ,
- B05 Latrines
- B06 Installing water or sanitation in public facilities)
- B07 Public sanitation (for schools, etc.)
- B08 PSP involved in manufacturing latrines
- B09 Supply-driven approach to sanitation
- B10 Low-cost sanitation facilities
- B11 Sanitation only

C. SEWERAGE

- C01 New sewers (sewer system)
- C02 Water/waste water treatment plants
- C03 Wastewater Treatment
- C04 Sewage treatment
- C05 Solid waste collection
- C06 Sanitary landfills constructed
- C07 Rehabilitation of sewage or sanitation systems
- C08 Rehab sewers
- C09 Maintenance of sewerage systems
- C10 Connecting Households to
- C11 Expansion/ Augmentation of Existing Systems
- C12 Installation of Sewage Flow Meters
- C13 Establish submarine outfalls to discharge treated wastewater
- C14 Construction of sewage collection and treatment facilities
- C15 Replacement of sewage pipelines
- C16 Rehabilitation of existing WWTP
- C17 Improvements in septic tank systems
- C18 Increased access to sewerage services

D. WATER QUALITY / POLLUTION MANAGEMENT

- D01 Control or treatment of polluted water
- D02 Closing Facilities that Pollute
- D03 Water quality
- D04 Pollution abatement
- D05 Industrial pollution abatement

ANNEX D

TAXONOMY OF WATER ACTIVITIES IN THE PORTFOLIO

D06 Monitoring Ocean/Coastal/Wetland Pollution
D07 Preventing Ocean/Coastal/Wetland Pollution
D08 Treatment Ocean/Coastal/Wetland Pollution
D09 International Transboundary Protection Ocean/Coastal/Wetland Pollution
D10 Restoration Ocean/Coastal/Wetland Pollution
D11 Control or Treatment of Leachate from Solid Waste Sites
D12 Control or Treatment of Industrial Runoff or Wastewater
D13 Control or Treatment of Agricultural Drainage Water or Runoff
D14 Control of the Quality of Water Provided To Croplands
D15 Measuring or Limiting Use of Fertilizers
D16 Relocation of Water Borne Pollutants
D17 Clean Up of Marine Oil Spills
D18 Construction of Road Micro catchments to Prevent Erosion
D19 Improved Manure Management Practices
D20 Promotion Aqua-Friendly Agriculture
D21 Reuse of Treated Water (Except For Agriculture)
D22 Dewatering
D23 Construction of Sludge Treatment or Disposal Facility
D24 Roadside Soil Erosion Prevention
D25 Promotion of Cleaner Industrial Practices
D26 Stabilization of Waste Ponds Containing Pollutants
D27 Invasive Species Control (Hyacinths)
D28 Planting of Forests
D29 Water Recycling in Agriculture
D30 Water Recycling Other Uses Domestic Uses I.E. Toilets
D31 Water Recycling Industrial Uses
D32 Chemical Treatment to Control Water-Borne Diseases
D33 Protection of the Food Supply
D34 Decontaminating Fruits and Vegetables
D35 Floating Plants as Indicator of Water Quality
D36 Non-Chemical Alternatives for Pest Management
D37 Prevent seawater intrusion into aquifer by constructing a water barrier
D38 Salinity / waterlogging prevention and mitigation
D29 Eutrophication
D30 Reduce Groundwater Contamination

E. IRRIGATION

E01 Water resource mobilization
E02 Irrigation
E03 Drainage for irrigation
E04 Water for agriculture
E05 Promotion of Irrigation Efficiency
E06 Rehabilitation of Irrigation Schemes
E07 Use of Tube Wells to Extract Groundwater
E08 Reuse of Treated Water for Irrigation
E09 Microcatchment System Development / management
E10 Construction of Small Irrigation Schemes
E11 Conversion of Irrigation Schemes Pump to Gravity
E12 Hill Dams Construction for Irrigation
E13 Construction of Pressurized Irrigation
E14 Pumping Station Rehabilitation/Expansion
E15 Promotion of Improved Techniques for Rain-Fed Farming
E16 Built or rehabilitated irrigation infrastructure
E17 Groundwater use for irrigation

E18 Improve Efficiency of Groundwater Use for Irrigation
E19 Dam / Reservoir for Irrigation
E20 Supply and installation of sprinkler and drip irrigation systems
E21 Use of monitoring for agriculture

F. STORM AND FLOOD CONTROL AND DRAINAGE

F01 Storm and flood control
F02 Construction of general drainage
F03 Construction of flood control
F04 Flood mitigation activities
F05 Construction of storm water drainage
F06 Drought mitigation
F07 Dredging
F08 Lining of Watercourses
F09 Construction of Retaining Walls
F10 Construction for Flood Prevention Dikes
F11 Rehabilitation of Existing Drainage Systems
F12 Construction of New Drainage Systems or Components
F13 Desalting Basin Construction/Improvements
F14 Prepared for or recovered from natural disasters
F15 Early warning system
F16 Flood Control and Drainage Improvement
F17 Check dams, flood and erosion control

G. ENERGY

- G01 Water for energy
- G02 New dam construction
- G03 Rehabilitate dams
- G04 Dam safety
- G05 Sediment control / removal from rivers
- G06 Oil Distribution/Equipment Acquisition
- G07 Monitoring Hydrocarbons in Water
- G08 Construction of CHP Generation/ Steam Facilities
- G09 Oil Distribution/Equipment Acquisition
- G10 Monitoring Hydrocarbons in Water
- G11 Construction of CHP Generation/ Steam Facilities
- G12 Built or rehabilitated energy infrastructure
- G13 Large Dam
- G14 Dam raising
- G15 New Hydro
- G16 Small Hydro
- G17 Hydro rehabilitation / upgrade
- G18 Run of river
- G19 Expand existing hydro
- G20 Multipurpose dam

H. LOCATION

- H01 Urban
- H02 Rural
- H03 Small Town
- H04 Peri urban areas
- H05 Health centers
- H06 Schools
- H07 Coastal areas
- H08 River
- H09 Catchment area
- H10 Flood plains
- H11 Local
- H12 Regional
- H13 National
- H14 Transboundary
- H15 Ministries
- H16 Local government
- H17 Basin

I. BIODIVERSITY

- I01 Fisheries Rehabilitation
- I02 Protection of Coastal Spawning Grounds
- I03 Promotion of Dry land Biodiversity to Protect Wetlands or Water
- I04 Marine Protected Areas (MPAs),
- I05 Rehabilitation and management of coral reefs
- I06 Protection of sea turtles
- I07 Rehabilitation and protection of mangroves

- I08 Management of coastal wetlands (Ramsar sites),
- I09 Biodiversity Conservation and species protection
- I10 Wetland restoration
- I11 Wetland protection
- I12 Fish studies
- I13 Nature reserve
- I14 Marshland management

J. WATERSHED MANAGEMENT [IWRM]

- J01 Watershed protection and Management
- J02 Environmental mgmt
- J03 Land Use
- J04 Erosion reduction or prevention
- J05 Natural Resources Management
- J06 Water management technology
- J07 IWRM
- J08 Water resources management
- J09 Climate change
- J10 Forest Management /Reforestation
- J11 Rangeland
- J12 Nurseries
- J13 Vegetative Cover Restoration
- J14 Agricultural Pollution Management Mechanisms with Manure Improved Practices to Prevent Nitrates Going Into Waters
- J15 Transboundary Cooperation
- J16 Small Earth Dams Construction
- J17 Improved Soil Management Practices to Prevent Loss in Grasslands and Biodiversity
- J18 Coastal Zone Management
- J19 Management of catchment area
- J20 Environmental Assessment
- J21 Environmental Impact Assessment
- J22 Environmental Flow Assessment (EFA)
- J23 Hydrological Assessment
- J24 Ecological Flow Assessment
- J25 River basin study
- J26 Environmental flows discussed
- J27 Groundwater Recharge
- J28 Reduce Pressure on Groundwater
- J29 Informal Environmental Flow Assessment
- J30 Environmental Flow Component
- J31 Environmental mitigation
- J32 Environmental Protection Assessment and Monitoring
- J33 Use of monitoring for water resources management
- J34 Reversing natural resources degradation
- J35 Water transfers

ANNEX D

TAXONOMY OF WATER ACTIVITIES IN THE PORTFOLIO

- J36 Soil conservation research
- J37 Groundwater management
- J38 Run-off control
- J39 Improving the management of international waters
- J40 Basin modeling

K. PLANS, POLICIES, AND REGULATIONS

- K01 Development of plans, policies and regulations
- K02 Enforcement
- K03 Plans
- K04 Policy
- K05 Water use rights
- K06 Support for Scientific and Economic Research/ Studies for Project Preparation or To Develop Policies
- K07 Support for Professional Education
- K08 Master plan Development
- K09 Development of Standards and Methodologies
- K10 Definition of Procedures and Standards
- K11 Development of Monitoring Methods
- K12 Hygiene education strategy of plan
- K13 Law
- K14 Land Registration
- K15 Land Development and Improvement
- K16 Water rights

L. INSTITUTIONAL DEVELOPMENT [REFORM, TA, and CAPACITY BUILDING]

- L01 Private Sector Participation
- L02 Regional cooperation
- L03 Institutional Strengthening/Capacity Building
- L04 New institutions (+ oversight for PSP)
- L05 Studies
- L07 Equipment purchase
- L08 Operation and maintenance O&M
- L09 Decentralization of services
- L10 Institutional reform
- L11 Demand management
- L12 TA Technical assistance and training
- L13 Project management and coordination
- L14 For Project Preparation (Experts, Best Practices) Consulting Services
- L15 For Project Management (Monitoring Equipment)/To Manage Studies, To Set Up Labs
- L16 Capacity Building, Training For Government Officials
- L17 Exploring possibilities for more PSP in the future

- L18 Local government has oversight role with PSP
- L19 Private sector development
- L20 PSP capacity building
- L21 Preparing contracts and management models for PSP
- L22 PSP provision of O&M
- L23 Studies undertaken on PSP
- L24 Local government involved PSP
- L25 Central government involved in PSP
- L26 Studies to evaluate health impact
- L27 Assessment of baseline hygiene behavior
- L28 Training of trainers
- L29 International operator for UWSS
- L30 Local operator for UWSS
- L31 Number of staff in public utilities to be reduced
- L32 Bidding documents prepared for PSP
- L33 Reformed water utility
- L34 Created regional management process
- L35 Created or developed institutions, government and non-government
- L36 Decentralization
- L37 Trans-Boundary Diagnostic Analysis (TDA)
- L38 Trans-Boundary Environmental Analysis
- L39 Institutional Development for Groundwater
- L40 Institutional Development for Hydro
- L41 O&M for Dams
- L42 TA for Dams
- L43 Dam studies
- L43 Surveys
- L44 Feasibility studies for sanitation subsidies
- L45 Interagency coordination

M. FINANCIAL MANAGEMENT

- M01 Financial capacity building
- M02 Cost Recovery
- M03 Procurement
- M04 Water tariffs, pricing
- M05 Water meters
- M06 (Financing) River Basin Agencies
- M07 Increase efficiency in water delivery
- M08 Financial reform
- M09 Subsidies
- M10 Local credits/grants
- M11 Imposition/Planning of Tariffs, Fees, Funds, Cost Recovery Strategies, Improved Billing Collection, Financial Management, Financial Planning, Creation of Revolving Funds
- M12 Fees collected
- M13 Risk
- M14 Water marketing

M15 WW&S technology financed
 M16 Ex ante sensitivity analysis undertaken for WWTPs
 M17 Ex ante EIRR calculated for WWTPs
 M18 Ex ante cost-benefit analysis undertaken for WWTPs (
 M19 Ex ante financial rate of return for WWTPs calculated
 M20 Ex post sensitivity analysis undertaken for WWTPs
 M21 Ex post EIRR calculated for WWTPs
 M22 Ex post cost-benefit analysis undertaken for WWTPs
 M23 Ex post financial rate of return for WWTPs calculated
 M24 Sewerage tariff was increased to continue operation
 M25 Water utility savings
 M25 Financial and Policy Incentives to Promote Conservation
 M26 Carbon finance
 M27 Land management incentives
 M28 Farm credits
 M29 Water tariffs increased
 M30 Improved billing efficiency
 M31 Improved service increased beneficiaries' willingness to pay
 M32 Stakeholder responsibilities for cost recovery established
 M33 Full cost recovery (O&M and infrastructure)
 M34 Cost recovery for O&M (infrastructure subsidized)
 M35 Cost recovery for infrastructure (O&M subsidized)
 M36 Increase tariffs or charges
 M37 Establish tariffs or charges where there have been none before
 M38 Reduce non-revenue water
 M39 Cost recovery for irrigation
 M40 Payments for environmental services

N. PUBLIC AWARENESS

N01 Public awareness
 N02 Hygiene education and training
 N03 Educational campaigns
 N04 Dissemination
 N05 Health
 N06 Schools Education Environmental Related Curriculum
 N07 PSP in hygiene promotion
 N08 PSP in information dissemination
 N09 Safe water practices

N10 Handwashing with soap
 N11 Hygiene messages (communication strategy) prepared
 N12 Hygiene training materials prepared
 N13 Integrated approach (WSS plus hygiene in one project)
 N14 Behavior changes with respect to hygiene expected
 N15 Safe excreata disposal
 N16 Health outcomes expected to improve
 N17 Mass media used for hygiene promotion
 N18 Public consultations for PSP
 N19 Environmental improvement through sanitation and WWT
 N20 Public Awareness Regarding Quality and Quantity

O. INFORMATION MANAGEMENT and MONITORING

O01 Monitoring and Evaluation (M&E)
 O02 Information management
 O03 Data collection
 O04 MIS
 O05 Groundwater Monitoring Quality of Aquifer Water
 O06 Groundwater Monitoring Aquifer Depth
 O07 Groundwater Monitoring, Preventing or Studying Salinity
 O08 Groundwater Monitoring Transboundary Aquifers
 O09 GIS Systems, Database (Design, Data-Entry and Use), Environmental Monitoring
 O10 Laboratory Data/Monitoring
 O11 Other [Monitoring specific activities]
 O12 The project was supposed to monitor water quality
 O13 Water quality data was collected
 O14 Data/parameters appropriate given nature of objectives
 O15 The project improved water quality
 O16 Monitoring continued (at least) until project closing
 O17 Monitoring sampling and analysis methods
 O10 PSP involved in monitoring
 O11 Monitoring for behavioral change with hygiene
 O12 Monitoring of marine species and coastal zone management
 O13 Water quality monitoring
 O14 Gauging stations
 O15 Environmental monitoring

ANNEX D

TAXONOMY OF WATER ACTIVITIES IN THE PORTFOLIO

P. BENEFICIARY PARTICIPATION

- P01 Participation by beneficiaries
- P02 CDD
- P03 Community or beneficiary participation
- P04 Gender (Activities specific to women)
- P05 Poverty targeted intervention
- P06 Water User Associations (farmers groups)
- P07 Demand-driven approach to water development
- P08 Employment creation
- P09 Communities responsible for O&M
- P10 Community organizations responsible for WSS delivery
- P11 Created community-based infrastructure management process
- P12 Enhanced welfare of the local people
- P13 Social Impact Assessment, Social Assessment
- P14 Demand-driven approach to sanitation
- P15 Delegate O&M roles to beneficiaries

Q. OTHER

- Q01 Commercial development of water-related business
- Q02 Fisheries and Aquaculture
- Q03 Budget Support
- Q04 Ports rehabilitation
- Q05 Donor coordination / other donors involved
- Q06 NGO's / Community Based Organizations
- Q07 Desalinization

- Q08 International waters
- Q09 Support for Fishermen
- Q10 Commercialization (Fish and Seafood)
- Q11 Support for Disadvantaged Stakeholders
- Q12 Roads and Highways Construction / Rehabilitation
- Q13 Rural Roads/Small Scale Road Construction/Improvements
- Q14 River / water transportation
- Q15 PSP for spare part distribution
- Q16 PPIAF involved
- Q17 PSP provision of goods and services
- Q18 Small and Medium Enterprise development
- Q19 Social marketing used for hygiene promotion
- Q20 Berth facilities
- Q21 Improve navigation
- Q22 Improve land access to the port
- Q23 Coastal/marine tourism
- Q24 Bridge construction
- Q25 Making water available for industrial uses
- Q26 Transport
- Q27 Resettlement
- Q28 Develop beneficiaries' productive capacity
- Q29 Improve living conditions
- Q30 Fish marketing
- Q32 Increased agricultural production and incomes
- Q33 Agricultural extension services

Annex E

Highly Satisfactory and Highly Unsatisfactory Projects

Of the 1,042 completed projects in the IEG water evaluation database, 44 were rated highly satisfactory for outcome (4.2 percent), and 17 were rated highly unsatisfactory (1.6 percent).

While highly satisfactory projects focused on the “software,” including institutional development, the environment, and social issues, the highly unsatisfactory projects focused primarily on what has generally been the Bank’s forte – building the “hardware,” or infrastructure.

Figure E1. Activities in Highly Satisfactory Projects

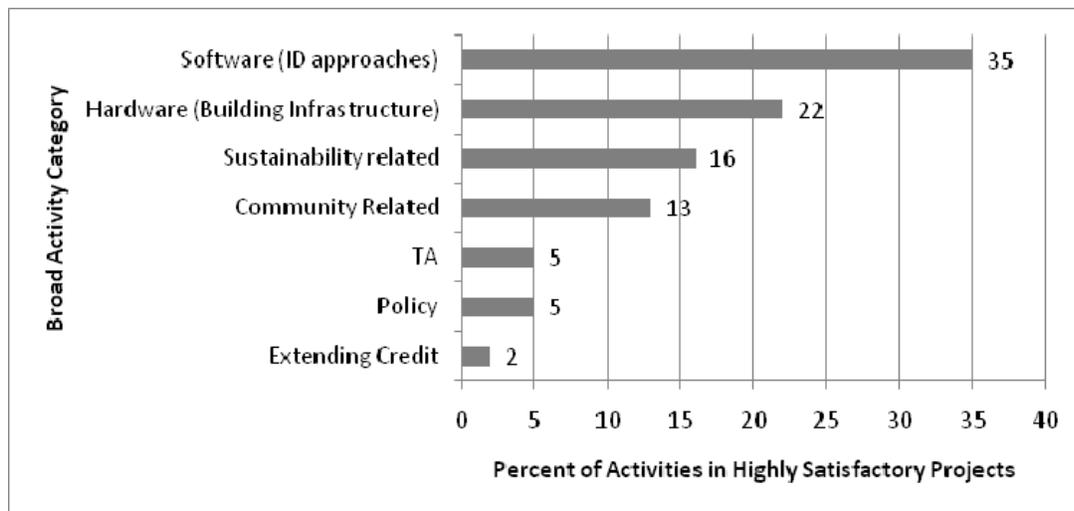
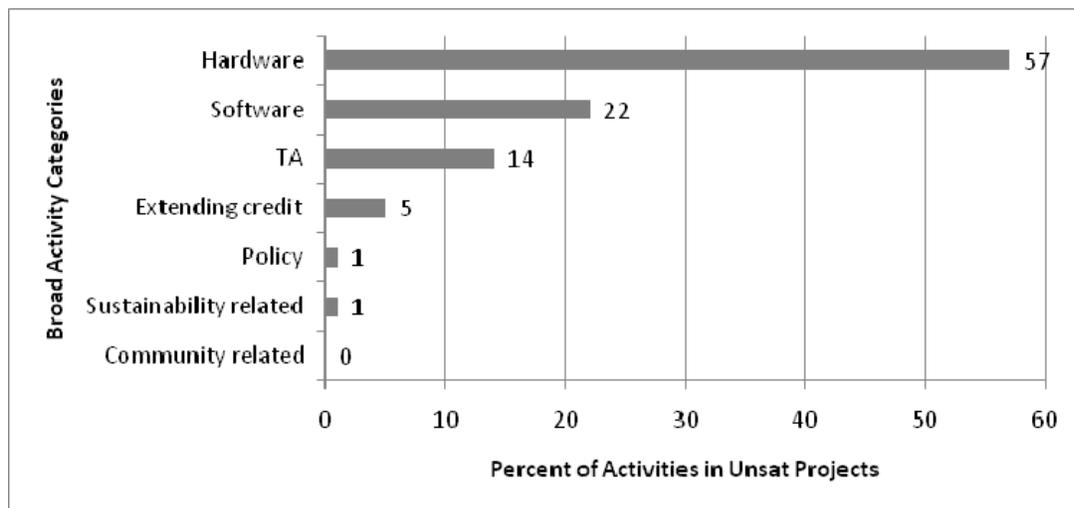


Figure E2. Activities in Highly Unsatisfactory Projects



ANNEX E HIGHLY SATISFACTORY AND HIGHLY UNSATISFACTORY PROJECTS

The projects were then analyzed to determine what success factors and broad lessons they had in common. While activities and processes can vary greatly from project to project, some overarching approaches common to the highly satisfactory projects and lacking in the highly unsatisfactory projects emerged.

Highly satisfactory projects emphasized getting things right on the front end – 41 lessons pointed to this. Project design was obviously an important part of this. It was important to design a project that could speak for itself and therefore encourage more widespread buy-in. Highly satisfactory project design was completely fleshed out and detailed by project effectiveness, and it strived to create the correct environment for success and clear communications. Works planned to be executed first were those with high demonstration value in order to sway opinions and garner support up front. Project design often included long-term planning.

In contrast, lessons from highly unsatisfactory projects indicate that those projects should have had things running well before project even started but did not. Many of these projects were behind from the start or ran into serious issues along the way and should have been reappraised but were not (8). Several suffered from a security collapse, conflict issues, which in turn hampered supervision (5). A pilot could have helped to avoid the failure of one of the projects, and another emphasized that the project team should have put effort into making things run smoothly before project start.

Highly satisfactory projects reported the importance of involving stakeholders in 35 instances. This was broken down into several types of participation. For instance, stakeholder participation and community involvement were important enough to the success of the project to be singled out in 17 cases. Two projects mentioned that it was important to offer participation training, where skills were taught. Active local government and private sector participation were also noted as important. Participation, as it relates to ownership was critical to the success of the highly satisfactory projects. The participation of an international panel of experts was mentioned in three projects as having a significant effect.

Highly satisfactory projects possessed a high degree of clarity – clear objectives, clear communication, clear design, clear procurement procedures (10 projects). Clear objectives were used to continually focus implementation efforts. Excellent communication among participants and clearly defined roles resulted in faster implementation. The continuity of staff members working on these projects was important to their success (5 projects). Responding rapidly to problems as they arose was credited for project success in 7 of the projects. Other factors included flexibility (3), simple procurement (1), and effective, decentralized, supervision (1).

In 18 instances the lessons from highly unsatisfactory projects indicated that commitment, communication, continuity, and quick correction were *missing*. Projects lacked government and donor commitment before project start (5), and communication among the various actors was insufficient (3). Making matters worse, staff did not act fast enough to correct issues, respond to new circumstances, or mitigate the effects of external shocks (5).¹ This was aggravated by a

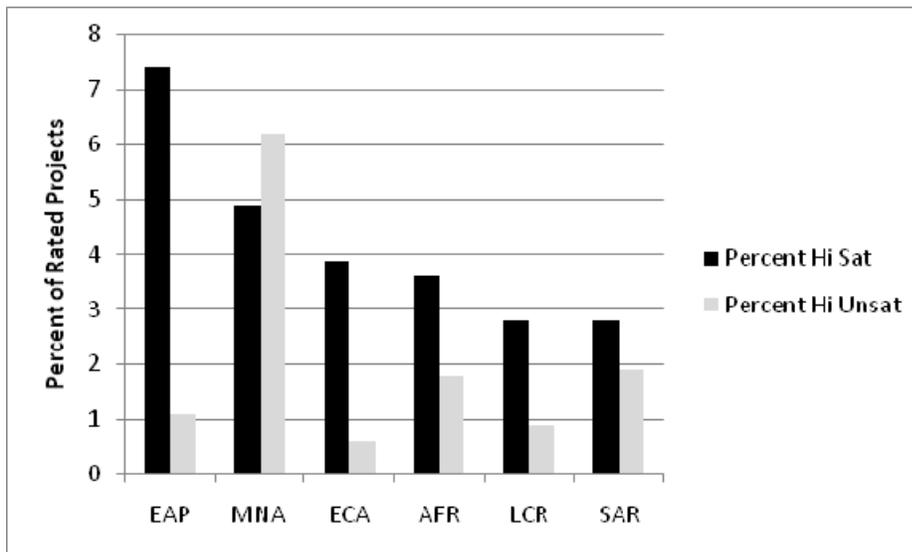
1. The Indonesia Surabaya UDP notes: “In support of the ICR recommendation, Bank supervision should include constant and continuous monitoring of the relevance and scope of project objectives and call for a radical redesign when a project is clearly no longer consistent with a borrower's sector strategy.”

staffing discontinuity issue in two projects, and lack of incentives for straightforward supervision reporting (1).

Looking at Highly Satisfactory projects from the regional perspective, the East Asia/Pacific (EAP) region had the highest percentage of its projects performing at this level. Eleven of those projects were in China, a top performer. The Middle East/North Africa (MNA) projects had an interesting performance profile with both the second highest percentage of Highly Satisfactory projects and the highest percentage of Highly Unsatisfactory projects. The Latin America/Caribbean (LCR) and South Asia (SAR) regions shared the status of having the lowest percentages of Highly Satisfactory projects.

After MNA, the second region with the largest percentage of Highly Unsatisfactory projects was SAR. The region with the lowest percentage of Highly Unsatisfactory projects was the Europe/Central Asia (ECA) region.

Figure E3. Regional Distribution of Highly Satisfactory and Highly Unsatisfactory Projects



Among countries, China had the highest number of highly satisfactory water projects. Brazil comes second. This is to be expected, given the overall strong performance of those two countries in the Bank portfolio as a whole. More surprising, however, is the fact that Senegal and the Republic of Yemen are listed next.

The Rural Sector Board oversaw the largest number of the highly satisfactory projects (13). These are primarily irrigation and drainage projects. Following is the Energy and Mining Sector Board, which oversaw 7 highly satisfactory projects (hydropower and dams), and no highly unsatisfactory projects. Four WSS projects were rated highly satisfactory.

The Rural and the WSS Sector Boards oversaw the largest number of the highly unsatisfactory projects, WSS stands out as one of the two sector boards with the most highly unsatisfactory projects, and as having fewer highly satisfactory projects than four of the other Sector Boards.

Annex F

Water in Country Assistance Strategies

To obtain this information, the study reviewed all available country strategy documents approved by the Board between fiscal year 1997 and 2009. This universe consists of 294 Country Assistance Strategies (CASs) or Country Partnership Strategies (CPSs) from 122 countries. For the purpose of this report, only 40 countries' CASs (98 documents) were analyzed in detail to get an overall sense of activities. The selection criteria were as follows: Of the 40 countries reviewed, 20 countries were selected from a list of "highly water-stressed" countries (representing the top 20 highly water-stressed countries) and the remaining 20 countries were chosen from a list of "least water-stressed" countries (representing the least water stressed countries, FAO AQUASTAT). Some countries had only one CAS during the period studied, some had two, a few had three, and two had four.

The review catalogued the water-related activities the country strategy papers committed the Bank to pursue.¹ The activities fell under three broad headings: "water supply and sanitation," "irrigation and drainage," and "comprehensive water resources management." The analysis found that of the 98 CASs from 40 countries, 55 assigned top priority to water supply and sanitation services (see Table F1). This is at least partly because countries are concerned with achieving the Millennium Development Goals (MDGs), which set targets for water supply and sanitation (WSS). The next most commonly occurring activity was comprehensive water resources management, found in 36 CASs. This likely reflects the 2003 World Bank Water Resources Strategy, which calls for countries to adopt an integrated water resources management approach. Twenty-nine strategic documents call for the improvement of irrigation and drainage infrastructure.

Table F1. Three Main Water Priorities of Country Assistance Strategies

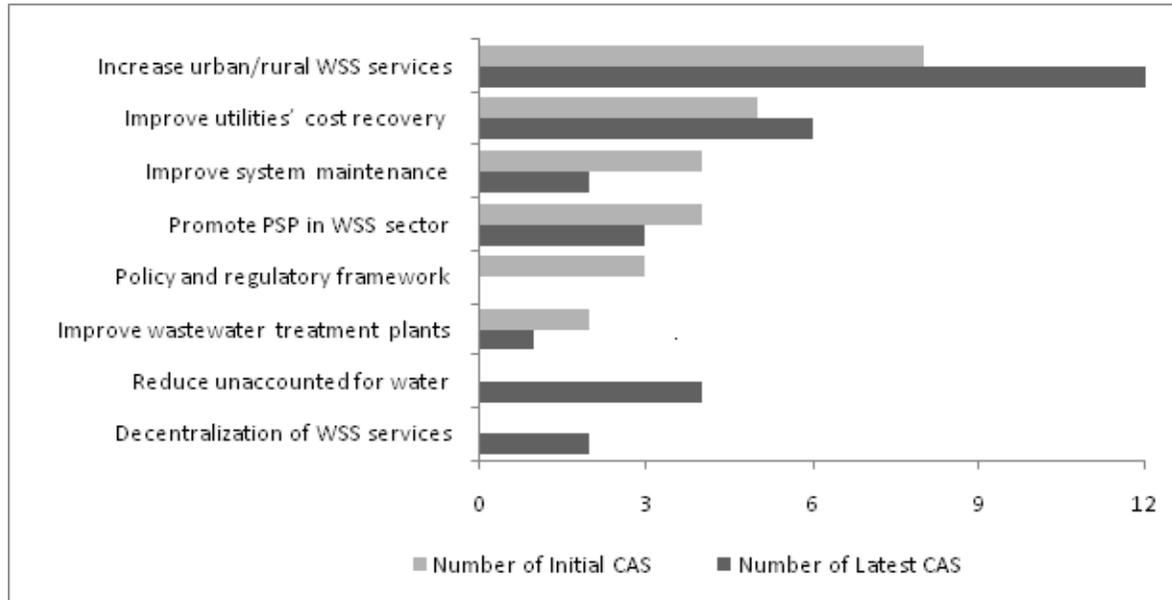
	<i>Number of CASs/CPSs that discuss this activity</i>
Water supply and sanitation	55
Irrigation and drainage	29
Comprehensive water management	36

Source: World Bank country strategy documents

Figure F1 compares the activities called for in the earliest and latest CAS. In the 20 highly water-stressed countries, under the WSS heading, in their earliest CAS 8 countries prioritize increasing the coverage of urban/rural WSS services. The most recent CAS documents, however, show a 50 percent increase in the pursuit of this goal. Twelve countries discussed the lack of basic services and planned to address this issue in the work guided by the strategic documents.

1. Under each heading, the relevant subcategories were identified and then the earliest CAS for each country (during the period studied) was compared to the most recent. This was done to determine the evolution in the nature of activities over time. No more than two CASs for each country were used: for those countries that had more than two, the interim documents were excluded from the analysis. The 20 highly water-stressed countries and the 20 least water-stressed countries were compared and contrasted.

Figure F1. WSS in Highly Water-Stressed Countries



Source: World Bank Country Assistance Strategy Documents

In addition, reducing the level of unaccounted-for water through installation and expansion of water metering systems is often mentioned in the recent CASs along with decentralization of WSS services. Although these two activities were mentioned in the earlier documents, they do not appear as often, thus they were not prioritized as highly. Table F2 compares the highest priority activities in the subject CASs.

Table F2. The 2003 Strategy Focuses on Class 2 Challenges

<i>Strategy does not focus on Class 1 Challenges:</i>	<i>Instead, it focuses on Class 2 Challenges:</i>
Water quality	Water resources management and development Major interventions—dams, interbasin transfers Improvement of catchment quality Improvement of utility performance Poverty targeted water services
Water conservation	Management and infrastructure, combined
Groundwater management	IWRM and political constraints Efficiency, equity, and sustainability
Watershed management	Respond to climate change—build dams, canals, dykes, and interbasin transfer schemes that meet environmental and social standards.
Institutional reform	Build dams/hydropower Use a more effective business model Tailor to country circumstances Be consistent with the CAS

Annex G

Environmental Health

1. 1. Environmental health risks consist of hazards related to poverty and lack of infrastructure including water-related diseases caused by inadequate water supply and sanitation, and respiratory diseases caused by poor indoor air quality; but they also include modern hazards, such as urban air pollution and exposure to agro-industrial chemicals and waste. But about 80 percent of illnesses in developing countries are water-related. Millions are blinded, disabled, or malnourished by water-borne illness or pollutants. Cholera, typhoid, Guinea-worm disease, dengue fever, river blindness, polio, malaria and diarrhea are all directly or indirectly associated with water and often affect the poor disproportionately.
2. Recognition of the potential contribution of water supply and sanitation (WSS) to health outcomes in the Bank's WSS sector dates back to the 1993 strategy for water resources, although the concept appeared in project documents much earlier. The strategy emphasized the potential health benefits of clean water supply and better hygiene, particularly their role in reducing the incidence of diarrheal diseases. It also advocated public health education, particularly on the safe handling of water, to change hygiene behaviors and improve health outcomes, particularly among the poor.
3. The 2003 sector strategy had health objectives and priorities similar to those of the water strategy issued 10 years earlier. The strategy acknowledged the critical relation between better sanitation and hygiene and improved health outcomes, noting that the health benefits from WSS investments depend on a "three-pronged strategy: (i) access to sufficient quantities of water; (ii) sanitary disposal of excreta; and (iii) sound hygiene practices." Improving health outcomes is recognized as one of five "cross-cutting operational, policy, and institutional priorities," requiring both investment in WSS infrastructure as well as behavior change. The creation of the Sanitation, Hygiene, and Wastewater Advisory Service (SWAT) in 2004 and the hiring of a health specialist for the WSS program in 2005 are evidence of the heightened commitment to improving health outcomes in the 2003 strategy.¹
4. IEG identified health-relevant projects—largely water supply, sanitation, and sewerage projects—and looked at what activities were actually undertaken, including training and outreach, and what could be learned about the results and effectiveness of that work.
5. With respect specifically to environmental health improvements, sewerage projects are often not meeting appraisal expectations. As most projects intend to achieve critically important environmental impacts, it is striking that ex post evaluations too often report suboptimal results:
 - The amount of infrastructure built or repaired is commonly less than what was planned at appraisal.
 - The numbers of beneficiaries served has consistently been less than promised.

1. IEG-World Bank. 2008.

- And most sewerage projects did not deliver the intended service to the targeted population and wastewater treatment often did not improve downstream water quality.

HYGIENE EDUCATION

6. The MDGs aim at cutting in half the number of households without access to safe drinking water and basic sanitation and reducing child mortality by two-thirds. These two goals are interrelated in that clean water and access to sanitation are critical to containing the spread of infectious diseases.¹ For instance, diarrhea (see Box G1) is a waterborne disease with huge impacts on children.

7. With respect to the relationship between better sanitation and hygiene and improved health outcomes, a 2008 IEG discussion paper that reviewed the evidence available from impact evaluations on water and health found overwhelming evidence that hand washing, sanitation, and household and point-of-use water treatment can improve health outcomes.² In the current IEG Water

evaluation, a total of 26 projects focused on hand washing with soap. In addition to national hand washing campaigns, programs focused on schools, health centers, and individual households. As with other hygiene practices, ensuring that hand washing facilities and soap are available at an affordable price is a precondition for hand washing campaigns to be effective.

8. Few impact evaluations reviewed by the IEG 2008 discussion paper focused on sanitation interventions. But of the seven that did, six (86 percent) show positive impact on health outcomes and the Fewtrell et al. (2005) meta-study (based on two cases) shows an overall positive effect of installing latrines. Three studies, Walker (1999), Root (2001), and Moraes (2003), find reductions in diarrhea incidence of over 60 percent in areas that have built sanitation systems.

9. The positive impacts of sanitation interventions are greater when spillover effects – that is, their environmental health benefits – are considered. One impact evaluation that does so is Root’s (2001) analysis of latrines in Zimbabwe. Households without latrines had lower diarrhea rates if their neighbors had a latrine than if they did not.

Box G1. Diarrhea, a Major Killer

Diarrhea claims the lives of 1.8 million children under the age of five each year (UN 2006). Diarrheal diseases remain among the five top preventable killers of children under five in developing countries and in many, among the top two (Bhargava and others 2006). According to the World Health Organization, poor sanitation, lack of access to clean water, and inadequate hygiene account for approximately 90 percent of childhood diarrhea (WHO 2004). The incidence of diarrhea is highest in Sub-Saharan Africa and Latin America, and among children below the age of five, with incidence rates peaking in infants age 6 to 11 months. There is, however, a strong correlation between unhygienic conditions of poor households and communities and the frequency and severity of diarrheal episodes. Improvements in water supply and sanitation infrastructure and behavior change activities have been shown to improve health outcomes, particularly the incidence of diarrheal and other water-related diseases in developing countries (WHO 2004).

Source: Bhargava and others, WHO 2004.

1. See Jalan and Ravallion (2003), among others.

2. “What Works in Water Supply and Sanitation? Lessons from Impact Evaluations” (IEG, 2008)

ANNEX G ENVIRONMENTAL HEALTH

10. Recent estimates suggest that *easily achievable improvements* in water, sanitation, and hygiene could reduce the total burden of disease in Africa and Southeast Asia by 4-5 percent.¹ Still, the health benefits of the World Bank's WSS investments remain obscure. While half of the 117 WSS projects evaluated for the 2008 IEG Health (HNP) evaluation cited potential health benefits and 89 percent financed infrastructure that plausibly could have improved health, only one in 10 had an objective to improve health. Projects approved more recently (FY02-06) are even less likely to have been justified by health benefits, to have explicit health objectives, or to plan to collect health indicators. And only 14 water projects included health benefits in their economic analysis.

11. Hygiene education is important since providing safe water and sanitation alone is never enough to ensure health benefits. Unless beneficiaries understand health and hygiene behavior they will not reap health benefits of having cleaner water in their environment. In addition, there is no point in constructing sanitation facilities that will not be used (the evaluation found ample instances of such cases): beneficiaries need to change their behavior and actually use the facilities.

12. Looking specifically at hygiene education in the context of water projects and water-related behavior reveals that, at the beginning of the period studied, Bank projects did little about it.² Initiatives specifically related to sanitation, hygiene, and health became more common after 2000, following the World Water Forum and the adoption of the MDGs.

13. About 15 percent of the 637 water supply projects in the water portfolio were found to include hygiene education. Sanitation projects, on the other hand, do a much better job of routinely promoting hygiene – 41 percent of the 181 projects with sanitation activities included hygiene education. In order to integrate water supply, sanitation, and hygiene education, projects have to break down institutional silos and bring together staff from different disciplines. In addition, water professionals need to team up with health educators and those involved in social marketing. With the establishment of a single Sector Board, some staff claim that their links to other sectors such as health, nutrition, and population and human development have suffered.

14. Looking at what worked in hygiene education reveals that first, hygiene education has to be coordinated with the provision of physical infrastructure to be effective. Training and awareness activities have little impact when water is provided at a later date. The evaluation team analyzed a total of 132 hygiene projects, and found that roughly half (63 hygiene

1. Cairncross and Valmanis 2006, p. 789. Water supply, sanitation and hygiene promotion (Chapter 41) in: 'Disease Control Priorities in Developing Countries' Jamison, D. T., Breman, J. G., Measham, A. R. et al. (2006) The World Bank (Washington DC) :771-792. "The proportion of the total disease burden attributable to water, sanitation, and hygiene is greatest in the high-mortality countries of the Eastern Mediterranean region, reaching 6 to 7 percent of the total. They are followed by the high-mortality countries of Southeast Asia and Africa, where the water and sanitation complex accounts for 4 to 5 percent of the total. Globally, improvements in water supply, sanitation, and hygiene could eliminate 3 to 4 percent of the global burden of disease."

2. See Pitman 2002.

projects) implemented water supply, sanitation, and hygiene activities together in one project.

15. With respect to what worked and what did not in hygiene education, conducting ex-ante assessments to determine pre-project hygiene behaviors and social and cultural norms is critical to make hygiene education messages more effective (see Box G2). Targeting women and children proved to be particularly effective to promote better hygiene practices. Finally, in more recent projects, the use of mass media, such as radio, television programs, and street theater, allowed hygiene messages to reach a large audience and reinforce messages over time, an approach that may be promising for the future.

16. When project activities required the coordination of different ministries (notably ones responsible for water, health, and education) it proved a major challenge (see Table G1). For that reason, in complex projects, providing technical assistance to the ministries dealing with hygiene education (be it water, health, or education) may help to encourage lasting institutional reform. Special attention needs to be given to projects with a complex institutional framework so that the necessary coordination among different ministries actually favors the effective implementation of hygiene education along with the installation of water and sanitation facilities. In this respect, sustainability rides particularly on the involvement of the ministry of health, as the only grouping with a mandate of continuing to support hygiene activities once the civil works are completed.

Box G2. Success Factors in Hygiene Education: Some Project Examples

In the Ghana Community Water and Sanitation Project, completed in 2001, hygiene education was front-loaded into the process of mobilizing and training communities to manage their water supply and sanitation facilities in order to ensure that the health aspects of water and sanitation were captured as fully as possible.

The 2002 Second Karnataka Rural Water Supply and Sanitation Project in India is being implemented as a social marketing program by developing and disseminating information, education, and communication (IEC) materials. The materials will be of two types: interpersonal, such as brochures, flip charts, manuals, stickers, etc., and mass media materials. The latter will be in three categories: folk program campaigns, wall paintings/posters, audio cassettes disseminated chiefly through radio, and audio/video spots/movies chiefly to be disseminated through television.

Source: IEG Water Database

Table G1. Communities Receiving Hygiene Education

<i>Beneficiaries</i>	<i>Completed projects</i>	<i>Ongoing projects</i>
Hygiene promotion addresses women and children	18	17
Hygiene promotion addresses schools	17	16
Hygiene promotion addresses the poorest households	1	11
Health centers addressed	1	5

Source: IEG Water Database, Total Number of Projects in the Hygiene Portfolio: 132
Total number of projects for which communities were identified: 27 for completed projects and 29 for ongoing projects.

ANNEX G
ENVIRONMENTAL HEALTH

Table G2. Activities in Hygiene Education Projects

<i>Activity</i>	<i>Completed projects</i>	<i>Ongoing projects</i>
Hygiene education and training provided	58	42
Hygiene messages and communication strategies developed	12	17
Hygiene training materials developed	10	15
Hand washing with soap promoted	13	13
Equipment for hygiene promotion purchased	2	0
Mass media involved for dissemination	1	17
Hygiene promotion undertaken	0	32
Strategic hygiene campaign organized	0	17

Source: IEG water database, Total Number of Projects: 132

Table G3. Partners Providing Hygiene Education

<i>Actors</i>	<i>Completed projects</i>	<i>Ongoing projects</i>
Communities participate in hygiene promotion	23	17
NGOs involved in hygiene promotion	8	12
Other donors involved in hygiene promotion	7	7
PSP promotes hygiene practices	3	13
WUAs involved in hygiene promotion	0	9

Source: IEG water database, Total Number of Projects: 132

Table G4. Difficulties with Coordinating Hygiene Education Activities

<i>Project ID</i>	<i>Country</i>	<i>Project year</i>	<i>Approval FY</i>	<i>Coordinating hygiene education activities</i>
P000297	Burkina Faso	BF-Urb Env (FY95)	1995	Regarding the school sanitation component, the hygiene education component to be financed by the EU did not materialize and this hampered the consolidation of the outcomes in schools.
P049924	Ecuador	EC Rural Water Supply & Sanitation	2001	Insufficient attention was given by water boards and users to water quality. In many systems, proper disinfection procedure was not followed, resulting in insufficient chlorine residuals in the network. In a few cases, a poor choice of surface water source (prone to contamination or high in turbidity) results in high costs of disinfection. There was no assessment of water sources, or planning/budgeting for protection of water sources in the majority of projects assessed.
P010369	India	Maharashtra Rural Water Supply & Environmental Sanitation	1991	The project could not deliver fully satisfactory development results because of institutional and financial shortcomings.
P040566	Morocco	Rural Water Supply & Sanitation Project	1998	In retrospect, two main shortcomings were identified in project's design. First, the project did not include any formal coordination mechanism

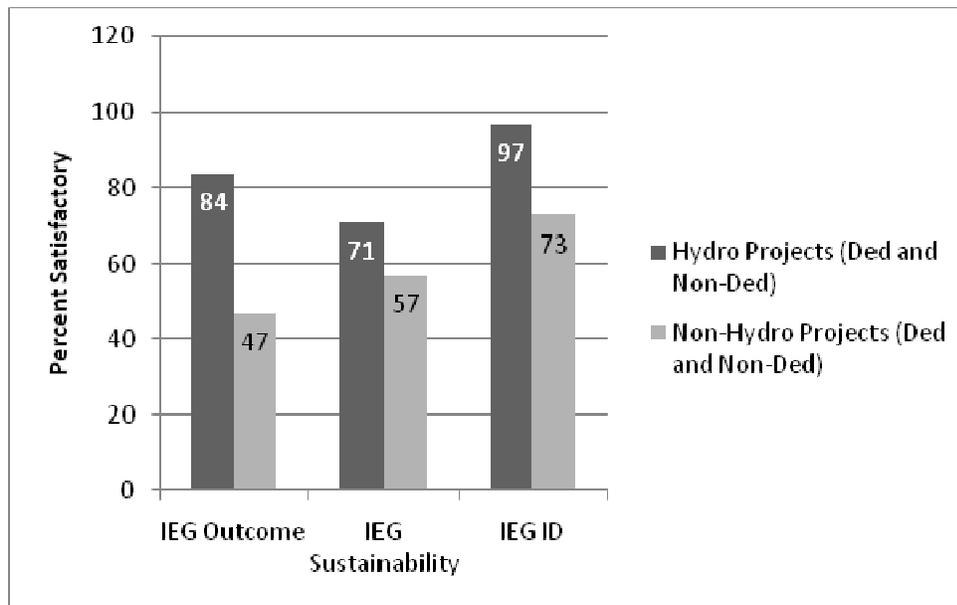
<i>Project ID</i>	<i>Country</i>	<i>Project year</i>	<i>Approval FY</i>	<i>Coordinating hygiene education activities</i>
				and/or specific budget allocation to enable the Ministry of Health (MOH) to carry out the activities under its responsibilities (control of water quality and sanitary conditions of water points, and hygiene education). Second, the fact that the sanitation component was entirely financed by beneficiaries and rural communes made monitoring difficult.
P041303	Morocco	Emergency Drought Recovery	1996	Coordination between the water utility ONEP and the Ministry of Health was missing. Due to the emergency nature of the project, sensitization and hygiene education of the beneficiaries was cut short and could affect the sustainability of public fountains.
P010478	Pakistan	NWFP-Community Infrastructure Project	1996	Difficulties with coordinating sanitation and hygiene education. Sanitation was limited to health and hygiene education. Neither the "incentives for on-plot sanitation" nor pre-treatment ponds, envisioned in the SAR, were implemented due to change in government policy of providing household grants.
P010366	Pakistan	Rural Water Project	1991	Sanitation and hygiene education components were cancelled because of a lack of coordination between the Public Health Engineering Department and social organizers.
P004561	Philippines	First Water Supply, Sewerage & Sanitation Sector Project	1990	Educational materials were distributed to support the sanitary and hygienic use of latrines. Many of these materials, although fully distributed to the Regional Departments of Education, Culture and Sports (DECS) by DOH, were often subject to long delays in redistribution to the intended end users (primary schools), which would have diminished somewhat the benefits of the facilities, and in particular could have had some effect on the number of observed toilets which failed due to improper sanitation practices.
P008867	Turkmenistan	Water Supply & Sanitation Project	1997	The broad design of the project to cover both urban and rural water supply, in addition to water quality, sanitation, health and hygiene components, made it difficult to coordinate activities between the multiple institutions responsible for each of these sub-sectors in Turkmenistan.
P002981	Uganda	Northern Uganda Social Action Fund	1992	Unsatisfactory NGO performance impeded the health and hygiene education activities. While NGOs certified the completion of successful boreholes, the health and hygiene education was only partially completed.

Annex H

Dams and Hydropower

Hydropower Projects Performed Particularly Well

Figure H1. Projects Involving Hydropower Were Rated Higher than Non-Hydro Dam Projects



Source: IEG water database

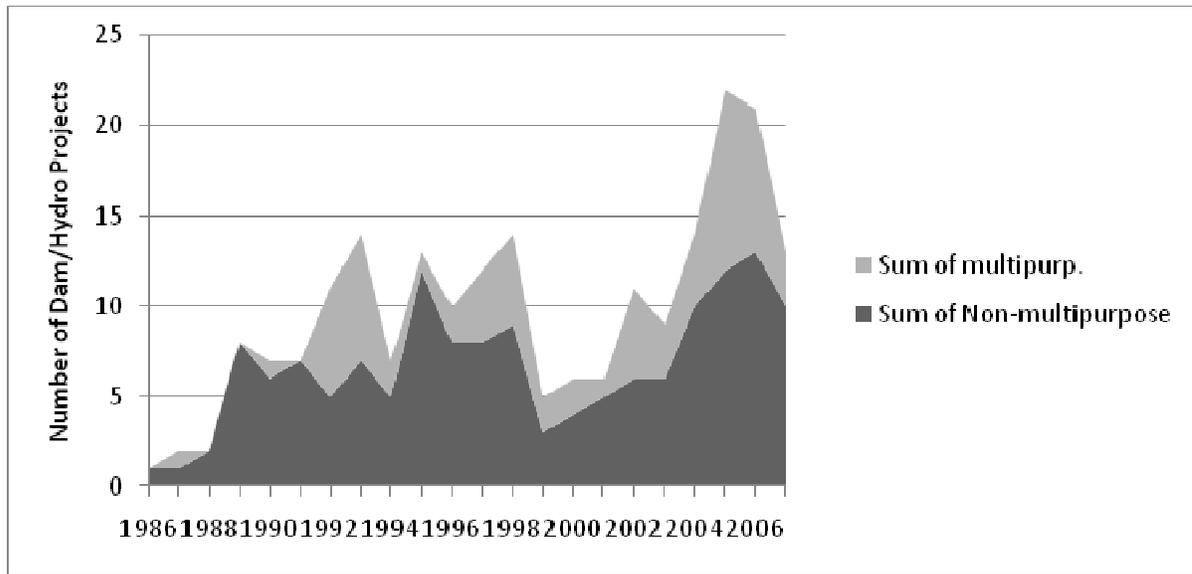
Multipurpose Hydropower Projects Address Several Water-Related Sectors Jointly

The Water Sector Board sees “new” hydro as demanding more sophisticated integration across disciplines, across water uses, across broader energy and water resources opportunities, across stakeholders (local and international), and across lending, reform and capacity building.¹ The “new” emphasis involves more projects that address both water supply and energy security. These multipurpose hydro projects, in addition to delivering electric power, also serve other water resource uses such as irrigation, flood protection, or water supply for people or industry.

The dams/hydro portfolio contains 100 hydropower projects representing \$11 billion in loans/grants at the project, component, and activity levels. Fifty seven of these are multipurpose hydropower projects, the ratings for which are on average better than those for the non-multipurpose hydropower projects. This seems to be the direction the sector is heading, given that the number of dedicated multipurpose hydropower projects approved per year has been increasing (see Figure H3). Regardless of average outcome ratings, the choice of the best type of hydro-project is of course context specific.

1. From ppt Hydro 2004 Porto Portugal Jamal Saghir

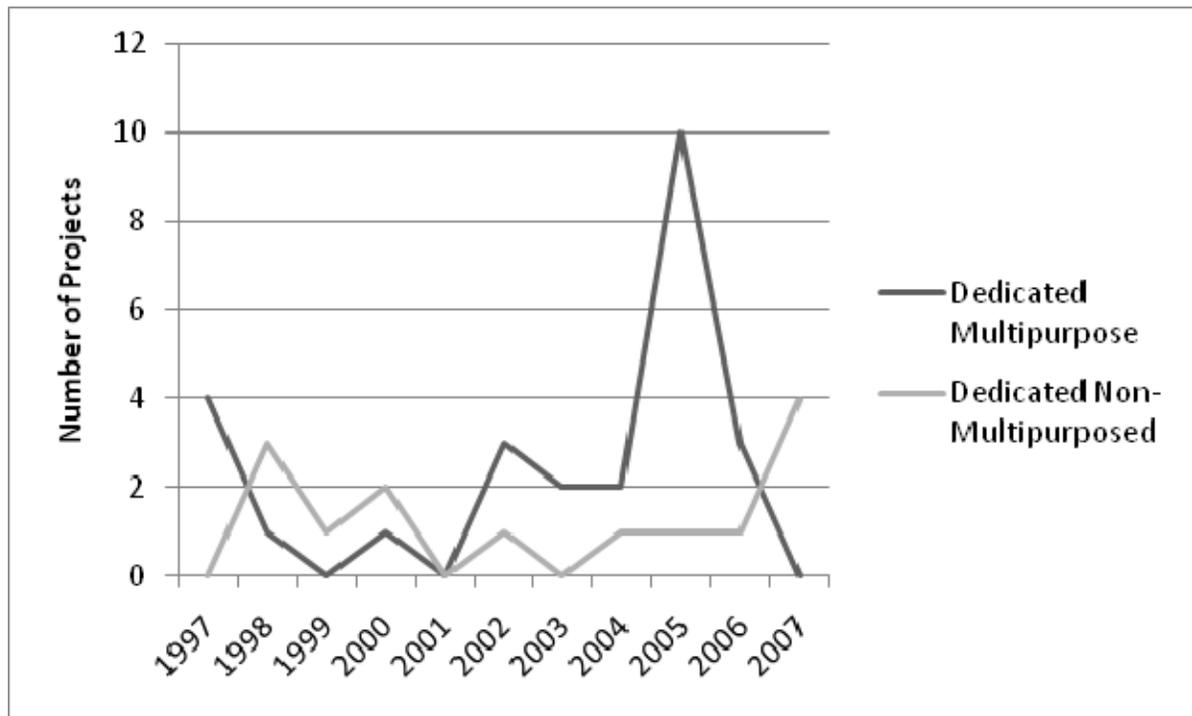
Figure H2. Multipurpose versus Non-Multipurpose Dam/Hydro Projects



Source: IEG water database

1.2

Figure H3. The Number of Dedicated Multipurpose Projects Has Increased over Time



Source: IEG water database

**ANNEX H
DAMS AND HYDROPOWER**

Table H1. Number of Large Dams Completed During Study Period

<i>Project ID</i>	<i>Country</i>	<i>Project name</i>	<i>Approval year</i>	<i>project status</i>	<i>New dam</i>	<i>Large dam</i>	<i>Total Amount</i>
P006036	Argentina	Yacyreta II	1993	Closed	Yacyreta dam. The project completed an earth dam of about 65 km long with a uniform elevation above sea level of 86m, and a maximum height of 42m (1996);	1	300
P035728	Brazil	State of Bahia Water Resources Management	1998	Closed	Ponto Novo and Pindobaçu	2	51
P000310	Burkina Faso	Engineering Credit	1993	Closed	Ziga dam	1	4.2
P000457	Central African Republic	Energy	1989	Closed	M'Bali river storage dam	1	18
P003493	China	Inland Waterways	1995	Closed	Guigang dam, Dayuandu dam	2	210
P003492	China	Daguangba-Hainan Ertan Hydroelectric Project	1992	Closed	A 56 m high, 719 m long concrete gravity dam;	1	67
P003506	China	Ertan II Hydroelectric Project	1992	Closed	240m	1	380
P003507	China	Ertan II Hydroelectric Project	1996	Closed	244m	1	400
P003526	China	Shuikou Hydroelectric Project II	1993	Closed	101m	1	100
P003562	China	Xiaolangdi Multipurpose	1994	Closed	154m	1	460
P003596	China	Yangtze Basin Water Resources	1995	Closed	128m RCC gravity dam	1	552
P003616	China	CN-Tianhuangping Hydroelectric Project	1993	Closed	72m, earth rockfill	1	300
P034081	China	Xiaolangdi Multipurpose II	1997	Closed	154m rockfill dam	1	430
P046563	China	Second Tarim Basin	1998	Closed	18 meter	1	150
P046564	China	CN - Gansu & Inner Mongolia Poverty Red.	1999	Closed 99	Construction of a new dam	1	160
P049665	China	CN-Anning Valley Agric. Development	1999	Closed 99	93 m rockfill dam	1	120
P056424	China	CN-Tongbai Pumped Storage	2000	Closed 99	68.3 meter dam	1	320
P056199	China	CN-3rd Inland Waterways	2001	Closed 01	15 meter high dam	1	100
P008365	Cyprus	Southern Conveyor II	1988	Closed	Kouris Dam and the Akhna dam	2	30
P000736	Ethiopia	ET-Energy 2 (FY98)	1998	Closed	Rock fill dam with a maximum height of 41m	1	200

ANNEX H
DAMS AND HYDROPOWER

<i>Project ID</i>	<i>Country</i>	<i>Project name</i>	<i>Approval year</i>	<i>project status</i>	<i>New dam</i>	<i>Large dam</i>	<i>Total Amount</i>
P000771	Ethiopia	ET-Soc Rehab & Dev Fund (FY96)	1996	Closed	Tebi Dam in Amhara	1	120
P009869	India	Nathpa Jhakri Power Project	1989	Closed	60m gravity dam	1	485
P009898	India	Upper Krishna Phase	1989	Closed	Earth fill dam 40m, plus another at 29m.	1	325
P003910	Indonesia	Sumatera & Kalimantan Power	1994	Closed	18.3m (9m above river bed), run of river hydro	1	261
P001340	Kenya	3RD Nairobi Water Supply	1990	Closed	Thika dam supplying Nairobi, 63m rolled earthfill	1	64.8
P001396	Lesotho	Highland WTR.I	1992	Closed	182 meter-high concrete arch dam; 55 meter-high concrete gravity arch dam other infrastructure facilities;	1	110
P001409	Lesotho	LS-Hiland Water IB (FY98)	1998	Closed	145m rockfill dam and hydro plant	1	45
P001642	Malawi	Infrastructure I	1990	Closed	raise one 4.5m and build one 20m high	1	28.8
P001662	Malawi	MW Power V	1992	Closed	Kapichira dam (55m high)	1	55
P001667	Malawi	MW-National Water Development (BD FY95)	1995	Closed	The Zomba dam -- a 47m high rock-fill dam	1	79.2
P007609	Mexico	Hydroelectric Development	1989	Closed	The Aguamilpa Hydroelectric Project: concrete faced rock-filled dam, 187 m high, 675 m wide	1	460
P002428	Sierra Leone	SL-Urban Water Supply	1995	Closed	70m	1	36
P002756	Tanzania	TZ-Power VI	1993	Closed	25m; referred to as 35m in another section of the SAR.	1	200
P009019	Turkey	Berke Hydro Plant	1992	Closed	Construction of arch dam with & height of 201 m	1	270
P004834	Vietnam	Irrigation Rehabilitation Project	1995	Closed	18.7m	1	100

ANNEX H
DAMS AND HYDROPOWER

Table H2. Number of Large Dams in Ongoing Water Portfolio

<i>Project ID</i>	<i>Country</i>	<i>Project name</i>	<i>Approval year</i>	<i>Project status</i>	<i>New dam</i>	<i>Large dam</i>	<i>Total Amount</i>
P068049	China	CN-Hubei Hydropower Dev in Poor Areas	2002	Active 02	3 dams: 39m concrete gravity dam, a single purpose concrete gravity dam 65m, multi-purpose concrete arch dam 85m	1	105
P068058	China	CN-Yixing Pumped Storage Project	2003	Active 03	75m 35m, raise height of another	1	145
P077137	China	4TH Inland Waterways Project of Guangxi	2004	Active	2 dams: 20m	1	91
P085333	China	5TH Inland Waterways	2006	Active	18m	1	100
P076445	Lao PDR	LA-Nam Theun 2 Power Project	2005	Active 05	48m concrete gravity dam	1	42
P086801	Sierra Leone	SL-Bumbuna Env. and Social SIL (FY05)	2005	Active 05	88 m high rockfill dam	1	12.5
P086903	Sierra Leone	SL-Bumbuna Hydro Guarantee (GU) (FY05)	2005	Active	yes, guarantee for 88m dam	1	38
P087154	Tanzania	TZ-Water Sector Support SIL	2007	Active 07	doesn't say. Over 15m though.	1	200
P089659	Uganda	Private Power Generation (Bujagali)	2007	Active	30m clay core rockfill dam	1	115
P064981	Yemen, Rep.	RY-Sana'a Basin Water Mgmt Project	2003	Active 03	5 dams: 18m rockfill, 16m rockfill, 8m rockfill, 8m earthfill, and 3m cascade	1	24

Source: IEG water database

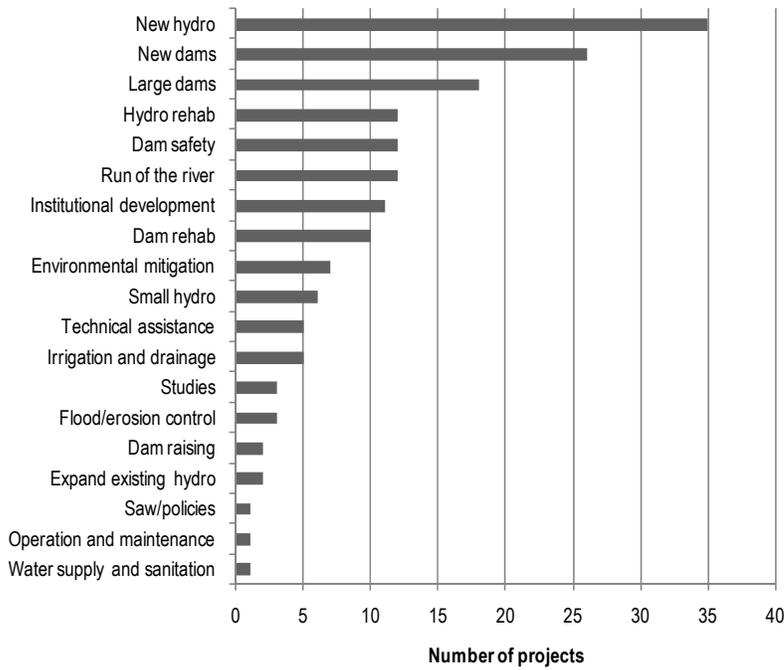
Table H3. Approvals of Major Hydropower-Related Infrastructure in US\$ (2003-08) from the 2009 Publication Directions in Hydropower

<i>Year</i>	<i>Region (Country)</i>	<i>Project</i>	<i>Total Amount</i>
2003	EAP (China)	Yixing Pumped Storage	\$145m
2004	ECA (Turkey)	Turkey Renewable Energy Project	\$202m
2004	EAP (China)	Fourth Inland Waterways	\$91m
2005	EAP (Lao PDR)	Nam Theun 2	\$270m
2005	ECA (Ukraine)	Hydropower Rehabilitation	\$106m
2006	AFR (Regional)	Felou	\$75m
2006	EAP (China)	Fifth Inland Waterways	\$100m
2007	AFR (DRC)	Inga Rehabilitation	\$297m
2008	SAR (India)	Rampur	\$400m
2008	AFR (Regional)	Niger	\$186m
2008	EAP (Philippines)	Magat Privatization	\$105m

Source: World Bank: Business Warehouse

Projects (Dedicated)

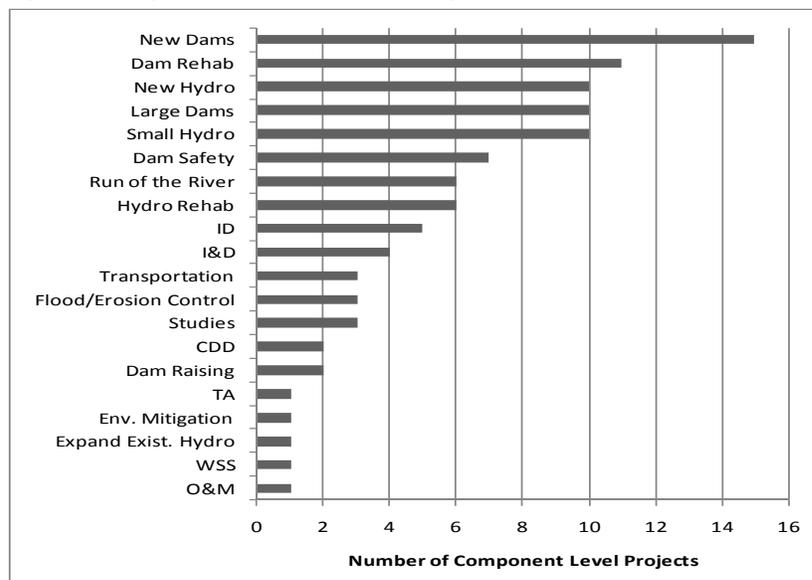
Figure H4. Dedicated Projects Deal with a Variety of Subjects. New Hydro and New Dams Are the Most Frequent (n = 69)



Source: IEG water database

Component-Level Projects (Non-Dedicated)

Figure H5. Projects with Dam Activities Only at the Component Level (n = 46)



Note: Overlaps exist between categories.

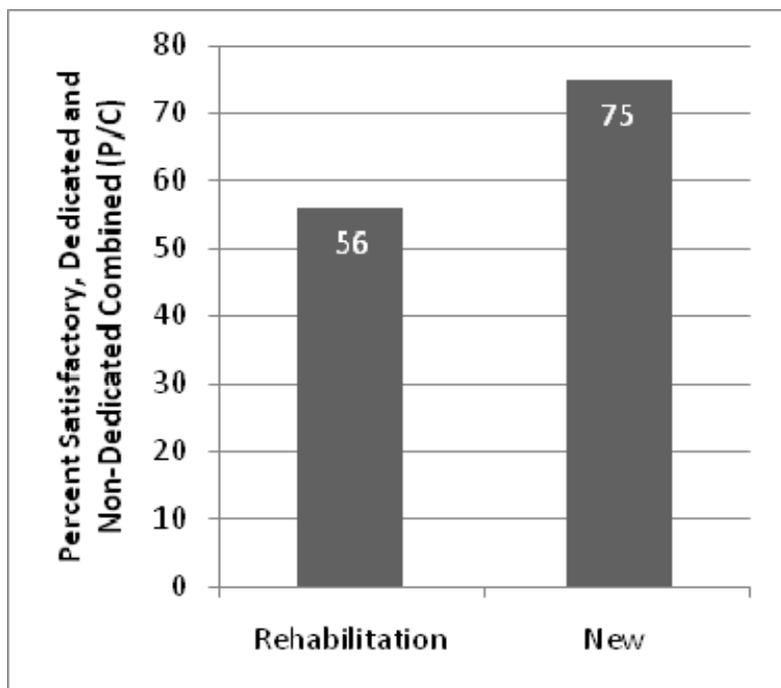
Source: IEG water database.

Building New versus Rehabilitation

Many dams face gradual deterioration as a result of lack of maintenance. Moreover, many dams are shut down due to salinity, sedimentation, and other problems. Almost a third (66) of the 211 dam/hydro projects include the rehabilitation of dams, hydro, or both (37 dam only, 24 hydro only, and 5 hydro and dam). Dam improvements can involve replacement of gates on outlet structures, excavation to make slopes more stable at critical locations, better instrumentation, repair of slope protection, and other activities.

Part of the hydropower business plan includes “growing the rehabilitation side of the business (e.g., undertaking rehab projects while scoping new projects)” as an area for emphasis. However, projects building new hydro (47) or dam (77) infrastructure rated higher than those projects involving rehabilitation.¹ Looking just at projects with dam/hydro rehab at the component or project level, 18 are closed and rated, with 56 percent of them rated satisfactory. By comparison, 36 projects involved the building of new dams/hydro, and 75 percent were rated satisfactory.

Figure H6. Projects Building New Dams/Hydro Perform Better Than Those with Dam/Hydro Rehab



Source: IEG water database

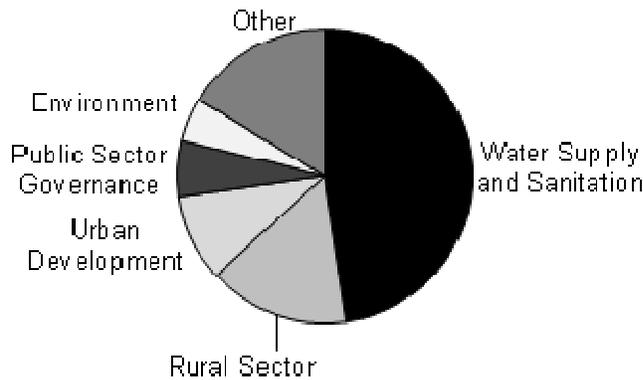
1. This includes rehabilitation, dam raising, expansion, and upgrades.

Annex I

Experience with Private Sector Involvement in the WSS Sector

To summarize the experience with private sector involvement in WSS since 1997, evidence from project self-evaluation reports and IEG Project Performance Assessments reveals that 46 out of 70 projects (that intended to facilitate PSP) implemented private sector arrangements and 24 did not. Among the 24 projects, Turkey and the República Bolivariana de Venezuela terminated the contracts prematurely. In República Bolivariana de Venezuela it happened for political reasons. In Turkey the contract was abbreviated because the operator did not reach the agreed targets for reducing unaccounted-for water. Seven countries (Algeria, Argentina, Bolivia, Nigeria, Rwanda, Tunisia, and Uganda), cancelled only one or two out of several contracts. In six countries (Guinea, Jordan, Kosovo, Sierra Leone, Trinidad and Tobago, and West Bank and Gaza), private companies managed water supply and/or sanitation efficiently for several years. However, when the contract was up for renewal, the government was reluctant or contractors were not ready to continue to work in a conflict-ridden region. Thus, water management reverted back to the public utility. The IEG water database contains 147 projects that involve the private sector. Among them, about half (70 projects), address WSS (Figure I1).

Figure I1. Private Sector Involvement in Water by Sector Board

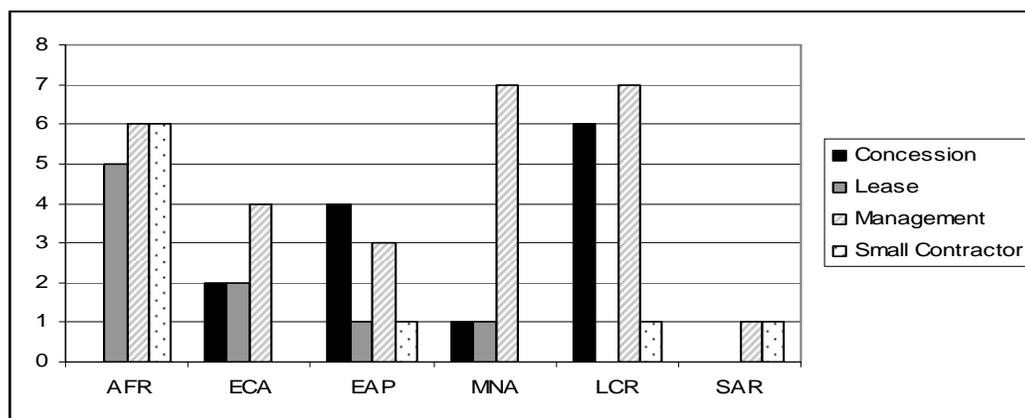


Source: IEG water database

Box I1. Forms of Private Involvement in Bank-Financed Projects

With the idea of making a lasting impact on water utility reform in developing countries, the Bank, in conjunction with IFC, developed a set of different forms of engagement with the private sector in the form of concession, lease, and management contracts. While more contract types are described in the Bank's 2006 toolkit,¹ four different contract types with varying modalities of private sector involvement can be identified²:

- Twenty- to 30-year concession contracts where the operator runs the business and finances investments, but does not finance the infrastructure asset (concession contracts were prepared for Argentina, Bolivia, Brazil, Bulgaria, China, the Dominican Republic, Indonesia, Morocco, Paraguay, the Philippines, and Romania, with the Latin American region being the most active, see figure).



- Lease contracts, where a private operator runs the business, retains revenue from customer tariffs, pays a lease fee to the contracting authority, but does not finance investments in infrastructure assets (e.g., Armenia, Guinea, Madagascar, Mozambique, the Philippines, Senegal, Turkey, and the Republic of Yemen).
- Performance-based management contracts in 28 projects (this contract form was most commonly used by the Bank and its borrowers). Under this contract type, the operator supplies management services to the utility in return for a fee.
- Local contractors mostly in low population density areas providing goods and services to communities willing to improve water and sanitation in their villages (Benin, Ethiopia, Ghana, India, Malawi, the Philippines, and Rwanda).

Source: Project research on private sector participation in urban WSS.

1. Public-Private Infrastructure Advisory Facility & World Bank, 2006

2. In practice, countries often used a combination of these types, to make contract fit their specific needs.

Table I1. Concession Contracts

<i>Project ID</i>	<i>Country</i>	<i>Name</i>	<i>Approval FY</i>	<i>Concession contract</i>	<i>Outputs and outcome</i>
P003868	Indonesia	Second Jabotabek Urban Development Project	1990	30-year concession contract awarded to two international operators.	Piped water supply increased from about 28 percent of the population to about 50 percent. Water production increased, reducing intermittent supply. Staff productivity was roughly doubled. A tariff increase of roughly 35 % approved on March 29, 2001 should improve the working ratios of the two operators.
P004611	Philippines	Manila Second Sewerage Project	1996	25-year concession contract awarded to international operator.	Total population served: 1,389,000 (East – MWCI operator: 768,000; West – MWSI operator: 621,000); MWCI shows strong performance, with the percentage of sewerage connections rising from 8% in 1997 to 15.7% in 2005. MWSI's performance was more modest in relative terms. Although the data suggest that MWSI was not able to develop its sewer/sanitation service in pace with its water service, it did increase the number of people with access to sewer/sanitation service.
P005435	Morocco	Fifth Water Supply Project	1994	30-year concession contract awarded to international operator.	A total of 61,234 social connections have been constructed, to be compared to the initial target of 47,770 forecast at appraisal.
P059510	Dominican Republic	Wastewater Disposal in Tourist Centers Projects	2000	A 20-year concession contract has been prepared. Five international operators have been interested. However, no contract has been awarded because changes in government diminished support for PSP.	N/A
P005977	Argentina	Water Supply and Sewerage Sector Project	1991	Long-term (mostly 30-year) concession contracts for Santa Fe, Santiago del Estero, Formosa, Misiones, La Rioja were awarded to international and local contractors.	The number of water supply connections has increased by 67%, from 476 to 797 connections per '000. The number of sewerage connections increased by 58%, from 252 to 398 connections per '000. By project closing, more than 60% (nearly 70%, if we include cooperatives) of Argentina's urban population were being served by private operators.

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<i>Project ID</i>	<i>Country</i>	<i>Name</i>	<i>Approval FY</i>	<i>Concession contract</i>	<i>Outputs and outcome</i>
P007926	Paraguay	Asuncion Sewerage Project	1995	Concession contract was prepared, but Congress suspended a law allowing private sector participation in water in 2000.	N/A
P008778	Romania	Bucharest Water Supply Project	1997	25-year concession contract awarded to a joint venture of national and international contractors.	Consumer complaints about water quality decreased by 20 percent from 5.64/day in 1997 to 4.52/day in 1999. Water supply availability increased from twelve to close to twenty-four hours per day in most areas of the city. Unaccounted for water decreased from 45 percent to 35 percent.
P008319	Bulgaria	Water Companies Restructuring & Modernization Project	1994	Two concession contracts prepared for Shumen and Varna. Eventually, neither one was completed due to the less than satisfactory quality of the relevant documents and incomplete understanding of the related risks and benefits.	N/A
P005945	Argentina	Water Supply Project	1986	Long-term concession arrangement with international operator for Buenos Aires, the province of Santa Fe, and Cordoba.	Financial performance of the concessioned utilities in Buenos Aires, Santa Fe and Cordoba shows a significant improvement. Water tariffs were initially reduced as a consequence of privatization, while the concessionaires have increased the billing and collection rates.
P003648	China	Second Shanghai Sewerage Project	1996	Concession contracts negotiated for Shanghai in parallel to this project.	N/A
P006368	Brazil	Water Sector Modernization Project	1992	30-year concession contract awarded to an international contractor. Contract was prepared in parallel to the project.	Implementation seemed successful, but results were not documented in Bank documents.

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<i>Project ID</i>	<i>Country</i>	<i>Name</i>	<i>Approval FY</i>	<i>Concession contract</i>	<i>Outputs and outcome</i>
P006172	Bolivia	Major Cities Water Supply & Sewerage Rehabilitation Project	1991	30-year concession contract for La Paz. A cooperative arrangement for Santa Cruz whereby the cooperative is owned by its customers. Contract cancellation in Cochabamba.	Water supply coverage over the period 1988–99 increased in La Paz and Santa Cruz, while in Cochabamba it declined. Overall, however, 416,200 people obtained assured water supplies, while the Pampahasi-Ovejuyo pipeline created a supply link for another 192,000 in the southern zone of La Paz. Thus, La Paz's household water connections rose from 75 to 92 percent. Santa Cruz did even better, with household connections increasing from 70 to 94 percent. Conversely, Cochabamba's households connected to water fell from 70 to 60 percent, and only 47,520 of the 300,000 new connections planned were achieved. While water supply availability at about 4 hours a day remained unreliable in Cochabamba, the 24 hours a day service in Santa Cruz was maintained, and in La Paz availability increased from about 19 to 22.5 hours a day.
P003586	China	Shanghai Environment Project	1994	Concessions or ownership arrangements in both the water and wastewater sectors in Shanghai was developed as well as a non-state owned Build-Operate-Transfer (BOT) operation for Zhuyuan wastewater treatment.	Implementation seemed successful, but results were not documented in World Bank documents.
<i>Source: IEG water database</i>					

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Table I2. Lease Contracts

<i>Project ID</i>	<i>Country</i>	<i>Name</i>	<i>Approval FY</i>	<i>Lease Contract</i>	<i>Outputs and outcomes</i>
P035805	Armenia	Municipal Development Project	1998	A 4-year lease contracts was awarded to a national private operator. In addition, an Investment Fund was established.	Meters were installed, fees collected, and tariffs increased. In addition, the numbers of subscribers with continuous water supply has increased from about 28% to about 50%. Furthermore, water production and quality have increase and the sewerage system was improved.
P002346	Senegal	Water Sector Project	1995	10-year lease contract was awarded to an international operator.	Meters were installed, fees collected, and tariffs increased. The private operator also installed 80,896 new connections, rehabilitated 22,079 pipes, and renewed 53,331 connections. The quality and continuity of services has considerably improved with few interruptions in the water supply. In addition, between 1996 and 2003, water production increased by 18 percent, from 264,000 m ³ /day to 312,000 m ³ /day, and unaccounted for water decreased from 31.5 percent in 1996 to 20 percent in 2003.
P001564	Madagascar	Rural Water Supply and Sanitation Pilot	1998	Lease contracts prepared and awarded to 18 private local operators for 24 small towns.	Fees were collected, but no meters were installed. A tariff study was undertaken to assess willingness to pay. More water supply systems than originally planned were built and about 400,000 people (compared to 280,000 targeted at appraisal) have gained access to safe water through the construction of 627 boreholes equipped with hand pumps and 320 gravity schemes.
P001075	Guinea	Third Water Supply and Sanitation	1997	Renegotiation of the lease / affermage contract for the water supply company was planned, but contract renegotiation failed.	Revenue collection from private customers decreased from US\$5.8 million in 1998 to US\$1.7 million in 2005. In addition, there was a tariff freeze until 2005 and tariffs actually declined in real terms. However, an estimated one million people benefited from the sludge treatment facilities. More than 200,000 people are now connected to the sewerage network in the Kaloum area, the most densely populated of Conakry.

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<i>Project ID</i>	<i>Country</i>	<i>Name</i>	<i>Approval FY</i>	<i>Lease Contract</i>	<i>Outputs and outcomes</i>
P001044	Guinea	Water Supply Project	1989	10-year lease contract was awarded to a foreign (French) investor manager.	Collection efficiency from private customers rose to a peak of 75% in 1990 but declined later due to the high tariff level. In addition, billing was revamped and computerized in an impressively short time span of less than six months. The number of connections in Conakry grew from 12,000 in 1988 to over 23,000 in 1996 and corresponding coverage grew from 40% to approximately 60%. A water treatment plant of 38,000 m ³ was installed instead of a plant of 40,000 m ³ . However, at project closing, only 11,000 out of a projected 15,000 connections could be installed, partly because the network was not long enough to reach so many additional customers.
P009093	Turkey	Antalya Water Supply & Sanitation Project	1995	10-year operating contract with a zero lease fee was signed. The contract was awarded to a national operator in a joint venture with a French operator. National operator ENKA sold its shares to Lyonnaise des Eaux shortly after start.	All connections were metered. Collections rose from annual US\$9 million in 1995 to US\$33 million as a result of higher sales and roughly doubled tariffs. In addition, the total number of water customers rose by 23% from 205,000 to 253,000 between 1996 and 2003. For water supply, the share of residential households connected to the public water supply rose from an estimated 95% at the time of appraisal to 100% from 1995 onwards. Sewerage demand was also met at least cost. In addition, annual water production rose by 12%, from 64 million m ³ in 1996 to 71 million m ³ in 2003. Water quality improved.
P039015	Mozambique	National Water Development I Project	1998	Private local lease contracts for Maputo and management contracts for Beira, Quelimane, Nampula, and Pemba.	Institutional developments have introduced new, innovative and more efficient urban water service provision regimes through the engagement of the private sector, which has reduced the burden on public spending whilst greatly improving the extent and level of services. The rural water supply component has increased sustainable access by constructing 130 water points through which 62,000 people have been served. Small piped systems using small-scale providers have increased service to 108,000 people.

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<i>Project ID</i>	<i>Country</i>	<i>Name</i>	<i>Approval FY</i>	<i>Lease Contract</i>	<i>Outputs and outcomes</i>
P039022	Philippines	Local Government Unites Urban Water & Sanitation Project Phase I	1999	Design-Build-Lease Contracts prepared. However, none of the water systems actually went into commercial operation by a private sector operator. The private sector lost interest due to the risk of low revenues and the uncertain policy environment.	N/A
P005907	Yemen, Rep.	Sana'a Water Supply & Sanitation Project	1999	Lease contract for Sana'a Local Water Supply and Sanitation Services Corporation was prepared. Unfortunately, none of the pre-qualified bidders submitted an offer.	N/A
<i>Source: IEG water database</i>					

Table I3. Performance-Based Management Contract

<i>Project ID</i>	<i>Country</i>	<i>Name</i>	<i>Approval FY</i>	<i>Performance-based management contract</i>	<i>Outputs and outcomes</i>
P004974	Algeria	Water Supply & Sewerage Rehabilitation Project	1994	Performance-based management contract awarded to an international (French) private operator.	Meters were installed, but tariffs remained low and fee collection did not improve. The water and sewerage system was rehabilitated and water quality improved. Leaks were detected and partially repaired.
P070365	Kosovo	Pilot Water Supply Project - TF	2001	Performance-based management contract with fixed management fee and with additional performance incentive compensation based on an agreed set of indicators and targets was awarded to an international (German) contractor. An Independent Reviewer (IR) was used to verify the achievements of the indicators.	Water meters were installed to 86%. A tariff increase was achieved late into the project. The installed meters lowered water consumption and thus revenues for the private operator. Water connections remained short of targets at 69%. However, water quality and continuity improved.
P064008	Nigeria	Small Towns Water Supply & Sanitation Program Pilot Project	2000	Management contract awarded to Nigerian and international contractors ranging from local artisans to multi-national companies.	Contracts were signed for 16 instead of a planned 12 small towns. Meters were installed, fees collected, and tariffs increased. Access to water and sewerage increased.

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<i>Project ID</i>	<i>Country</i>	<i>Name</i>	<i>Approval FY</i>	<i>Performance-based management contract</i>	<i>Outputs and outcomes</i>
P037006	Trinidad and Tobago	Water Sector Institutional Strengthening Project	1995	3-year management contract awarded to an international (British) operator.	Efficiency increased through metering, fee collection and a tariff increase. Water connections increased by 14 percentage points from 300 to 343 per '000. Water production increased by 30%, but was less continuously available.
P002428	Sierra Leone	Urban Water Supply Project	1995	Freetown City Council has contracted out the management of public toilets, including cleaning and collection of user fees, to the private sector, with monitoring done by the community.	Seven sanitary facilities were completed. Thirteen rehabilitated sanitary facilities were provided to a low income area with high population density in addition to five market centers spanning Greater Freetown. These now have improved environmental sanitation, hygiene education and facility management. Fee collection was modest and interrupted by the civil war.
P005731	Tunisia	Greater Tunis Sewerage & Reuse Project	1997	Build Operate Transfer (BOT) contracts awarded to private companies.	At the end of 2004, the operator's total number of customers in Tunisia reached 1.25 million, surpassing the figure of 0.99 million targeted for the end of 2005. The project's sewerage component has connected 40,640 new customers in Greater Tunis. A population of about 192,000 people have thus benefited from improved level of service and reduced urban pollution in their neighborhoods.
P007257	Guyana	Water Supply Technical Assistance & Rehabilitation Project	1994	Performance based Management Contract (MC) based on international competition awarded for five years in October 2002 to an international operator.	More than 170,000 people received safe water as a result of these interventions, raising the percentage of population with access to treated water from 36% in 2001 to 45% in 2003. 3,484 new service connections were implemented in 2003.
P008224	Venezuela	Water & Sewerage Decentralization Project in the State of Monagas	1996	4-year management contract.	Meters were installed, the collection rate improved from 29% in 1996 to 48% in 2000, and tariffs were maintained throughout project implementation. Leakage was reduced as well as unaccounted for water, and the average number of service hours per day increased from 11 to 21. In addition, 100 % of water was chlorinated.
P043367	Yemen, Rep.	Taiz Water Supply Pilot Project	1997	Management contract was not awarded.	N/A

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<i>Project ID</i>	<i>Country</i>	<i>Name</i>	<i>Approval FY</i>	<i>Performance-based management contract</i>	<i>Outputs and outcomes</i>
P040505	West Bank and Gaza	Water & Sanitation Services Project in Gaza	1997	4-year Management Contract (MC) was awarded to an international operator; plus an Investment Fund was set up. The incentive fee for the private operator was calculated by an independent auditor.	22,000 meters were repaired and 40,000 meters were installed. By the end of the project, system efficiency was reported to be at 66 percent, compared to an estimate of 50 percent at appraisal. The operator replaced 26,800 service connections, chlorinated water, and increased water production from a level of 70 liters per capita per day (lcd) in 1996 to about 100 lcd by 2000. However, following the outbreak of renewed hostilities in October 2000, this improving trend was no longer sustainable and at the end of the project, per capita usage declined to around 80 lcd.
P006894	Colombia	Santa Fe I Water Supply and Sewerage Rehabilitation Project	1996	20-year Built Operate Transfer (BOT) contract with a private firm for rehabilitating, operating, and maintaining the Tibito system. In addition, five contracts were signed with three firms to improve customer services.	Meters were installed, fees collected and tariffs increased. Water and sewerage services were provided to about 2 million additional inhabitants in the period 1996-2003. 100% of the population living in formal settlements of the city was covered. 348,000 water connections were installed. In addition, 393,000 sewer connections were installed, covering 90% of the population. Water production increased, but water sales decreased because of higher costs. Water quality and continuity improved and unaccounted-for water decreased from 184 million m ³ in 1996 to 167 million m ³ in 2003.
P005680	Tunisia	Water Supply & Sewerage Project	1995	Management contract signed.	Meters were installed, fees collected, and tariffs increased. Water supply connections increased, serving 7,760,000 people. Newly installed sewerage connections cover 84,000 people. In addition, 280 kilometers of sewerage network was constructed. Water production has increased and is more continuous. Unaccounted-for water has reached 20 percent, making the operator's performance one of the best in the region.

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<i>Project ID</i>	<i>Country</i>	<i>Name</i>	<i>Approval FY</i>	<i>Performance-based management contract</i>	<i>Outputs and outcomes</i>
P064064	Zambia	Mine Township Services Project	2000	4-year performance based management contract awarded to an international private operator (PO).	Some meters were installed. Billings rose by 54% since 2001. The collection ratio increased from about 55% to 82% and, coupled with reduced costs, resulted in a substantial improvement of the agency's operating income. Water connections increased and previously dilapidated and bypassed wastewater treatment plants were rehabilitated to full operation. Over 95% of solid waste is being collected and disposed of, contributing to environmental mitigation by ending direct discharge of sewerage into the rivers. Constancy of supply increased from an average of 13.5 hours/day to about 17 hours/day, and unaccounted-for water was substantially reduced from an estimated level of 58% to 26%.
P051564	West Bank and Gaza	Southern Area Water & Sanitation Improvement Project	1999	Performance-based management contract was not renewed because no bidders submitted bids. Security was an issue at the time. The project area was occupied by Israeli troupes.	N/A
P000217	Burundi	Water Supply Sector Project	1992	A management assistance program in partnership with a professional operator was prepared, but not implemented because of a <i>coup d'Etat</i> in 1993.	N/A
P066491	Albania	Water Supply Urgent Rehabilitation Project	2000	Private sector involvement was prepared, but not implemented.	N/A
P000901	Ghana	Water Sector Rehabilitation Project	1989	Private sector involvement was prepared, but not implemented.	N/A
P006540	Brazil	Minas Gerais Water Quality & Pollution Control	1993	Construction of a wastewater treatment plant under a Build Operate Transfer arrangement, was prepared, but not signed.	N/A

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<i>Project ID</i>	<i>Country</i>	<i>Name</i>	<i>Approval FY</i>	<i>Performance-based management contract</i>	<i>Outputs and outcomes</i>
P009065	Turkey	Bursa Water & Sanitation Project	1993	Private operator managed the waste collection and landfill operation services; meter reading, billing and invoicing.	The private operator increased efficiency with respect to meter reading, billing, and invoicing. The operating ratio declined from 89% in 1993 to 59% in 2000. The targets for working ratio were achieved - working ratio declined from 87% in 1993 to 51% in 2000. In addition, the project had substantial impact on reduction in unaccounted-for water in Bursa.
P006836	Colombia	Water Supply & Sewerage Sector Project	1988	Management contracts were signed for the cities of Cartagena and Barranquilla.	Implementation seemed successful, but results were not documented in World Bank documents.
P004169	Korea, Republic of	Kwangju & Seoul Sewerage Project	1993	Since 1998, a private operator manages the water treatment plant in Kwangju city.	Implementation seemed successful, but results were not documented in World Bank documents.
P009482	Bangladesh	Fourth Dhaka Water Supply	1997	Private sector involvement in the form of contracting-out billing and collection, was prepared, but not implemented.	N/A
P008595	Poland	Bielsko-Biala Water & Wastewater Project	1996	Management contract signed with an international contractor.	All wastewater was treated. Water became continuously available and water quality was improved. Unaccounted-for water was reduced to 47%.
P004830	Vietnam	Water Supply Project	1997	Thu Duc Build-Own-Operate (BOO) project in Ho Chi Minh City and the Song Da BOO project in Hanoi were prepared.	Implementation seemed successful, but results were not documented in World Bank documents.
P006646	Chile	Second Valparaiso Water Supply & Sewerage Project	1991	A private operator engaged for the San Antonio area (Litoral Sul).	Implementation seemed successful, but results of the private operator were not documented.
P003637	China	National Rural Water Supply Project	1997	Private sector involvement was prepared with a grant from PPIAF and many township governments are considering management contracts or leasing out O&M to a third party. Several experiments are taking place.	N/A
P003241	Zambia	Urban Restructuring & Water Supply Project	1995	Management contract for the water and sanitation systems used in addition to small contractors.	Implementation seemed successful, but results of the private operator were not documented.

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<i>Project ID</i>	<i>Country</i>	<i>Name</i>	<i>Approval FY</i>	<i>Performance-based management contract</i>	<i>Outputs and outcomes</i>
P048521	Jordan	Amman Water & Sanitation	1999	Performance-based management contract with 40 indicators was signed; plus an operations investment fund established. However, after project completion, the government decided to have WSS managed by a public utility.	The private management contract operator met or exceeded 12 of 15 performance targets. The hours of water service were to be increased from one 8 hour period in a week to 36 hours and it was actually increased to 46 hours. The number of water and sewerage network repairs target was only partially met, however. The project improved management of water and sanitation services. Operating and maintenance procedures were prepared, staff productivity was improved, an energy management plan (EMP) was developed and implemented, power consumption was reduced by 18 percent by 2004, a customer service and public information program developed and implemented, unaccounted-for water was reduced by 25 percentage points from 54 percent in 1999 to 29 percent in 2004.
<i>Source: IEG water database</i>					

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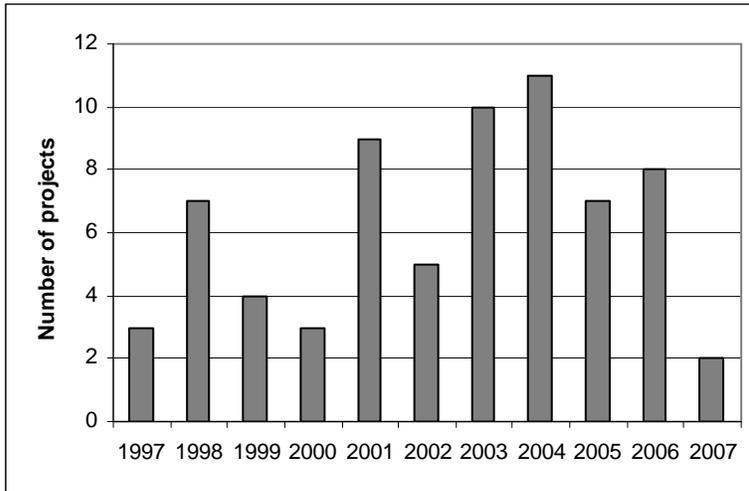
Table I4. Local Contractors Providing Goods and Services

<i>Project ID</i>	<i>Country</i>	<i>Name</i>	<i>Approval FY</i>	<i>Local contractors providing goods and services</i>	<i>Outputs and outcomes</i>
P004561	Philippines	Water Supply, Sewerage & Sewerage Project	1990	Small contracts with private well drillers, and manufacturers; in addition, Local Competitive Bidding (LCB) was used to construct school wells.	A total of 7,150 shallow well hand pumps, 1,900 deep well hand pumps, and 100% of plastic toilet bowls (650,000) were locally produced. Training was provided to increase water quality.
P000924	Ghana	Community Water & Sanitation Project	1994	Individual contracts with local operators.	320,000 rural inhabitants have access to new water points; 120,000 residents have improved water in 29 towns; 1,288 new water points were installed; and 2,610 conversions were completed. In addition, 29 small town systems were completed. Approximately 93 percent of the rural water facilities surveyed (all of which were at least two years old) are adequately functioning. With respect to sewerage, 6,000 household latrines have been constructed, serving about 36,000 people.
P050616	Ghana	Community Water	2000	Private sector activity at the district level was significant and over 300 contracts were issued to the private sector.	The project provided an estimated 794,900 people (representing about 6% of the total rural population in Ghana) in 2,000 communities with safe water supply and sanitation facilities.
P002222	Rwanda	Community Water & Sanitation Project	1987	Local Small and Medium Enterprises (SMEs), private engineering firms and NGOs to be contracted. However, participation of the private sector encountered difficulties and hardships because of contract cancellations, non-payment of claims by the government and deteriorated security conditions in the project area.	N/A

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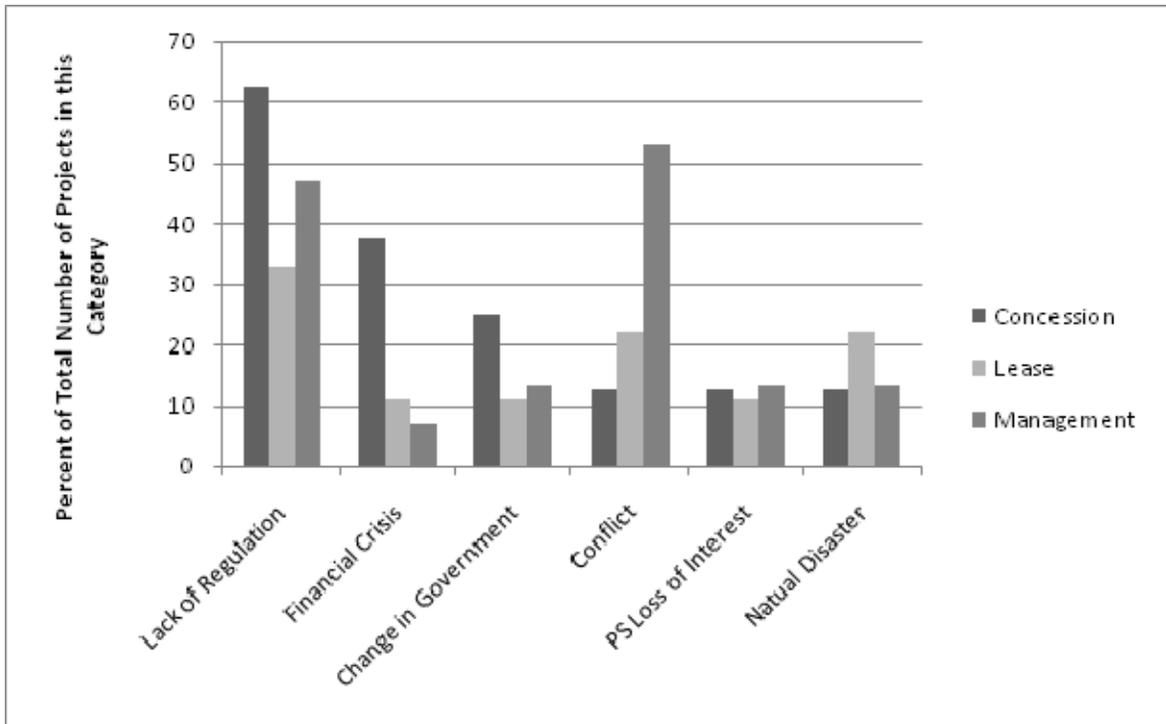
<i>Project ID</i>	<i>Country</i>	<i>Name</i>	<i>Approval FY</i>	<i>Local contractors providing goods and services</i>	<i>Outputs and outcomes</i>
P001667	Malawi	MW-National Water Development (BD FY95)	1995	Over 50% of the project was carried out by local experts, artisans, consultants, suppliers and contractors.	Water production and sales increased. Unaccounted-for water decreased from 32% in 1999/2000 to 27% in 2003. Tariffs were increased.
P000764	Ethiopia	ET-Water Supply Dev & Rehab (BD FY96)	1996	Private contractors provided goods and services and participated in the management of water and sanitation systems.	Partnerships between communities, local private sector and districts has been developed and piloted in 109 communities. Forty six community water systems were rehabilitated. Eight districts developed and piloted sustainable rural water supply & sanitation management systems to support communities. Four regions developed an enhanced capacity to support sustainable rural water supply & sanitation management systems. Although hygiene promotion has been carried out in eight districts, improvements in sanitation and hygiene are limited.
P000121	Benin	Rural Water Supply & Sanitation Project	1994	Local private operators and artisans provided goods and services.	A total of 323 rural systems were completed; 120 rural systems were partially completed; 162 water points were also completed. 296 school latrines and 285 rainwater systems were constructed. In addition, local artisans built 809 household latrines. 99 percent of systems have water available throughout the year. With respect to cost recovery, 65 percent communities practice "pay as you fetch" 94 percent have a bank account.
P010418	India	Karnataka Rural Water Supply & Environmental Sanitation Project	1993	Local private operators and artisans provided goods and services.	N/A
<i>Source:</i> IEG water database					

Figure I3. Water Projects with Private Sector Involvement by Exit Year (1997-2007)



Source: IEG water database

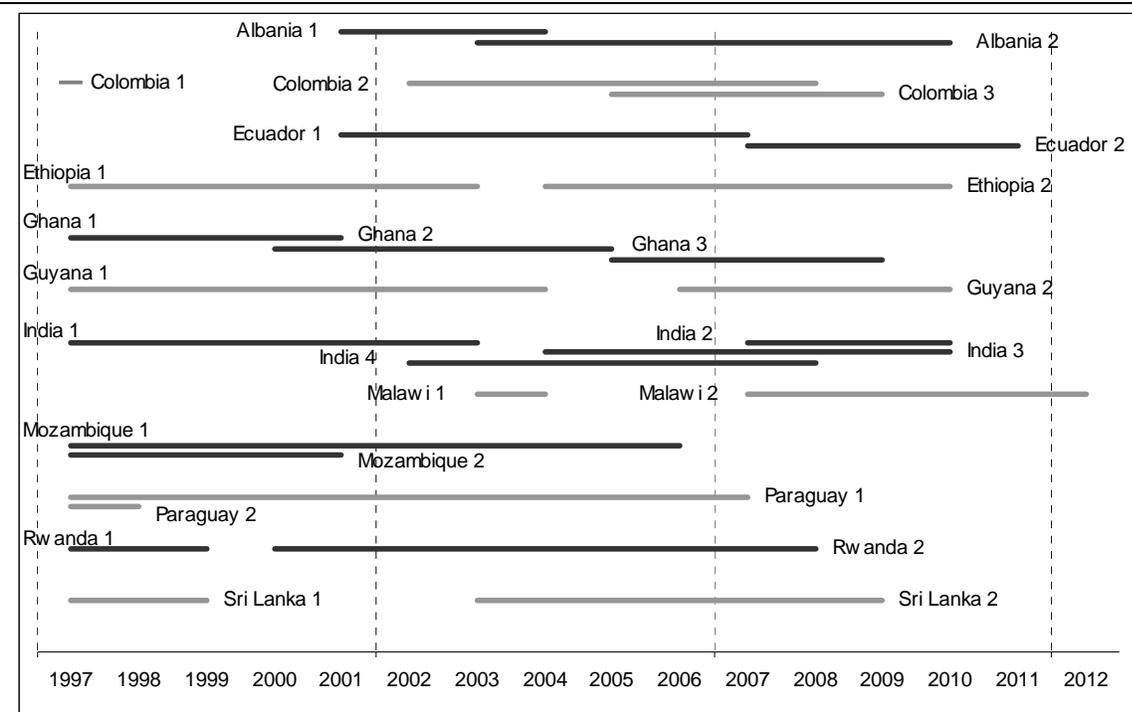
Figure I4. Among the Obstacles to PSP Are Conflicts and the Lack of Regulation



Source: IEG water database

Private Sector Participation in Rural WSS

Figure I5. The Bank Has Made a Long-Term Commitment to Foster PSP in RWSS in Some Countries



Note: Projects are mapped by Approval FY. Approval Years before 1997 are not reflected in this Figure, meaning that a project may have started in 1988, but is only shown in its final year of 1997 as is the case for Colombia 1, for example.

Table I5. Activities Undertaken During Project Implementation to Create Enabling Environment for PSP

<i>Activity</i>	<i>Number of Projects</i>
Policy framework for private sector participation developed	19
Private sector capacity building in rural areas undertaken	12
Studies undertaken on private sector participation	12
Contracts and management models prepared for private sector involvement	8

* Total number of completed projects: 34

Table I6. Activities Undertaken by the Private Sector in RWSS Projects

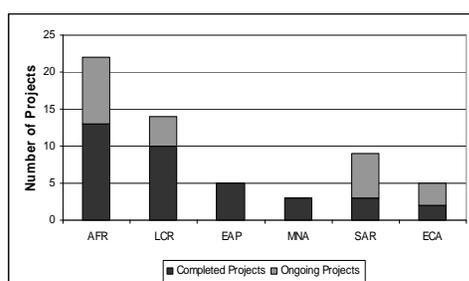
Activity	Percentage of completed projects*	Percentage of ongoing projects**
PS involved in new construction of WS systems	41	55
PS involved in the provision of O&M	35	64
PS provision of goods and services	21	50
PS involved in the design of RWSS	15	32
PS rehabilitates community water systems	12	9
PS responsible for spare part distribution	12	23
PS involved in toilet manufacturing	9	5
PS involved in construction supervision	9	5
PS involved in hygiene promotion	9	0
PS involved in monitoring and data collection of RWSS facilities/coverage	3	14
PS supports community RWSS management systems	3	18
PS involved in information dissemination	0	5
PS involved in water quality monitoring	0	9
PS to collect user fees	0	5

*34 completed projects; **22 ongoing projects;

Box I2. Comparing RWSS Projects with PSP with the Whole RWSS

Comparing RWSS project with PSP with the whole RWSS portfolio reveals that Bank financing for ongoing private sector involvement in the MNA and EAP regions is absent (see Figure A). A lack of private sector engagement does not mean that the Bank is not financing RWSS in those regions (see Figure B), it means that the Bank is not supporting PSP in rural areas. In both regions, PSP is fairly recent and started with providing WSS services to urban areas. According to a 2008 OECD study¹, Algeria, Egypt, Jordan, Lebanon, Morocco, Tunisia, and West Bank and Gaza have outsourced WSS services to the private sector only since the late 1990s. In these countries, between 10 and 40 percent of the population is served by the private sector, mostly in urban areas. In the EAP region, the private sector also focused on urban areas in Vietnam, China, and the Philippines, and on Build Operate Transfer (BOT) contracts for sewerage in China, for example.

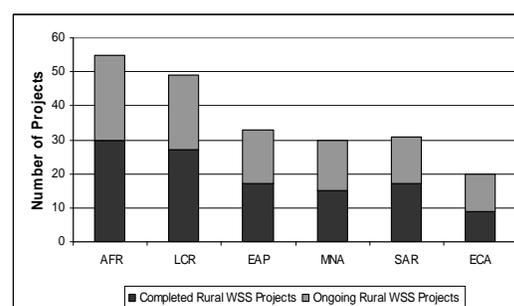
A.



Total Number of Projects: 56 (34 Completed, 22 Ongoing)

Source: IEG water database

B.



Total Number of Projects: 218 (115 Completed, 103 Ongoing)

1. Perard, Eduard, (2008). *Private Sector Participation and Regulatory Reform in Water Supply: The Southern Mediterranean Experience*. Working Paper No. 265. OECD Development Center. Paris, France.

Box I3. Lessons from the Colombia Self-Evaluation Report Reflect Upon How to Better Engage the Private Sector in Small Municipalities

The predominant difficulty encountered by involving the private sector in rural areas is the problem of economies of scale. Water and sewerage companies in large and medium-size cities are attractive for the private sector. It is in smaller cities – remote, with no technical or managerial capacities and where political interference is most prevalent – where the efforts to attract private participation need to be directed. A favorable environment should be developed for such cases. Lessons from a Colombia self-evaluation recommend the following:

- merging of small neighboring utilities to create regional companies
- increasing competition by reducing the stringent requirements for prior experience of the private sector and thus encouraging buildup of local capacity
- providing concessional financing terms to small utilities that incorporate the private sector
- providing TA in preparing the PSP process
- providing transparent subsidies for non-profitable utilities

Source: Colombia - Water Supply and Sewerage Sector Project, Closing FY 1997 (P006836)

Annex J

Supplemental Data

This annex contains supplemental charts and tabular data organized by chapter and subject.

Chapter 2

COUNTRY RANKINGS

Table J1. Ranking of Borrowing Countries, 1997-2007

Country	Number of projects	
	Water portfolio	Entire Bank portfolio
China	1	2
Brazil	2	1
India	3	3
Indonesia	4	5
Vietnam	5	7
Philippines	6	17
Tanzania	7	15
Mexico	8	6
Argentina	9	4
Uganda	10	21

PROJECT PERFORMANCE

Figure J1. Outcome Ratings By Year

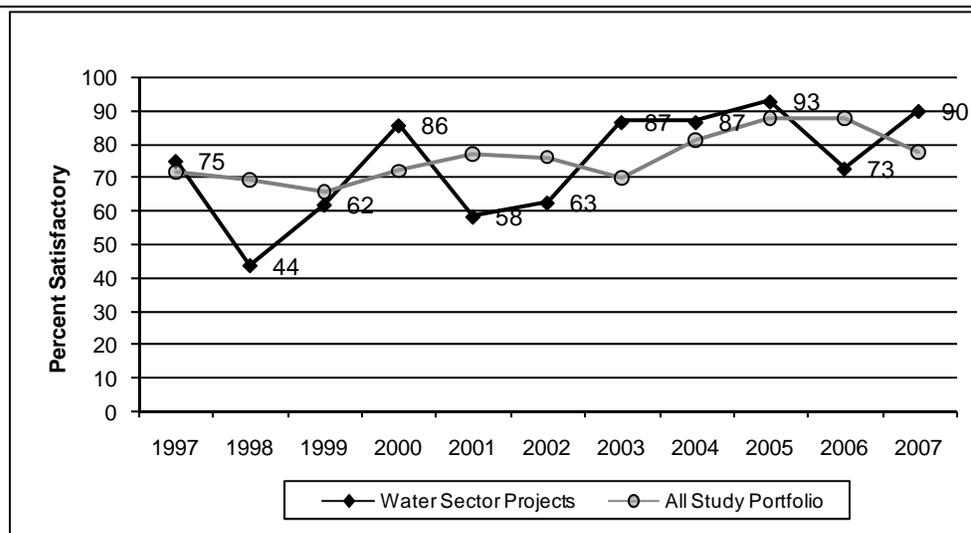


Figure J2. Outcome Ratings for Water Projects

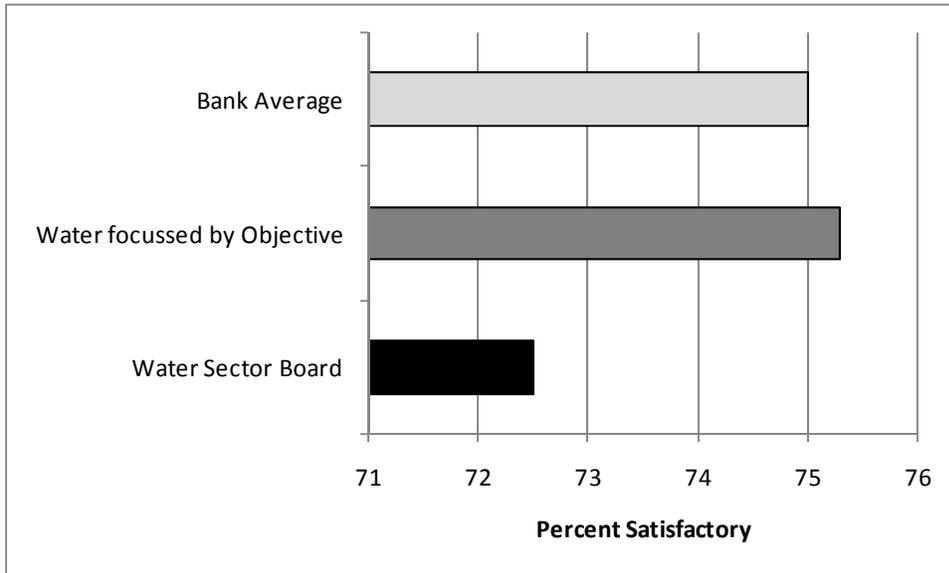


Figure J3. Sustainability and Institutional Development in Water Projects, Exit Years 1997-2007

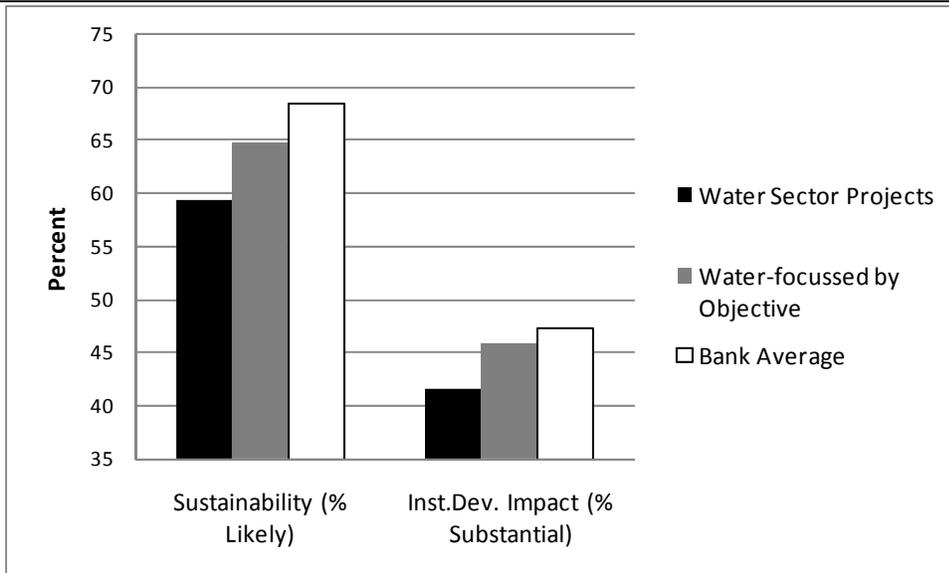


Figure J4. Regional Outcome Ratings for Entire Water Portfolio

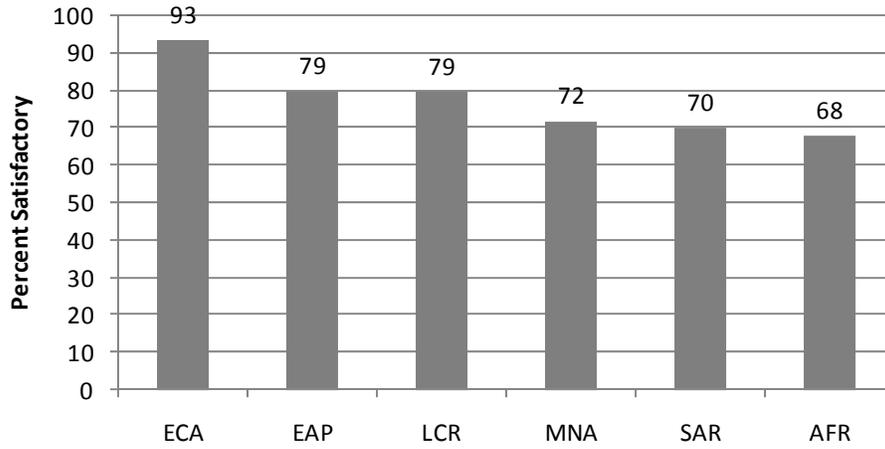
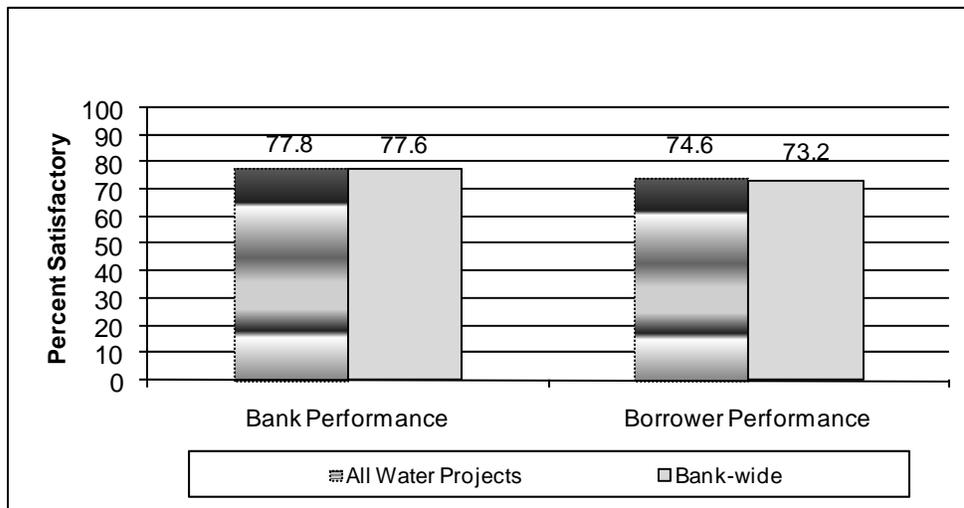
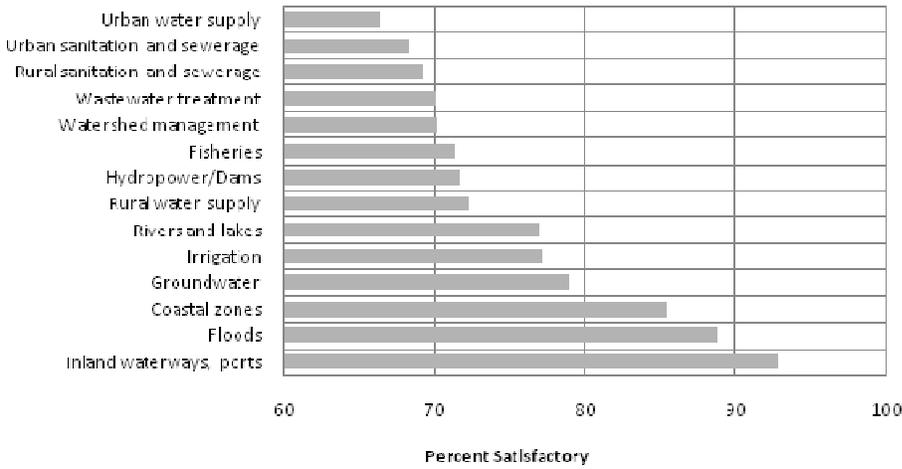


Figure J5. Bank and Borrower Performance in Water Projects, exit years 1997-2007



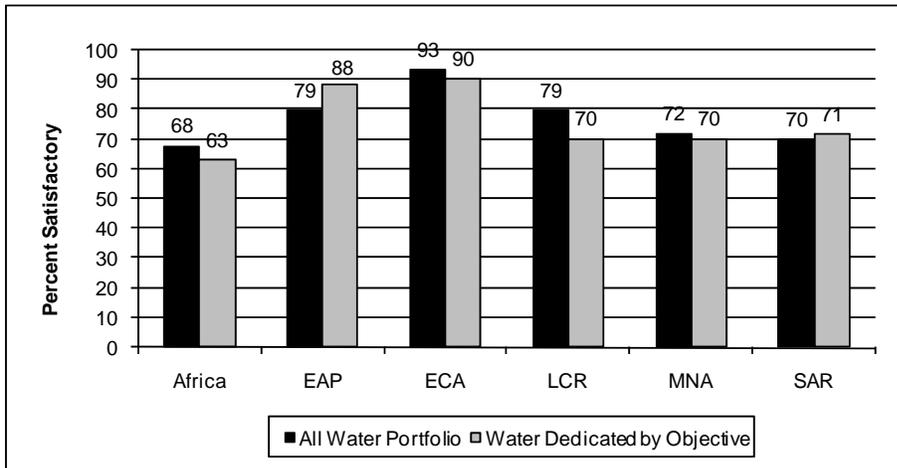
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Figure J6. Ratings of Focal Areas in Water-Dedicated Projects Show Significant Variability



Source: IEG water database

Figure J7. Outcome by Region



Source: IEG data

Table J2. Subsets of Water Projects Categorized by Focal Area & Their Ratings

<i>Portfolio</i>	<i>Number of projects</i>	<i>Total commitment (US\$ millions)</i>	<i>Number rated: all water portfolio</i>	<i>Percent satisfactory: all water portfolio</i>	<i>Number rated: Water-dedicated</i>	<i>Percent satisfactory: Water-dedicated</i>
Water and Land						
Irrigation	311	26,490	213	77.7	96	77.1
Groundwater	229	20,508	146	80.1	90	78.9
Hydropower/dams	211	21,800	108	73.1	60	71.7
Floods	177	15,509	104	85.6	53	88.7
Water Supply and Sanitation						
Urban water supply	229	15,522	113	70.8	80	66.3
Rural water supply	218	13,871	113	76.1	47	72.3
Wastewater treatment	312	13,460	241	76.8	110	70.1
Urban sanitation and sewerage	190	15,609	94	72.3	66	68.2
Rural sanitation and sewerage	108	5,894	40	75	26	69.2
Environment						
Watershed management	218	13,100	110	75.5	40	70.2
Rivers and lakes	174	14,780	90	77.8	52	76.9
Coastal zones	121	4,660	84	80.9	41	85.4
Inland waterways, ports	104	7,632	43	81.4	14	92.8

Source: IEG water database

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SUBPORTFOLIO OVERLAPS

Table J3. Top 20 Larger Portfolio Comparisons with Two Overlaps

	<i>No. of projects</i>	<i>Percent of 1st portfolio*</i>
Groundwater and water quality	179	77.16
WWT and water quality	312	76.10
Rivers/lakes and WRM	115	66.47
Rivers/lakes and water quality	114	65.90
WWT and urban	266	64.88
Groundwater and WRM	149	64.22
WRM and water quality	329	60.26
WWT and WSSS	241	58.78
WSSS and water quality	302	55.72
Urban and water quality	289	53.03
Watershed management and WRM	133	51.75
WSSS and urban	274	50.55
Urban and WSSS	274	50.28
Irrigation and WRM	155	49.84
Urban and WWT	266	48.81
Groundwater and WSSS	112	48.28
Watershed management and water quality	120	46.69
Water quality and WRM	329	45.44
Irrigation and water quality	139	44.69
WSSS and WWT	241	44.46

*Percent of 1st portfolio is the percent of the first listed portfolio, for example in the first line, it would be the percent of the Groundwater portfolio that also has water quality activities.

Table J4. Top 20 Smaller Portfolio Comparisons with Two Overlaps

	<i>No. of projects</i>	<i>Percent of 1st portfolio*</i>
Hydrometeorological monitoring and WRM	39	70.91
Environmental flow and WRM	26	66.67
Hygiene education and WSSS	88	66.67
Environmental flow and water quality	24	61.54
Environmental flow and dams/hydropower	24	61.54
Coastal zones and water quality	83	60.14
Hygiene education and water quality	79	59.85
Hydrometeorological monitoring and floods	28	50.91
Dams and WRM	99	47.83
Drought and WRM	92	47.42
Floods and WRM	91	46.67
Floods and water quality	90	46.15
Fisheries and water quality	40	45.98
Dams and water quality	95	45.89
Transport and water quality	47	45.19
Coastal zones and WRM	59	42.75
Fisheries and WRM	37	42.53
Hydrometeorological monitoring and rivers and lakes	23	41.82
Drought and irrigation	81	41.75
Drought and water quality	77	39.69

*Percent of 1st portfolio is the percent of the first listed portfolio, for example in the first line, it would be the percent of the Hydrometeorological portfolio that also has WRM activities.

Table J5. Top 20 with Three Overlaps

	No. of projects	Percent of 1st portfolio*
Environmental flow and WRM and water quality	20	51.28
Hygiene education and WSSS and water quality	60	45.45
Rivers/lakes and WRM and water quality	83	47.98
WWT and urban and WSSS	177	43.17
Groundwater and water quality and WSSS	95	40.95
Environmental flow and WRM and dams	14	35.90
Environmental flow and water quality and dams	14	35.90
Hydrometeorological monitoring and WRM and floods	19	34.55
Hydrometeorological monitoring and WRM and rivers/lakes	19	34.55
Coastal zones and water quality and WRM	47	34.06
Rivers/lakes and water quality and WWT	57	32.95
Hydrometeorological monitoring and WRM and water quality	18	32.73
WSSS and urban and WWT	177	32.66
Urban and WSSS and WWT	177	32.48
Groundwater and WRM and irrigation	75	32.33
WWT and water quality and WRM	132	32.20
Rural PSP and water quality and WRM	18	32.14
Watershed management and water quality and WRM	82	31.91
Dams and WRM and water quality	65	31.40
Environmental flow and WRM and rivers/lakes	12	30.77

*Percent of 1st portfolio is the percent of the first listed portfolio, for example in the first line, it would be the percent of the Environmental Flow portfolio that also has WRM and water quality activities.

Table J6. Top 10 with Four Overlaps

	No. of projects	Percent of 1st portfolio*
Environmental flow and WRM and water quality and dams	11	28.21
Environmental flow and WRM and water quality and rivers/lakes	11	28.21
Environmental flow and WRM and water quality and WSSS	11	28.21
Groundwater and water quality and WRM and WSSS	58	25.00
Rivers/lakes and water quality and WWT and urban	40	23.12
Environmental flow and WRM and water quality and groundwater	9	23.08
Groundwater and water quality and WRM and irrigation	53	22.84
Rivers/lakes and WRM and water quality and WWT	39	22.54
Rivers/lakes and water quality and WSSS and WWT	39	22.54
Water quality and urban and WSS and WWT	158	22.00

*Percent of 1st portfolio is the percent of the first listed portfolio, for example in the first line, it would be the percent of the Environmental Flow portfolio that also has WRM, water quality and dam activities.

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Table J7. All Comparisons with Five Overlaps

	No. of projects	Percent of 1st portfolio*
WWT and water quality and WRM and urban and WSSS	80	19.51
WRM and water quality and urban and WSSS and WWT	80	14.65
Groundwater and water quality and WRM and WSSS and urban	33	14.22
Water quality and WRM and urban and WSS and WWT	80	11.05
Groundwater and water quality and WRM and WSSS and watershed management	15	6.47
Groundwater and water quality and WRM and WSSS and irrigation	14	6.03
Rivers/lakes and water quality and WWT and urban and floods	6	3.47
Rivers/lakes and water quality and WWT and urban and dams	5	2.89
WWT and WRM and urban and WSSS and irrigation	7	1.71
WRM and urban and WSSS and WWT and irrigation	7	1.28

*Percent of 1st portfolio is the percent of the first listed portfolio, for example in the first line, it would be the percent of the WWT portfolio that also has water quality, WRM, urban and WSSS activities.

Table J9. Total Net IFC Commitments for Water (US\$ '000)

<i>Sub Portfolios</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>Total</i>
Animal Aquaculture		5,500	2,900	3,000						-		11,400
Fishing						4,505						4,505
Large Hydro	30,000	1,642	5,000			23,000			94,091	29,925	139,700	323,358
Water and Wastewater Utilities			7,147	20,000	31,195		77,325	75,404		80,418	16,408	307,897
Water Transportation	24,803				373	27,490		21,760	15,750	15,000		105,176
Total	54,803	7,142	15,047	23,000	31,567	54,995	77,325	97,164	109,841	125,342	156,108	752,335

Source: IFC data

Table J10. Total IFC Projects for Water

<i>Sub- Portfolios</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>Total</i>	
Animal Aquaculture			1	2	1						1	5	
Fishing							1					1	
Large Hydro		1	1	1			2			2	2	11	
Water and Wastewater Utilities				1	1	3		5	2		4	3	19
Water Transportation		1				1	3		2	1	1	9	
Total	2	2	4	2	4	6	5	4	3	8	5	45	

Source: IFC data

Table J11. Total IFC Projects for Water, by Region

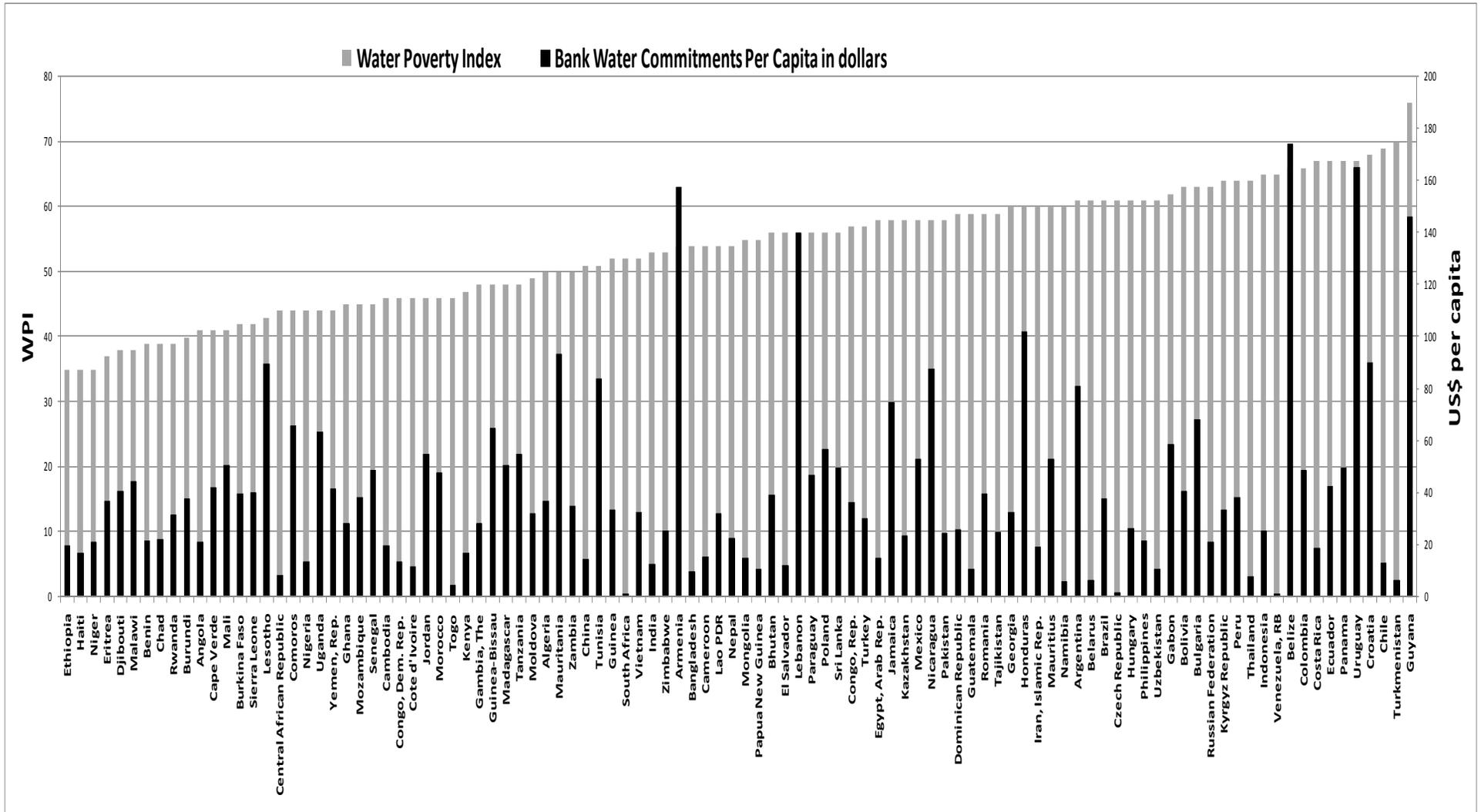
<i>Regional analysis</i>	<i>Africa</i>	<i>Asia</i>	<i>ECA</i>	<i>LCR</i>	<i>MNA</i>	<i>Total</i>
Animal aquaculture	2	1		2		5
Fishing	1					1
Large hydro	1	4	1	5		11

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Water and wastewater utilities	2	7	1	9		19
Water transportation		3	2	3	1	9
Total	6	15	4	19	1	45

Source: IFC data

Figure J8. Water Poverty Index and World Bank Per Capita Financing – All Countries



Source: WRI and IEG

Table J12. Country Breakdown – Water Stress and Economic Stress

<i>Water poor and GNI per capita below US\$1,095</i>	<i>Bank comm. to water (US\$m)</i>	<i>Share of water portfolio</i>	<i>Water poor and GNI per capita above US\$1,095</i>	<i>Bank comm. to water (US\$m)</i>	<i>Share of water portfolio</i>	<i>Water rich and GNI per capita below US\$1,095</i>	<i>Bank comm. to water (US\$m)</i>	<i>Share of water portfolio</i>	<i>Water rich and GNI per capita above US\$1,095</i>	<i>Bank comm. to water (US\$m)</i>	<i>Share of water portfolio</i>
Angola	353	0.30%	Algeria	1244	1.05%	Bhutan	25	0.02%	Argentina	3199	2.70%
Armenia	473	0.40%	China	18840	15.91%	Bolivia	385	0.33%	Belarus	58	0.05%
Bangladesh	1482	1.25%	Jordan	312	0.26%	Congo, Rep. of	135	0.11%	Belize	53	0.04%
Benin	195	0.16%	Morocco	1467	1.24%	Georgia	142	0.12%	Brazil	7153	6.04%
Burkina Faso	579	0.49%	South Africa	38	0.03%	Guyana	108	0.09%	Bulgaria	519	0.44%
Burundi	319	0.27%	Tunisia	854	0.72%	Honduras	721	0.61%	Chile	211	0.18%
Cambodia	282	0.24%			Kyrgyz Republic	173	0.15%	Colombia	2142	1.81%	
Cameroon	283	0.24%			Mongolia	39	0.03%	Costa Rica	84	0.07%	
Cape Verde	22	0.02%			Nicaragua	489	0.41%	Croatia	397	0.34%	
Central African Rep.	36	0.03%			Pakistan	3931	3.32%	Czech Republic	13	0.01%	
Chad	236	0.20%			Papua New Guinea	65	0.05%	Dominican Republic	252	0.21%	
Comoros	41	0.03%			Sri Lanka	984	0.83%	Ecuador	566	0.48%	
Congo, Dem. Rep. of	841	0.71%			Tajikistan	167	0.14%	Egypt, Arab Republic of	1120	0.95%	
Cote d'Ivoire	220	0.19%			Uzbekistan	283	0.24%	El Salvador	80	0.07%	
Djibouti	34	0.03%					Gabon	78	0.07%		
Eritrea	178	0.15%					Guatemala	141	0.12%		
Ethiopia	56	0.05%					Hungary	261	0.22%		
Gambia, The	48	0.04%					Indonesia	5637	4.76%		
Ghana	657	0.55%					Iran, Islamic Republic of	1339	1.13%		
Guinea	313	0.26%					Jamaica	199	0.17%		
Guinea-Bissau	110	0.09%					Kazakhstan	363	0.31%		
Haiti	16	0.01%					Lebanon	571	0.48%		
India	13993	11.82%					Mauritius	67	0.06%		
Kenya	632	0.53%					Mexico	5556	4.69%		
Lao PDR	187	0.16%					Namibia	12	0.01%		
Lesotho	179	0.15%					Panama	166	0.14%		
Madagascar	988	0.83%					Paraguay	284	0.24%		
Malawi	615	0.52%					Peru	1064	0.90%		
Mali	250	0.21%					Philippines	1874	1.58%		
Mauritania	291	0.25%					Poland	2161	1.82%		
Moldova	120	0.10%					Romania	847	0.72%		
Mozambique	808	0.68%					Russian Federa-	2984	2.52%		

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<i>Water poor and GNI per capita below US\$1,095</i>	<i>Bank comm. to water (US\$m)</i>	<i>Share of water portfolio</i>	<i>Water poor and GNI per capita above US\$1,095</i>	<i>Bank comm. to water (US\$m)</i>	<i>Share of water portfolio</i>	<i>Water rich and GNI per capita below US\$1,095</i>	<i>Bank comm. to water (US\$m)</i>	<i>Share of water portfolio</i>	<i>Water rich and GNI per capita above US\$1,095</i>	<i>Bank comm. to water (US\$m)</i>	<i>Share of water portfolio</i>
Nepal	622	0.53%							tion		
Niger	294	0.25%							Thailand	493	0.42%
Nigeria	2000	1.69%							Turkey	2211	1.87%
Rwanda	303	0.26%							Turkmenistan	30	0.03%
Senegal	601	0.51%							Uruguay	548	0.46%
Sierra Leone	232	0.20%							Venezuela, R.B. de	28	0.02%
Tanzania	2204	1.86%									
Togo	27	0.02%									
Uganda	1954	1.65%									
Vietnam	2740	2.31%									
Yemen, Rep.	924	0.78%									
Zambia	412	0.35%									
Zimbabwe	340	0.29%									
TOTALS	\$ 37,490	32.03%		\$ 22,755	19.44%		\$ 7,647	6.53%		\$ 2,761	36.54%

Source: WRI and World Bank IDA classification

Note: Total of shares do not equal 100 percent due to rounding and other than country-specific lending (i.e., Africa, Caribbean, etc.)

Chapter 3

WATERSHED MANAGEMENT

Table J13. Area Covered by Watershed Management Activities and People Served in 31 Closed Livelihood-focused Watershed Management Projects

<i>Project ID</i>	<i>Country</i>	<i>Area covered</i>	<i>People served</i>	<i>Ratings</i>
P001967	Niger	234,000 ha	566,000 people	Satisfactory
P006473	Brazil	400,000 ha	106,000 farm families	Highly satisfactory
P049665	China	3,014 ha orchard development	900,000 people	Satisfactory
P043868	Brazil	860,000 ha	94,300 farmers	Satisfactory
P056216	China	35,7000 ha	1.9 million people	Highly satisfactory
P003540	China	100,411 ha	1 million farmers	Highly satisfactory
P003649	China	16,107 ha terracing; 12,766 ha horticulture; 1,677 ha reforestation	4.1 million people	Satisfactory
P003639	China	6,601 ha terracing; 20,046 ha soil improvement;	280,000 people	Satisfactory
P003595	China	25,750 terracing	400,000 people	Satisfactory
P006858	Colombia	24,429 ha	23,663 groups	Satisfactory
P039437	Ecuador	19,000 km ²	37,633 families	Satisfactory
P005153	Egypt, Arab Republic of	4,394 acres dyke construction; 18,917 acres shrub plantation;	10,440 households	Satisfactory
P009860	India	433,498 ha in 12 watersheds in Gujarat, Orissa and Rajasthan	100,000 rural families	Satisfactory
P009958	India	86,380 ha	171,000 small landholders	Satisfactory
P041264	India	103,652 ha. covering 36 sub-watersheds in 835 villages	16,620 beneficiaries	Satisfactory
P009882	India	147,501 ha	17,000 farmer families	Satisfactory
P010408	India	2,000 ha	19,540 farmers receiving training	Satisfactory
P003985	Indonesia	10,000 ha	20,000 small farmers	Unsatisfactory
P003912	Indonesia	518 watersheds	8,000 farm families	Satisfactory
P001556	Madagascar	16,832 ha	45,074 families	Moderately unsatisfactory
P001745	Mali	844 villages	844 villages	Moderately satisfactory
P005519	Morocco	16,000 ha	14,700 people	Satisfactory
P007847	Panama	Not available	296,434 people	Satisfactory
P007918	Paraguay	264,567 ha	13,000 farm families	Satisfactory
P042442	Peru	415,000 ha	31,000 farm families	Satisfactory
P004613	Philippines	1,035 ha reforestation, 650 ha enrichment planting, 163 ha riverbank stabilization, 360 ha rattan plantation, and	Don't know	Satisfactory

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<i>Project ID</i>	<i>Country</i>	<i>Area covered</i>	<i>People served</i>	<i>Ratings</i>
		1,227 ha agro-forestry		
P010513	Sri Lanka	12,000 ha	12000 households	Satisfactory
P005721	Tunisia	34,000 ha watershed treatment, 15,500 ha pasture improvement	5,200 beneficiaries	Moderately satisfactory
P005733	Tunisia	53,000 ha	Don't know	Satisfactory
P009023	Turkey	520,000 ha	40,000 families	Satisfactory
P008173	Uruguay	17,991 ha	395 producers	Moderately unsatisfactory

Source: IEG water database

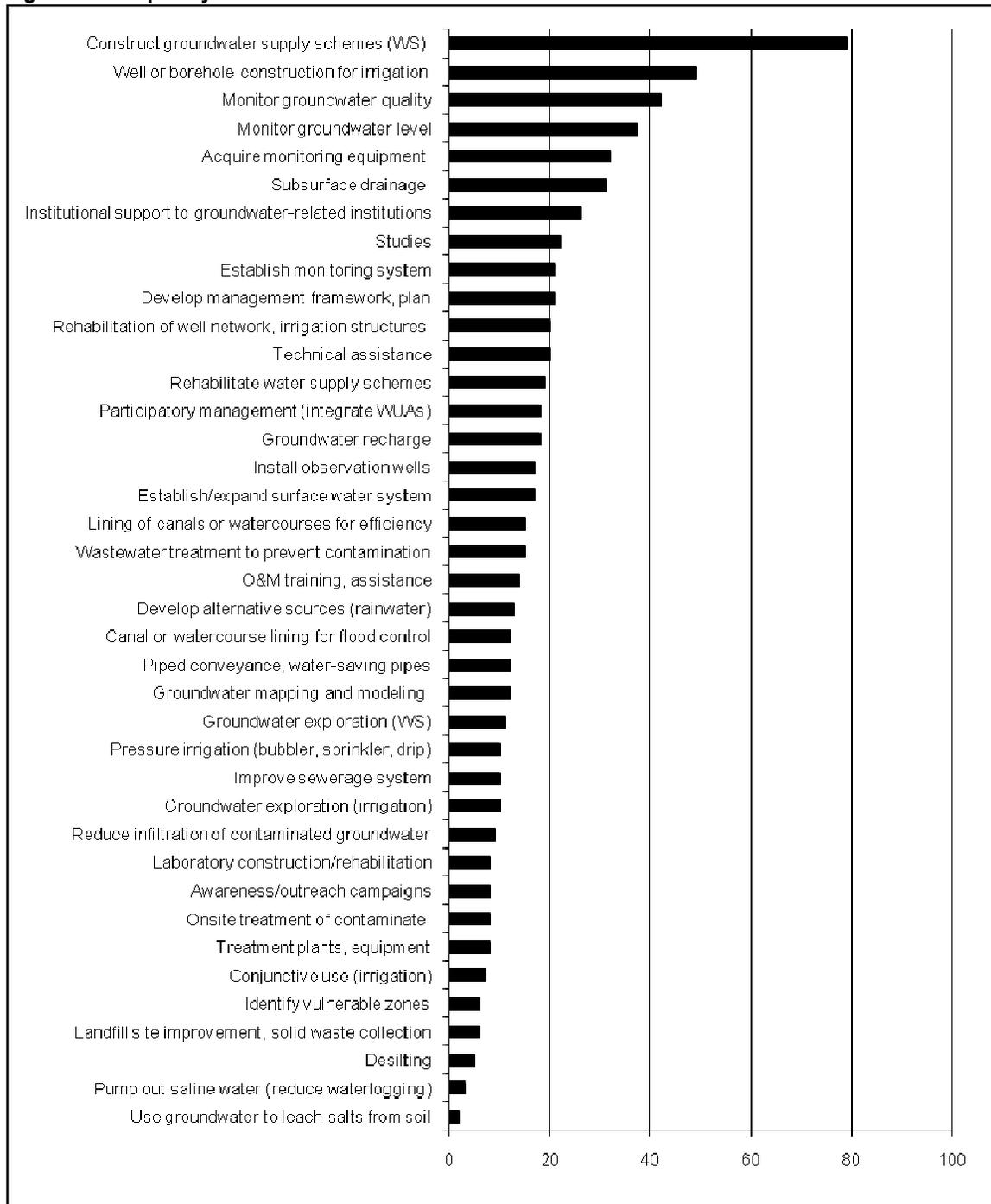
Box J1. Morocco – Lakhdar Watershed Management Pilot Project (Loan 4426; P005519)

The community outreach effort undertaken in this project had a high up-front costs for staff, staff training, staff transport, etc. The longer the extension work could be implemented (with a concomitant increase in number of families attending) the lower the per-family cost of the operation. In other words, efficiency in staff costs depended to some degree on scaling up the pilot operation. It would not be unreasonable for an economic analysis to consider that having staff trained in participatory methods, as was done in this pilot operation, is a positive externality. Expensive staff training costs would not be incurred in any follow-on operation. But the up-front costs of the participatory approach to natural resources management selected for this project proved to be relatively costly in the short term: \$0.8 million was spent to educate and motivate beneficiaries in natural resources management. Another \$0.8 million was spent on training and equipping government officials. Although almost half the project costs was spent for social purposes, had the decision been made to scale up this effort, little of this cost would have had to be made again. Thus, while the efficiency of this approach is suboptimal due to the abandonment of the follow-on, the project evaluation does not take this outcome into account in determining the overall project efficiency for two reasons. First, the successful demonstration that beneficiary participation can work in rural Morocco will lead to other similar work in time, and that will produce a considerable amount of additional economic benefits. And second, the awareness raising that has happened in the mountain communities regarding the importance of preserving and restoring natural resources borders on the priceless, and it will also yield positive economic results in the future.

Source: PPAR for the Morocco – Lakhdar Watershed Management Pilot Project (Loan 4426); (P005519)

GROUNDWATER

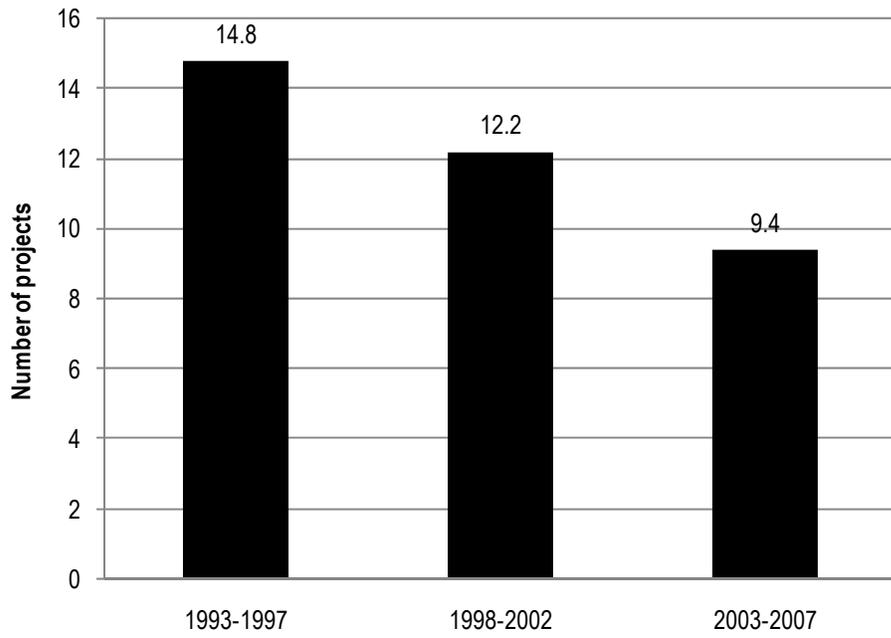
Figure J9. Frequency of Groundwater Activities



Source: IEG water database

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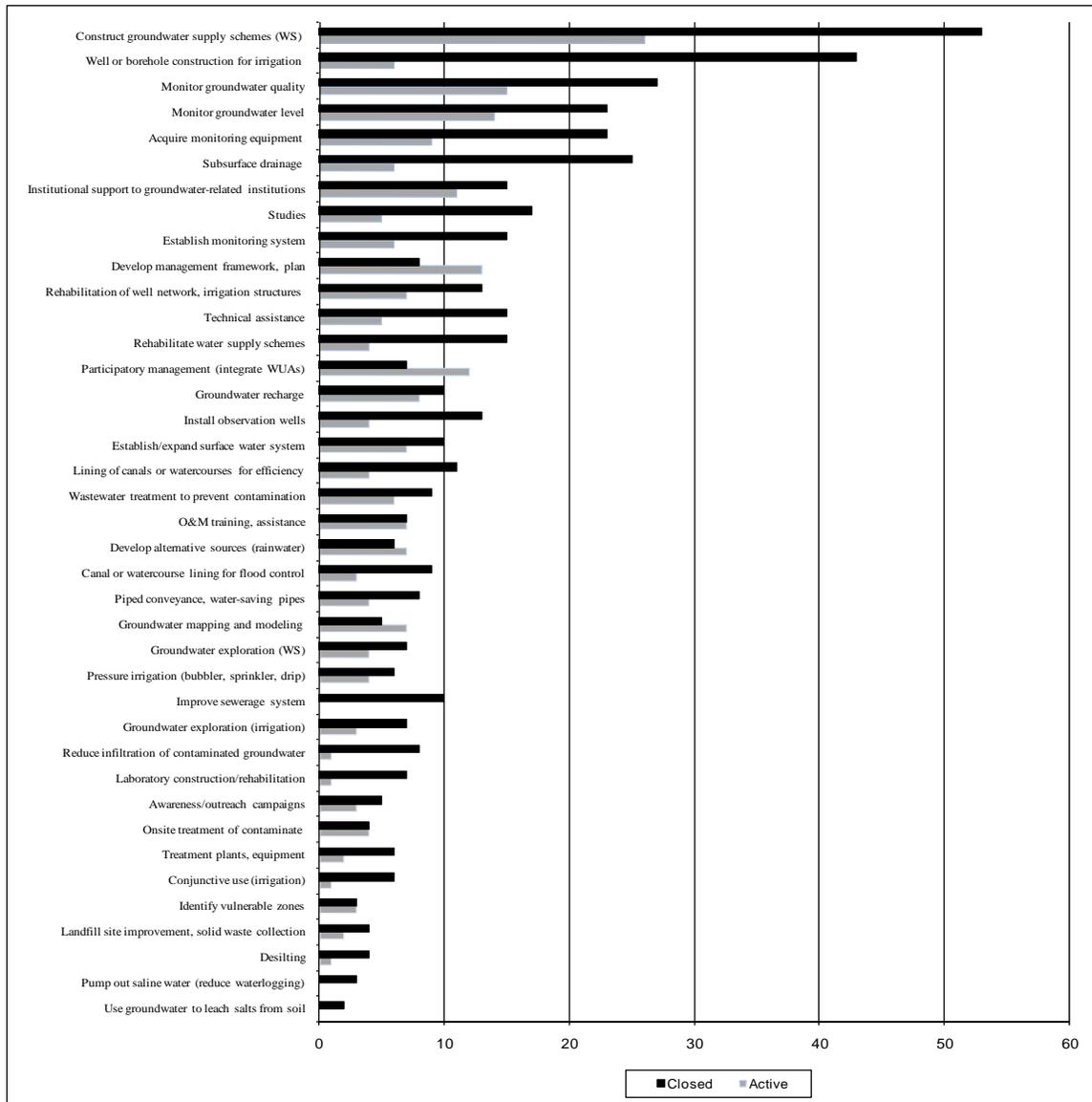
Figure J10. Groundwater Approvals: 5-Year Averages



Source: IEG water database

COMPLETED AND ONGOING PROJECTS

Figure J11. Frequency of Activities in Closed and Active Groundwater Projects



Source: IEG water database

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Table J14. Percent of Activity Found in Ongoing Groundwater Projects

<i>Activity</i>	<i>Percent of Activity Found In Ongoing Projects</i>	<i>Active Projects</i>	<i>Total Projects</i>
Participatory management (integrate WUAs)	67%	12	18
Develop management framework, plan	62%	13	21
Groundwater mapping and modeling	58%	7	12
Develop alternative sources (rainwater)	54%	7	13
Identify vulnerable zones	50%	3	6
Onsite treatment of contaminate	50%	4	8
O&M training, assistance	50%	7	14
Groundwater recharge	44%	8	18
Institutional support to groundwater-related institutions	42%	11	26
Establish/expand surface water system	41%	7	17
Pressure irrigation (bubbler, sprinkler, drip)	40%	4	10
Wastewater treatment to prevent contamination	40%	6	15
Monitor groundwater level	38%	14	37
Awareness/outreach campaigns	38%	3	8
Groundwater exploration (WS)	36%	4	11
Monitor groundwater quality	36%	15	42
Rehabilitation of well network, irrigation structures	35%	7	20
Landfill site improvement, solid waste collection	33%	2	6
Piped conveyance, water-saving pipes	33%	4	12
Construct groundwater supply schemes (WS)	33%	26	79
Groundwater exploration (irrigation)	30%	3	10
Establish monitoring system	29%	6	21
Acquire monitoring equipment	28%	9	32
Lining of canals or watercourses (irrigation efficiency)	27%	4	15
Treatment plants, equipment	25%	2	8
Canal or watercourse lining for flood control	25%	3	12
Technical assistance	25%	5	20
Install observation wells	24%	4	17
Studies	23%	5	22
Rehabilitate water supply schemes	21%	4	19
Desilting	20%	1	5
Subsurface drainage	19%	6	31
Conjunctive use (irrigation)	14%	1	7
Laboratory construction/rehabilitation	13%	1	8
Well or borehole construction for irrigation	12%	6	49
Reduce infiltration by contaminated surface water	11%	1	9
Use groundwater to leach salts from soil	0%	0	2
Pump out saline water (reduce waterlogging)	0%	0	3
Improve sewerage system	0%	0	10

Source: IEG water database

RIVER BASIN MANAGEMENT

Table J15. National and Transboundary Basin Institutions

<i>Project ID</i>	<i>Country</i>	<i>Project name</i>	<i>Total amount</i>	<i>IEG outcome rating</i>	<i>Approval year</i>	<i>Building the capacity of existing institutions</i>
National Basin Institutions						
P006541	Brazil	Water Quality and Pollution Control Project	245	Satisfactory	1992	Basin-level management units were established. Regulation for water use in the basin was decreed. However, basin organizations did not get full support from the state due to a change of government administration. Law on establishing water use charges in the basin was not approved by project closure. No information provided about different Basin Agencies that planned to be established under the project.
P038895	Brazil	Federal Water Resources Management Project (PROAGUA)	198		1998	Water resources management will support institutional development, which will cover the areas of legislation, state agencies, human resources, and bulk water rights. It will also support the technical basis for National Water Resources Management System (SINGRH) including the hydro-meteorological networks and information systems.
P006449	Brazil	Ceara Integrated Water Resource Management Project (PROGERIRH)	136		2000	To improve institutional, legal, and administrative frameworks, emphasizing participatory management mechanisms.
P089929	Brazil	Rio Grande do Norte Integrated Water Resources Management Project	35.9		2007	To improve the state's water resource management (WRM) capabilities and develop adequate WRM instruments.
P075035	China	Hai Basin Integrated Water and Environment Management Project	17		2004	Hai Basin Project management will support coordinated and integrated actions by the Ministries/Bureaus of environmental protection and water resources at the various levels.
P010476	India	Tamil Nadu Water Resources Consolidation Project	282.9	Satisfactory	1995	Basin water resources planning was legalized. Basin management committee of stakeholders were formed. However, government did not approve National Water Resources Act legislation, thus basin organizations have no legal standing. Stakeholder participation did not take place as planned. Law on establishing water use charges in the basin was not approved by project closure due to devastating conti-

**ANNEX J
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<i>Project ID</i>	<i>Country</i>	<i>Project name</i>	<i>Total amount</i>	<i>IEG outcome rating</i>	<i>Approval year</i>	<i>Building the capacity of existing institutions</i>
						nuous natural disasters.
P073370	India	Madhya Pradesh Water Sector Restructuring Project	394		2004	To support the establishment and operationalization of the proposed planning, allocation and regulatory institutions and instruments at the state and basin-levels.
P003954	Indonesia	Java Irrigation Improvement and Water Resources Management Project	165.7	Unsatisfactory	1994	Basin water resources planning was legalized. However, Basin management agencies are weak due to limited access to financial sources and TA. No clear responsibility over water distribution hampered basin agencies to fulfill their duties successfully. Law on establishing water use charges in the basin was not approved by project closure.
P064118	Indonesia	Water Resources Adjustment Loan	300	Satisfactory	1999	Basin-level management units were established. 'Water use rights' framework was adopted in the basin. However, Government did not approve National Water Resources Act legislation, thus basin organizations have no legal standing. Basin management agencies are weak due to limited access to financial sources and TA. Law on establishing water use charges in the basin was not approved by project closure due to devastating continuous natural disasters.
P059931	Indonesia	Water Resources & Irrigation Sector Management Program	70		2003	Basin Water Resources Management, assists in establishing and/or strengthening sector governance, planning, management capacity, and fiscal and cost recovery for national water agencies/institutions; supports an operational and monitoring system for hydrology, water allocation, basin water quality, flood management as well as a program for river infrastructure management and repair, and establishment of a national water quality monitoring network system.
P005521	Morocco	Water Resources Management Project	20	Moderately Satisfactory	1998	Basin-level management units were established. Various donor communities committed to strengthening basin agencies. However, basin management agencies are weak due to limited access to financial sources and TA. Basin agencies encounter difficulties due to lack of sufficiently skilled and motivated staff. Law on establishing water use

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<i>Project ID</i>	<i>Country</i>	<i>Project name</i>	<i>Total amount</i>	<i>IEG outcome rating</i>	<i>Approval year</i>	<i>Building the capacity of existing institutions</i>
						charges in the basin was not approved by project closure.
P034212	Sri Lanka	Mahaweli Re-structuring and Rehabilitation Project	57	Unsatisfactory	1998	Basin-level management units were established. Basin management committees of stakeholders were formed. However, government did not approve new National Water Resources Act legislation, thus basin organizations have no legal standing. Basin management agencies are weak due to limited access to financial sources and TA.
Transboundary Basin Institutions						
P070073	Africa	3A-GEF Nile Transboundary Environmental Action (FY03)	8		2003	Nile Basin Council of Ministers (Nile-COM)
P070252	Africa	Lake Chad Basin	2.9		2003	Lake Chad Basin Commission (LCBC)
P070256	Africa	Reversing Land & Water Degradation Trends in the Niger River Basin	13		2004	Niger Basin Agency
P093826	Africa	Senegal River Basin Multi-Purpose Water Resources Development	110		2006	Senegal River Basin Organization (OMVS)
P093806	Africa	Niger Basin Water Resources Development and Sustainable Ecosystems Management (APL) Project	186		2007	Niger Basin Agency
P085782	Africa	Lake Victoria Transboundary Project	1		2005	The Treaty for the Establishment of the East African Community (EAC) came into force in July 2000, and it mandates the EAC to coordinate management aspects of the Lake Victoria Basin through its Committee for Lake Victoria Development (CLVD).
P000306	Burkina Faso	BF-Ouaga Water Suply (FY01)	70		2001	Information exchange mechanism established, through a joint technical Committee (DGH in Burkina Faso and the Volta River Authority in Ghana).
P053349	Central America	GEF 6C-Meso American Barrier Reef System	11		2001	The project fostered new mechanisms for coordination and multistakeholder representation within the countries themselves via the National Barrier Reef Committees (NBRCs), comprised of representatives from both the public and private sectors.

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<i>Project ID</i>	<i>Country</i>	<i>Project name</i>	<i>Total amount</i>	<i>IEG outcome rating</i>	<i>Approval year</i>	<i>Building the capacity of existing institutions</i>
P035783	Lithuania	SIAULIAI Environment	6.2	Moderately Satisfactory	1996	The Lithuanian side of the Lieupe River Basin Commission was established.
P046651	Mali	Regional Hydro-power Development	17.1	Satisfactory	1997	The creation of a permanent commission on water resources (CPE) has offered a forum for representatives for water users, territorial communities, NGOs, and committees for decentralized management. In addition, national and local coordinating committees have been created.
P046650	Mauritania	Regional Hydro-power Development	11.1	Satisfactory	1997	The creation of a permanent commission on water resources (CPE) has offered a forum for representatives for water users, territorial communities, NGOs, and committees for decentralized management. In addition, national and local coordinating committees have been created.
P076809	Mozambique	MZ-GEF TFCA & Tourism Dev (FY06)	10		2006	Bilateral Agreement by Mozambique and Zimbabwe for the Chimanimani TFCA resulted in the enhanced management and protection of important trans-boundary water catchments.
P046648	Senegal	Regional Hydro-power Development	10.5	Satisfactory	1997	The creation of a permanent commission on water resources (CPE) has offered a forum for representatives for water users, territorial communities, NGOs, and committees for decentralized management. In addition, national and local coordinating committees have been created.
P058120	Tanzania	TZ-IDF NBI (FY98)	0.25		1998	The NBI was formally launched in February 1999 by the Ministers of Water Affairs of the ten countries that share the Nile River: Burundi, Democratic Republic of Congo, Egypt, Ethiopia, Eritrea, Kenya, Rwanda, Sudan, Tanzania and Uganda. Together, these ministers make up the Nile Basin Council of Ministers (Nile-COM). The NBI is guided by a Shared Vision "to achieve sustainable socio-economic development through the equitable utilization of, and benefit from, the common Nile basin water resources."
P087154	Tanzania	TZ-Water Sector Support SIL	200		2007	The WSDP will improve access to water supply and sanitation services and strengthen sector institutions for integrated water resources management.
P090680	Tanzania	Lake Victoria	3.5		2005	The project was to support the

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<i>Project ID</i>	<i>Country</i>	<i>Project name</i>	<i>Total amount</i>	<i>IEG outcome rating</i>	<i>Approval year</i>	<i>Building the capacity of existing institutions</i>
		Environmental Management Project Second Supplemental Credit				Regional Policy Steering Committee meetings for Lake Victoria.
P084213	Tanzania	TZ-GEF Marine & Coastal Env Mgmt (FY06)	10		2006	The East African Community (EAC) passed the Lake Victoria Protocol and, with its ratification by member states in November 2004, created the Lake Victoria Basin Commission (LVBC) based in Kisumu.
P046836	Uganda	Lake Victoria Environmental Management	12.1	Moderately Satisfactory	1997	Lake Victoria Basin Commission (LVBC)

Source: IEG water database

Table J16. “What Happened Analysis” for the 11 Completed Projects with National Basin Organizations

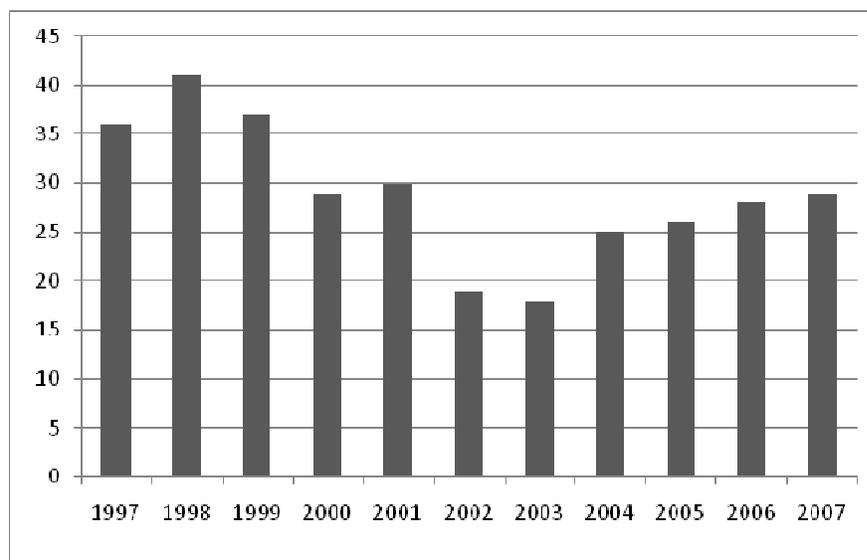
<i>Positive results</i>	<i>Number of projects</i>	<i>Negative results</i>	<i>Number of projects</i>
Basin-level management units were established	6	Basin management agencies are weak due to limited access to financial sources and insufficient TA	5
Basin management committee of stakeholders were formed	4	Law on establishing water use charges in the basin was not approved by project closure	5
Basin water resources planning was legalized	2	Government did not approve National Water Resources Act legislation, thus basin organizations have no legal standing	4
Basin management agencies were strengthened	2	Basin agencies encounter difficulties due to lack of sufficiently skilled and motivated staff	2
'Water use rights' framework was adopted in the basin	1	No information provided about different Basin Agencies that planned to be established under the project	1
Regulation for water use in the basin was decreed	1	No clear responsibility over water distribution hampered basin agencies to fulfill their duties successfully	1
River basin management concept was adopted	1	Basin organizations did not get full support from the state due to a change of government administration	1
Various donor community committed to strengthening basin agencies	1	Stakeholder participation did not take place as planned	1

Source: IEG water database

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MANAGING DEMAND FOR WATER

Figure J12. After a Peak in the Late 1990s, the Number of (Annual Approvals of) DSM Projects Declined



Source: IEG water database

HYDROLOGICAL AND METEOROLOGICAL MONITORING

Table J17. National Monitoring Systems Are Most Frequently Implemented

	<i>Closed projects</i>	<i>Active projects</i>	<i>Total number of projects</i>	<i>Percent of total</i>
National	15	8	23	42
Regional	8	9	17	31
Local	3	5	8	15
Transboundary	1	5	6	11

Source: IEG water database

Table J18. The Most Frequently Pursued Activities in Hydrological and Meteorological Monitoring

<i>Frequency count – ranking highest to lowest</i>	<i>Activities pursued</i>	<i>Completed projects</i>	<i>Ongoing projects</i>	<i>Total</i>
1	Equipment and supplies	27	27	54
2	Institutional capacity building	23	21	44
3	Use of monitoring data for disaster prevention and mitigation	15	14	29
4	Development of monitoring-related products (maps, publications)	10	18	28
5	Participation by beneficiaries	7	7	14
6	Use of monitoring for agriculture	2	10	12
7	Use of monitoring for water resources management	5	5	10

Source: IEG water database, completed projects 1997-2008 (n=28)

Table J19. The Most Common Results for Hydrological and Meteorological Monitoring

Positive results	Number of projects	Negative results	Number of projects
The equipment has been procured	16	Data collection and analysis to the extent that data is available is not effectively disseminated	8
Scientific equipment was installed and is operational	14	Equipment/facilities inadequate, obsolete, function poorly or not at all	7
Communications equipment and/or IT hardware and software were installed	13	Network achievements impossible to evaluate because guidelines on network performance not available	7
Training was given as planned	13	Activity cancelled or not implemented [Equipment and Supplies-Related]	5
Improvement in methods and capacities to collect and report weather information are documented	12	Training had no short or long term impact	5
Monitoring information shared in timely manner with intended users	10	Design of the system inappropriate relative to existing institutional capacity and/or prevailing conditions	4
System disseminated information for used successfully for mitigation and prevention (natural disaster damage was reduced)	8	Weak existing legal framework was a constraint	4
Institutional development achieved as planned	7	Installation was begun but insufficient time was allocated so that system was not set up	3
Monitoring system has been established and/or data collection and management was initiated	6	Personnel for O&M required to ensure continued effective operation has not been hired (permanently)	3
New or additional personnel was hired	6	Staff insufficiently skilled to conduct data collection and analysis	3
New/revised policies and strategies	5	Limitations on hardware and software capacities are reported	3
Monitoring materials were prepared	5	Data collection and dissemination is not taking place as anticipated	3
System data used for investment planning and infrastructure construction	4	Mechanisms that allow participatory analysis and dissemination are absent	2

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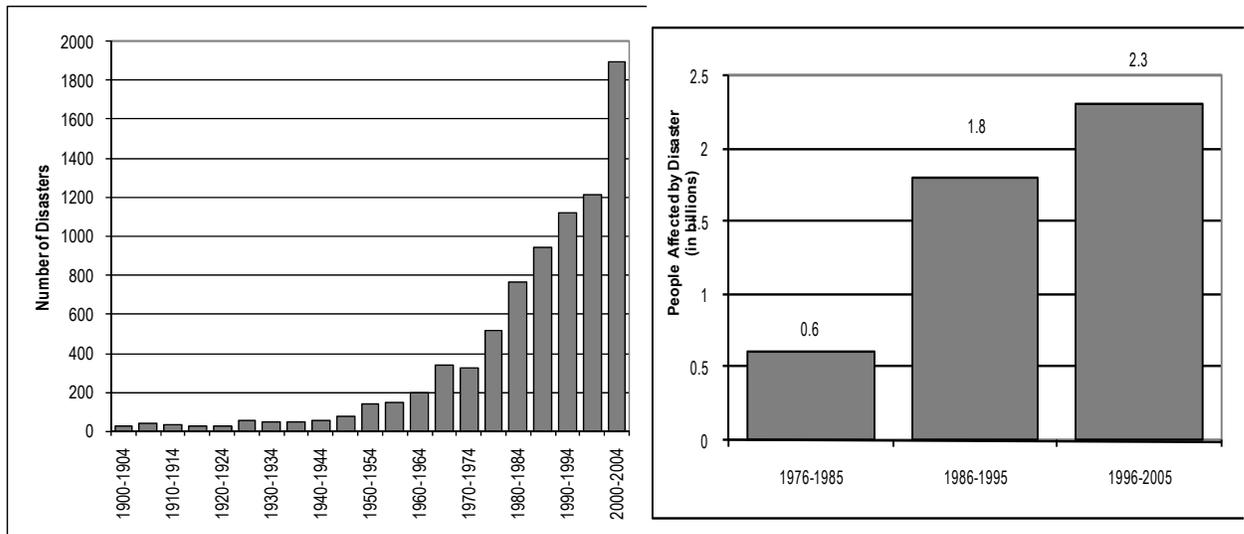
Positive results	Number of projects	Negative results	Number of projects
Facilities were constructed	4	Monitoring data and results intended for sharing were not disseminated	2
Upgrades were completed	3	Expected benefits from monitoring did not materialize	2
Rehabilitation of monitoring equipment occurred as planned	3	Institutional development achievements unknown	2
Information available from modern computer-based system is accessible on a real-time basis	3	Expected benefits from monitoring did not materialize	2
Continuous environmental monitoring and dissemination of information is taking place	3	Lack of sufficient personnel or adequately	1
More government agencies and stakeholders receive monitoring information than anticipated	3	Activity cancelled or not implemented [Institutional Capacity Building]	1
Financing and monitoring continues after project interventions	3	Stakeholder support was partial or inadequate	1
New committees/ units, were established to manage or coordinate monitoring or such a role was given to stakeholders	3	Activity cancelled or not implemented [Development of Monitoring-Related products]	0
Enforcement and compliance	2		
Reservoir use	2	Activity cancelled or not implemented [Use of Monitoring data for Disaster Prevention and Mitigation]	0
Groundwater issues	2		
Agreements achieved	2		
Monitoring programs were organized and are in place	2	Activity cancelled or not implemented [Use of Monitoring For Disaster Prevention and Mitigation]	0
System benefits neighboring communities (near to monitoring points)	1		
Water management measures were improved in agricultural decisions	1	Activity cancelled or not implemented [Use of Monitoring for Agriculture]	0
Transboundary water issues	1		
Private sector participates in monitoring activities	1	Activity cancelled or not implemented [Use of Monitoring for Water Resources Management]	0

Source: IEG water database (n=28)

Chapter 4

DISASTERS

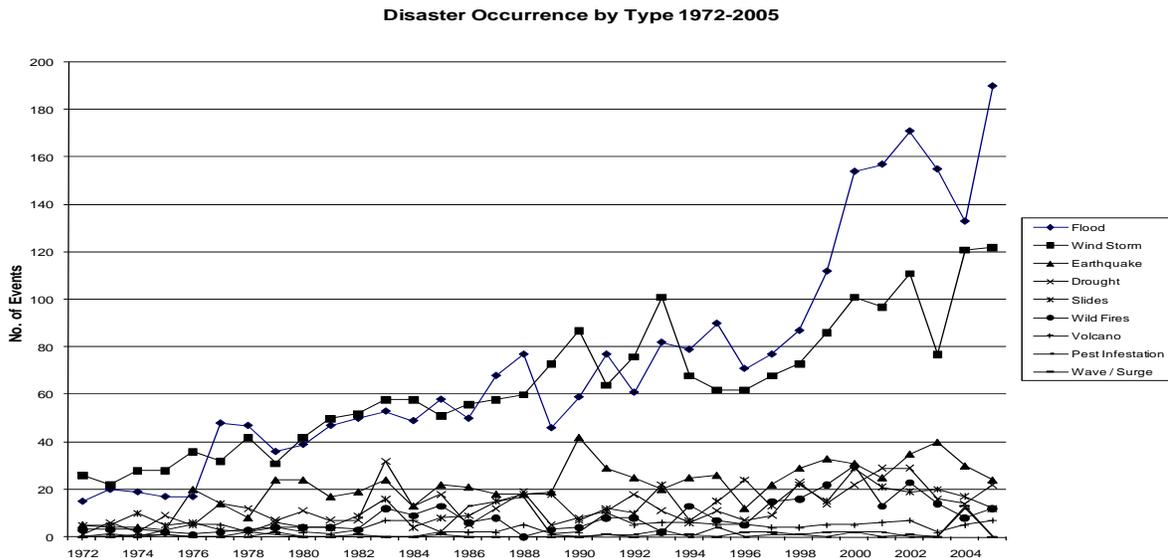
Figure J13. Number of Natural Disasters in All Countries Figure J14. Billions Affected



Source: EM-DAT: The OFDA/CRED International Disaster Database, www.em-dat.net - Université Catholique de Louvain - Brussels – Belgium

FLOODING

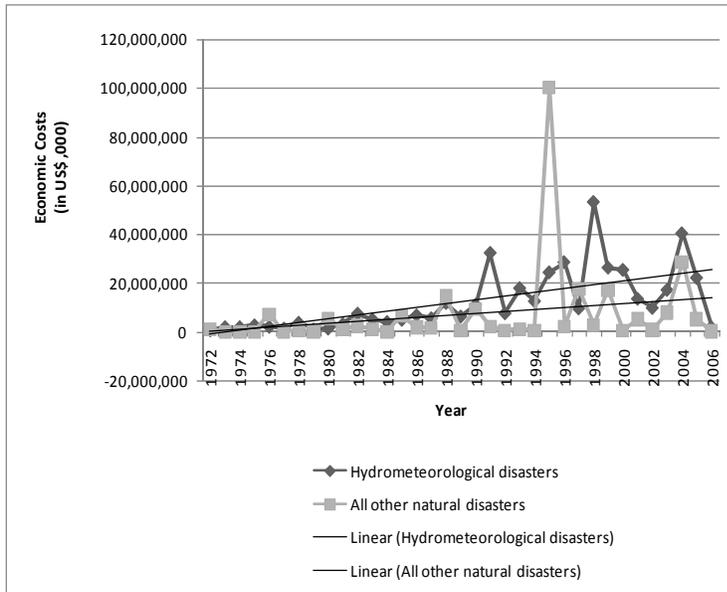
Figure J15. Flood and Wind Storm Disasters are Increasing in Frequency



Source: EM-DAT: The OFDA/CRED International Disaster Database, www.em-dat.net - Université Catholique de Louvain - Brussels – Belgium

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Figure J16. Economic Cost of Hydro-Meteorological Disasters is Higher Than That of All Other Disaster Types Combined



Source: EM-DAT: The OFDA/CRED International Disaster Database, www.em-dat.net - Université Catholique de Louvain - Brussels – Belgium. Note: this database reports large and medium scale disasters, not local, small scale ones. *This category includes earthquake, insect infestation, volcanoes, and wildfires. Hydro-meteorological disasters include drought, extreme temperatures, floods, mudslides, wave/surges, and wind storms.

Table J20. Top 20 Activities in World Bank Flood Projects

<i>Flood project activity</i>	<i>No. of Flood Projects</i>
Rehabilitation of road infrastructure	55
Rehabilitation of flood control structures	50
Equipment and supplies acquisition	39
Preventive flood control activities and structures (pre-event)	31
New construction of flood control structures	31
Rehabilitation of irrigation/drainage infrastructure	25
Rehabilitation of (rural) water systems infrastructure	24
Rehabilitation of (urban) water systems infrastructure	24
Institutional development/strengthening (disaster specific)	21
Early warning/public awareness	18
Design and supervision	18
Studies and research	17
Restoration of education facilities	16
Technical assistance: engineering	15
Planning	15
Restoration of health facilities	13
Support for a Project Implementation Unit	13
Operations and maintenance	13
Rehabilitation of (urban) water/sanitation infrastructure	12
Relocation to safe area	12

Source: IEG water database

Box J2. Integrated Water Resources Management and Hydrological and Meteorological Monitoring in Mexico

In 1996, the Bank approved the Water Resources Management Project in Mexico designed to help the government face major critical challenges in water resources management. The general objectives were to promote conditions for environmentally sustainable, economically efficient, and equitably allocated use of water resources in Mexico; to support the integrated comprehensive management of water resources; and to increase the benefits and reduce the risk related to existing hydraulic infrastructure.

The project had five main components. The second component – water quantity and quality monitoring improvement and assessments – supported the improvement and upgrading of the hydrological and hydrogeological water quality and quantity monitoring and related climatological/meteorological networks, including telemetric networks to provide information to improve the quality of information for better and more efficient water resources management. The networks were to improve data collection, processing, and dissemination among users. Assessments of surface and groundwater bodies and hydrological and hydrogeological studies were planned to be prepared.

The outcomes of this component were (i) technological modernization of the various networks of the Meteorological Observation System, telecommunications, and the computational base for the processing of meteorological data; (ii) improvement of the National Bank for Climatological Data; and (iii) improvement in the quality of meteorological prognostics.

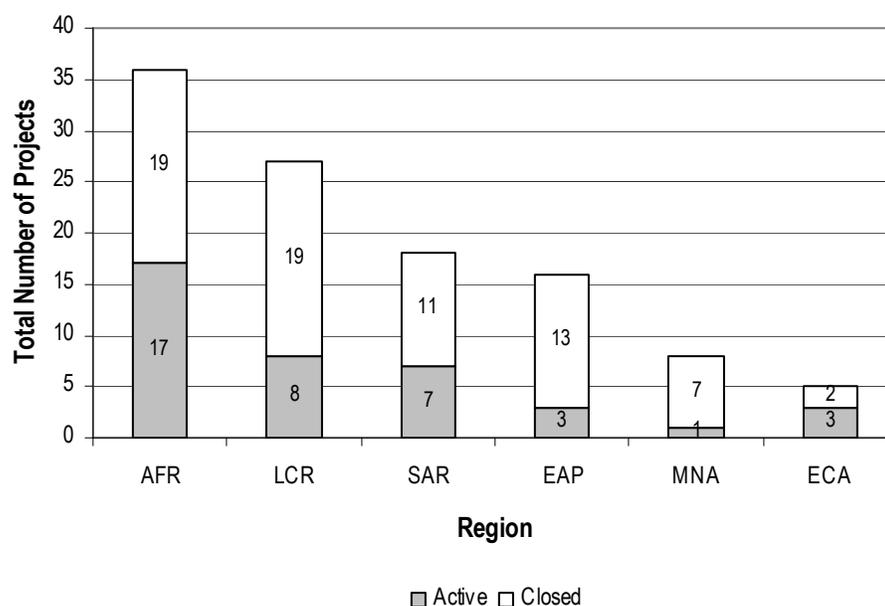
The project files noted a substantial increase in the quantity and opportunity of available data on the state of the atmosphere and the hydrological cycle, in particular during emergency situations like hurricanes and droughts. Improvement of emergency alert capabilities was also noted, in particular within the National Civil Protection System. Prognostics at the disposal of users and the general public through a Web site recorded more than 2.2 million discrete users in 2004 on daily weather, rapid-onset emergency alerts, and drought reporting.

The benefits reported include (i) improved daily decision-making for social and economic activities (such as agricultural and like activities in general, social events, etc.); (ii) minimization of damage caused by extraordinary hydrometeorological phenomena (protection of human lives, reduced destruction in cultivation zones, triggering of emergency evacuation, and averted economic loss, etc.). For groundwater management issues, the systems helped improve the decision-making process in the administration and management of groundwater, conservation and sustainable exploitation, and transparency on aquifer status.

Source: World Bank project documents (Project P007713).

DROUGHT

Figure J17. Regional Breakdown—Most Drought Projects Are in Africa



Source: IEG water database

Table J21. Drought Projects Portfolio Loan Commitments Snapshot

<i>Drought projects portfolio</i>	<i>Completed</i>	<i>Ongoing</i>	<i>Total number of projects</i>	<i>Total loan commitments (US\$ billion)¹</i>	<i>Percentage of total commitments</i>
Projects focused on droughts with at least one “drought” objective	36	14	50	4.81	48
Projects with drought-related components	34	26	60	5.14	52
Total number of projects	70	40	110	9.96	100

Source: IEG water database

¹ This figure represents the total size of the loans not the specific cost of the drought related components.

Table J22. Implementation Activity Results for Drought Mitigation

Category	Activity	Total number of projects for which data were found	Meet or exceed appraisal expectations	50 % to 99% of appraisal expectations	Less than 50% of appraisal expectations	Percentage of projects that meet or exceed appraisal expectations to the total number of projects for which data were found
Agriculture	Support for agricultural extension, scientific and/or economic studies and research (soils)	2	2	0	0	100
	Water reuse in agriculture	1	1	0	0	100
	Support the breeding of drought resistant animals	5	4	1	0	80
	Erosion prevention through reforestation	2	1	1	0	50
	Construction and rehabilitation of irrigation water supply schemes (systems and related equipment)	21	6	8	7	29
	Provision of animal-related essential supplies	4	1	3	0	25
	Support for agricultural extension, scientific and/or economic studies and research (agriculture and irrigation related)	18	4	6	8	22
	Promotion of improved soil management and conservation practices	6	0	4	2	0
	Implementation of water efficiency and/or sustainable farming practices	1	0	1	0	0
	Implement water conservation and efficiency measures/water harvesting	4	0	3	1	0
	Control and treatment of animal diseases	2	0	2	0	0
	Introduction of drought-resistant crops	3	0	1	2	0
	Development of rain-fed irrigation systems	1	0	0	1	0
	Environment	Forest management/reforestation	5	3	0	2
Drinking water efficiency		2	1	1	0	50
Effluent and run-off management		2	1	0	1	50
Small earth dams construction and rehabilitation		5	2	2	1	40
Development of watershed management plans and policies		1	0	0	1	0
Social/Human Dimension	Public awareness and education	3	3	0	0	100
	Creation of new drought related institutions	1	1	0	0	100
	Monitoring equipment and supplies acquisition	1	1	0	0	100
	Upgrading/modernizing/rehabilitating monitoring stations and facilities	4	3	0	1	75
	Road construction/repairs	4	3	0	1	75
	TA and training on monitoring	3	2	1	0	67
	Installing new monitoring stations	5	3	2	0	60
	Energy – new infrastructure/rehabilitation	7	4	3	0	57

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Community drought preparedness TA or training	4	2	1	1	50
Regularization of land tenure	2	1	0	1	50
Delegating O&M roles and responsibilities to beneficiaries (infrastructure schemes)	12	4	6	2	33
Community and user association financial/administrative/management//drought preparedness TA or training	6	2	0	4	33
Food security and nutrition/health training	3	1	2	0	33
Development of agricultural and water policies/reform	3	1	1	1	33
Establishing insurance policies and funds for climate risks	3	1	0	2	33
Financing income-generating activities for women and disadvantaged groups	15	4	9	2	27
Construction and rehabilitation of drinking water supply schemes	17	4	7	6	24
Institutional capacity building (drought specific)	5	1	1	3	20
New/improved agricultural practices/technologies TA and training	7	1	3	3	14
Imposition/planning of cost recovery strategies, improved billing collection, financial management, for O&M of water infrastructure	7	1	2	4	14
Developing databases and information systems/data sharing and dissemination	1	0	1	0	0
Infrastructure-construction related TA and training	4	0	2	2	0
Development of drought preparedness/management plans or procedures	2	0	0	2	0
Food security measures for disadvantaged groups	5	0	4	1	0
Groundwater related studies and research	1	0	0	1	0
Poverty reduction master plan development	2	0	0	2	0

Source: IEG water database.

Chapter 4

PRESERVING ENVIRONMENTAL FLOWS

Table J23. List Projects Involving Environmental Flows

<i>P0 number</i>	<i>Country</i>	<i>Region</i>	<i>Project</i>	<i>PAD date</i>	<i>Original amount (US\$ million)</i>	<i>Assessment components</i>
P001340	Kenya	AFR	Third Nairobi Water Supply Project	Jul-89	64.8	Environmental Assessment (EA), Social Assessment (SA) Environmental Flow Assessment (EFA)
P001361	Kenya	AFR	Second Mombasa and Coastal Water Supply Engineering and Rehabilitation Project	Dec-91	43.2	Environmental Impact Assessment (EIA; quite extensive)
P001396	Lesotho	AFR	Lesotho Highland Water Project Phase 1A	Jul-91	110	EIA (covered this and phase 1B)
P001409	Lesotho	AFR	Lesotho Highland Water Project Phase 1B			EFA
P001662	Malawi	AFR	Power V Project	Dec-00	55	EA considers the issues that an EFA would consider. Does not quantify flows. More qualitative assessment.
P003492	China	EAP	Daguangba Multipurpose Project	Sep-91	30 loan, 37 credit	Water quality, fish impacts, afforestation
P008037	Peru	LCR	Irrigation Subsector Project	Jun-96	85	Institution/law
P008821	Russian Federation	ECA	Environmental Management Project	Oct-94	110	An analysis similar to an EFA, including all parts of the hydrologic cycle, such as precipitation, snow melt, overland runoff, groundwater infiltration, groundwater discharge, well pumpage, reservoir regulation, diversion of surface water for water supplies and industries, discharge of point sources, and evaporation. The conceptual model will include, where possible, spatial variability; seasonal variability; long-term trends; daily, seasonal, and annual loads; and the source, cause, transport, fate, and effect of contaminants in the basins; when the data do not allow quantification of source, cause, transport, fate, and effects,

<i>P0 number</i>	<i>Country</i>	<i>Region</i>	<i>Project</i>	<i>PAD date</i>	<i>Original amount (US\$ million)</i>	<i>Assessment components</i>
						hypotheses will be identified to provide guidance for designing a new monitoring program.
P009127	Uzbekistan	ECA	Drainage, Irrigation, and Wetlands Improvement Phase I Project (Aral Sea Basin Program)	May-03	Credit 25, Loan 35	EA, plus SA and CH assessment.
P009512	Bangladesh	SAR	Second Small Scale Flood Control, Drainage, and Irrigation Project	Dec-87	81.5	Hydrological analysis
P010476	India	SAR	Tamil Nadu Water Resources Consolidation Project	May-95	282.9	Institutions/law; operational hydrology assessment
P036414	China	EAP	Guangxi Urban Environment Project	May-98	72 Loan 20 credit	Economic, environmental, and social assessments
P038570	Tanzania	AFR	River Basin Management and Smallholder Irrigation Improvement Project	Jun-96	26.3	Hydrological assessment, Floods and droughts studies, WRM study, rapid water resources assessment
P039015	Mozambique	AFR	National Water Development I	Dec-97	36	EA, River basin and groundwater studies, studies measuring flow and diversion, and prefeasibility studies including field exploration; EAs of proposals for works and changed river management rules, proposals for environmental monitoring of water resources.
P039281	Pakistan	SAR	Ghazi-Barotha Hydropower Project	Nov-95	350	Detailed studies and evaluations of the potential hydrological and ecological impacts of reduced flows
P040185	China	EAP	Shandong Environment Project	Sep-97	95	EA
P040610	India	SAR	Rajasthan Water Sector Restructuring Project	14-Apr-03	140	Institution/law

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<i>P0 number</i>	<i>Country</i>	<i>Region</i>	<i>Project</i>	<i>PAD date</i>	<i>Original amount (US\$ million)</i>	<i>Assessment components</i>
P045864 TF02340 6 (GEF TF number)	Cambodia, Lao PDR, Thailand, and Vietnam (Mekong River Commission)	EAP	Water Utilization Project	Jan- 00	11	EFA law
P046042	Kyrgyz Republic	ECA	Irrigation Rehabilitation Project (Aral Sea)	Mar- 98	35	EA
P046045	Kazakhstan	ECA	Syr Darya Control and Northern Aral Sea Phase-I Project	May- 01	64.5	SA, EA, preparatory study (EFA-like)
P046563	China	EAP	Second Tarim Basin Project	Apr- 98	90 (started) 150 (ended)	EIA, social impact assessment (SIA), hydrological modeling studies
P046648	Mali, Mauritania & Senegal	AFR	Regional Hydropower Development Project	Jun- 97	38.7 (17.1 Mali, 11.1 Mauritani a, 10.5 Senegal)	Cost benefit study, Reservoir management study, and water charter (acts as living EFA)
P049290	Lao PDR	EAP	Nam Theun 2 Social and Environment Project (NTSEP)	2005		Riparian release study, hydrology study, CIA, EA, SA
P056424	China	EAP	Tongbai Pumped Storage Project	Dec- 99	320	EA as EFA Important to note that EAs sometimes only show what the impacts of the project <i>might</i> be. They do not determine environmental flows. pp 85-88 shows the EFA-like results.
P058067	Sri Lanka	SAR	Second Community Water Supply and Sanitation Project, Volume 1	ongoi ng	39.8	River basin-level study
P060474	Bolivia	LCR	Sustainability of the National System of Protected Areas Program, Phase I		15	Ecosystem analysis/institution- building
P064573	Senegal	AFR	Senegal River Basin Water and Environmental	Oct- 03	5.26	EA (TEA and TDA)

<i>P0 number</i>	<i>Country</i>	<i>Region</i>	<i>Project</i>	<i>PAD date</i>	<i>Original amount (US\$ million)</i>	<i>Assessment components</i>
			Management Project			
P071170	Iran	MNA	Alborz Integrated Land And Water Management Project	Feb-05	120	Studies of river morphology, Water flows, and quality comprehensive set of ecological monitoring, survey, and analytical studies
P073397	Tanzania	AFR	Lower Kihansi Environmental Management Project	May-01	6.3	EMP; Task Force to investigate the scope for a modified environmental flow regime; ecosystem monitoring.
P075035	China	EAP	Hai Basin Integrated Water and Environment Management Project	Mar-04	17	Studies to determine minimum ecological flows, Water ecological environment monitoring systems
P076445	Lao PDR	EAP	Nam Theun 2 Hydroelectric Project	Mar-05	20 Credit, 50 IDA Guarante e, 200 MIGA Guarante e	EIA, SIA, fish studies
P078220	Colombia	LCR	Amoya River Environmental Services	May-04	7.5	Water cycle study to document water flows and sources, including: * Collection of river flow and rainfall data; * Water cycle and water balance modeling * Formulation of scenarios incorporating anticipated local and global changes;
P080093	Ecuador	LCR	Ecuador Netherlands Clean Development Facility (NCDF) Umbrella Project	Dec-04	7.47	Ecological flow review
P086505	China	EAP	Ningbo Water Management Project or "Ningbo Water and Environment Project"	Feb-05	130	EFA
P086903 and P086801	Sierra Leone	AFR	Completion of the Bumbuna Hydroelectric Project Under a	May-05	38 (partial risk guarante	EA, EIA, RAP, Contractor EMPS, Biodiversity studies, fish species study; an amenity or environmental flow maintained

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<i>P0 number</i>	<i>Country</i>	<i>Region</i>	<i>Project</i>	<i>PAD date</i>	<i>Original amount (US\$ million)</i>	<i>Assessment components</i>
			PPP		e) 12.5 (grant)	
P087964	Serbia and Montenegro	ECA	Serbia Irrigation and Drainage Rehabilitation Project	Jun- 05	25	EA
P088671	Kyrgyz Republic	ECA	Water Management Improvement Project	Mar- 06	19	EA, EMP
P089659	Uganda	AFR	Private Power Generation (Bujagali) Project	Mar- 08	115 IDA PRG, 100 IFC "A" Loan, 30 IFC "C" Loan, 115 MIGA	Hydrological assessment, EA
P092015	Chile	LCR	Quilleco Hydropower Project Purchase of Certified Carbon Emissions Reductions by the Netherlands Clean Development Mechanism Facility	May- 06	2.4	EFA (Instream Flow Increase Methodology)

Source: IEG water database

Table J24. The Costs and Benefits of EFAs

<i>Location</i>	<i>Cost</i>	<i>Benefits</i>
China Hai Basin	US\$0.858 million (WB) US\$2.1 million (total) (ongoing project)	<p>Determining minimum flows and their scheduling:</p> <ul style="list-style-type: none"> • Helps ensure that the Bohai Sea, with its globally important ecological resources, will continue to provide significant fishery benefits to China, North and South Korea, and Japan • Allows minimum flows to be factored into the planning process • Helps develop priorities for follow-up actions • Helps maintain ecological functions • Helps reduce pollution to preserve environmental uses of water • Helps in the effort to control toxic pollutant loads • Helps avoid overuse of surface water • Aids in the arrest of the decline and deterioration of water resources and damage to freshwater in coastal environments in the Hai Basin • Saves the Bohai ecosystem and fishery resource • Preserves this seasonal spawning and nursery ground for the larger and more productive Yellow Sea
Ecuador	Funded by the BNWPP Figures not available Ongoing project	<ul style="list-style-type: none"> • The EFA saved three species of rare and endangered fish from harm. The species most affected by the water diversion is the prefiadilla (<i>Pinielodes cyclopum</i>), a small fish that does not migrate significantly. The prefiadilla survives in turbulent high-quality waters and tends to hide in small lateral creeks under critical conditions. The flow regulations were altered accordingly • The EFA helped mitigate the impacts of the project on the natural distribution of aquatic species, migratory events, and food web interactions within the watershed
China Tarim Basin	Figures not available	<ul style="list-style-type: none"> • Development of a mechanism for defining the rights to water, <i>including the in-stream environmental needs</i>, and effective monitoring systems drives sensible investment in water-saving measures, conjunctive use of surface and groundwater, water quality improvements and drainage • Analyses allowed evaluation of overall river basin management options, and sub-basin investment and operation proposals to ensure adequate water availability for downstream purposes • Development of a mechanism for defining the rights to water, including the in-stream environmental needs, and effective monitoring systems can drive sensible investment in water-saving measures, conjunctive use of surface and groundwater, water quality improvements and drainage <p>Policy and legal frameworks developed as part of the project, and institutional reforms meant that The Tarim Basin Water Resources Committee (TBWRC) was able to monitor and control water extraction and ensure minimum environmental flows. As a result:</p> <ul style="list-style-type: none"> • Water deliveries to the “Green Corridor” recreated 200 square kilometers of terminal lake systems • Water table rose between 3.2 meters and 12.6 meters in the lower river reach • The mineral content of the ground-water has improved dramatically, from 4-5 grams per liter to 2-3 grams per liter • The trees, shrubs, and grasslands have been revitalized on both sides of the river, providing food, shelter and water for wildlife and people • The lower river has seen a return of 25 species of native birds, amphibians, reptiles, and 11 species of fish. Other wildlife, such as red deer, have also returned • Dramatic revitalization in the growth of trees
Tanzania	Figures not available	<ul style="list-style-type: none"> • The droughts studies informed the water-use policy formulation process by determining, <i>inter alia</i>, river flow characteristics • The impacts of unregulated abstraction were lessened by minimum flow maintenance

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<i>Location</i>	<i>Cost</i>	<i>Benefits</i>
Lower Mekong Basin	Basin modeling and institutional knowledge base US\$9.9 million	<ul style="list-style-type: none"> • Provide a “unifying framework” for assessing the ecosystem needs as part of the river basin management • Help avoid changes in flows and salinity from, <i>inter alia</i>, deforestation, dams, increased abstraction for irrigation • Help protect the Tonle Sap fishery, which provides jobs to 1.2 million people • Help avoid increased flood frequency and peaks in the rainy season • Help avoid exacerbated drought conditions and therefore rice production¹

WATER QUALITY MANAGEMENT

Table J25. The Top 20 Approaches to WQM

<i>Activities pursued</i>	<i>Projects approved since 1997 that include this activity</i>
Technical assistance and training for water quality improvement	333
Development of plans, policies and regulations to improve water quality management	211
Construction of new potable water systems	174
Construction of new sanitary systems	153
Control or treatment of polluted water	98
Storm and flood control (drainage)	83
Irrigation	68
Public awareness campaign on the use of improved water for drinking and to avoid pollution	64
Information management	63
Transportation	41
Watershed protection and management	42
Provision of in-household installations	41
Commercial development of water-related business	40
Water for energy	33
Ocean/coastal/wetland pollution	33
Attention to aquatic biodiversity	29
Installing water or sanitation in public facilities	24
Monitoring of groundwater	15
Water recycling	6
Bacteriological control	6

Source: IEG database, n=423 (projects approved 1997-2007). **Bold** text considered as software

1. <http://www-esd.worldbank.org/bnwpp/documents/3/EnvironmentalFlowCaseStudy.pdf>

Table J26. Water Quality Management—Taxonomy of Activities

<i>Activity</i>	<i>Subactivity</i>
Construction of new potable water systems	<ul style="list-style-type: none"> a) Installation of pipes and household connections b) Development of reservoirs c) Construction of water treatment facilities d) Protection of the drinking water supply e) Expansion of existing water systems f) Provision of pumps and/or other equipment, construction of gravity systems g) Installation of water filters for surface water, rain harvesting h) Dam expansion or strengthening i) Construction of wells, tube wells, and related infrastructure
Construction of sanitary systems	<ul style="list-style-type: none"> a) Construction of sewage treatment plants b) Construction of sewer systems c) Connecting households to system d) Expansion/augmentation of existing systems e) Installation of sewage flow meters
Provision of in-household installations	<ul style="list-style-type: none"> a) Provision of latrines, toilets, sinks, baths, etc.
Installing water or sanitation in public facilities	<ul style="list-style-type: none"> a) Provision/ of potable water to schools, health facilities, or public offices b) Installation of bathrooms/latrines and sinks for schools, health facilities, or public offices
Monitoring of groundwater	<ul style="list-style-type: none"> a) Monitoring quality of aquifer water b) Monitoring aquifer depth c) Monitoring, preventing, or studying salinity d) Monitoring transboundary aquifers
Control or treatment of polluted water	<ul style="list-style-type: none"> a) Control or treatment of leachate from solid waste sites b) Control or treatment of industrial runoff or wastewater c) Control or treatment of agricultural drainage water or runoff d) Control of the quality of water provided to croplands e) Closing facilities that pollute f) Measuring or limiting use of fertilizers g) Relocation of water-borne pollutants h) Clean up of marine oil spills i) Construction of road microcatchments to prevent erosion j) Improved manure management practices k) Promotion aqua-friendly agriculture l) Reuse of treated water (except for agriculture) m) Dewatering n) Construction of sludge treatment or disposal facility o) Roadside soil erosion prevention p) Promotion of cleaner industrial practices q) Stabilization of waste ponds containing pollutants r) Invasive species control (hyacinths) s) Planting of forests

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<i>Activity</i>	<i>Subactivity</i>
Irrigation	<ul style="list-style-type: none"> a) Promotion of irrigation efficiency b) Rehabilitation of irrigation schemes c) Use of tube wells to extract groundwater d) Reuse of treated water for irrigation e) Microcatchment system development f) Construction of small irrigation schemes g) Conversion of irrigation schemes pump to gravity h) Hill dams construction for irrigation i) Construction of pressurized irrigation j) Pumping station rehabilitation/expansion k) Promotion of improved techniques for rain-fed farming
Storm and flood control (drainage)	<ul style="list-style-type: none"> a) Construct storm drainage b) Construct water channels c) Dredging d) Lining of watercourses e) Construction of retaining walls f) Construction for flood prevention dikes g) Rehabilitation of existing drainage systems h) Construction of new drainage systems or components i) Desalting basin construction/improvements
Attention to aquatic biodiversity	<ul style="list-style-type: none"> a) Fisheries rehabilitation b) Protection of coastal spawning grounds c) Promotion of dryland biodiversity to protect wetlands or water
Commercial development of water-related business	<ul style="list-style-type: none"> a) Support for fishermen, b) Commercialization (fish and seafood) c) Support for disadvantaged stakeholders
Watershed protection and management	<ul style="list-style-type: none"> a) Forest management /reforestation b) Rangeland c) Erosion control d) Nurseries e) Vegetative cover restoration f) Agricultural pollution management mechanisms with manure improved practices to prevent nitrates going into waters g) Transboundary cooperation h) Small earth dams construction i) Improved soil management practices to prevent loss of grasslands and biodiversity
Development of plans, policies, and regulations	<ul style="list-style-type: none"> a) Support for scientific and economic research/ studies for project preparation or to develop policies b) Support for professional education c) Masterplan development d) Development of standards and methodologies e) Definition of procedures and standards f) Development of monitoring methods g) Imposition/planning of tariffs, fees, funds, cost recovery strategies, improved billing collection, financial management, financial planning, creation of revolving funds, cost recovery schemes
Public awareness	<ul style="list-style-type: none"> a) Education campaigns b) Schools education environmental related curriculum c) Information dissemination in websites, other publicity

<i>Activity</i>	<i>Subactivity</i>
Technical assistance and training	<ul style="list-style-type: none"> a) For project preparation (experts, best practices) consulting services b) For project management (monitoring equipment)/to manage studies, to set up labs c) Capacity building, training for government officials d) Institutional level capacity building i.e. Equipment, knowledge, improved authority and administration/ management schemes.
Information management	<ul style="list-style-type: none"> a) GIS systems, database (design, data-entry and use), environmental monitoring b) Laboratory data/monitoring c) Other
Water recycling	<ul style="list-style-type: none"> a) In agriculture b) Other uses domestic uses i.e. Toilets c) Industrial uses
Water for energy	<ul style="list-style-type: none"> a) Hydropower plants construction b) Rehabilitation or expansion of plants c) Oil distribution/equipment acquisition d) Monitoring hydrocarbons in water e) Construction of CHP generation/ steam facilities
Transportation	<ul style="list-style-type: none"> a) Roads and highways construction b) Rural roads/small-scale road construction/improvements
Bacteriological control	<ul style="list-style-type: none"> a) Chemical treatment to control water-borne diseases b) Protection of the food supply c) Decontaminating fruits and vegetables d) Floating plants as indicator of water quality e) Non-chemical alternatives for pest management
Ocean/coastal/wetland pollution	<ul style="list-style-type: none"> a) Monitoring b) Preventing c) Treatment d) International transboundary protection e) Restoration

Source: IEG water database

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Table J28. Non-Point Source-Related Projects Are Mostly Focusing on Implementing Efficiency in Irrigation, Reforestation, and the Construction of Drainage Systems

<i>Top-five implemented activities in non-point source projects</i>	<i>Most common implemented strategic approach (top in the list)</i>	<i>Total number of projects implementing this approach frequency count</i>
Technical assistance and training	Institutional-level capacity building, i.e., equipment, knowledge, improved authority, and administration/management schemes	151
Development of policies and regulations	Support for scientific and economic research and studies for project preparation or to develop policies	76
Irrigation	Promotion of irrigation efficiency	54
Storm and flood control (drainage)	Construct storm drainage	29
Watershed protection and management	Forest management/reforestation	39

Source: IEG water database

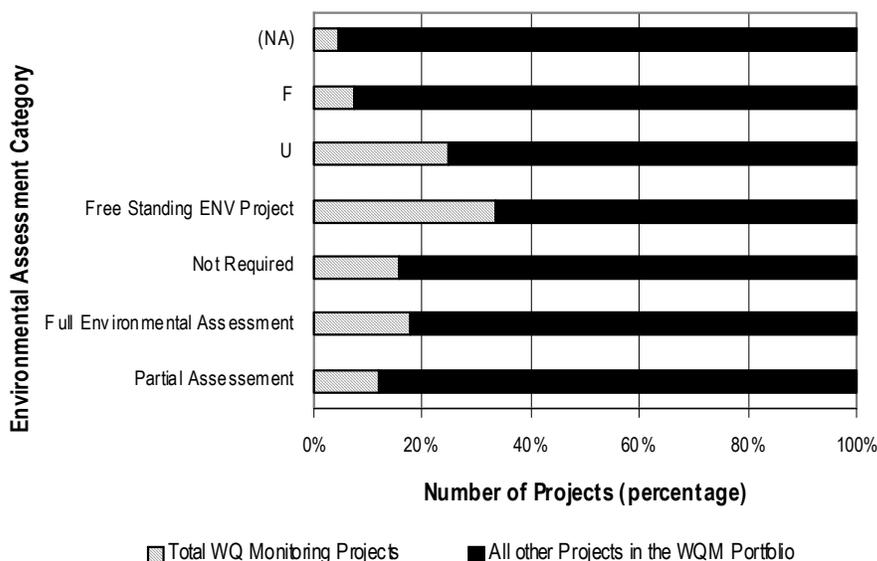
WATER QUALITY MONITORING

Table J29. Environmental Assessment Category Analysis of Water Quality Monitoring Projects Compared to All Other Projects in the WQM Portfolio

<i>Environmental assessment category</i>	<i>All other projects in the WQM portfolio</i>			<i>Total projects that monitored water quality</i>		
	<i>Completed</i>	<i>Ongoing</i>	<i>Total number of projects (n=629)</i>	<i>Completed</i>	<i>Ongoing</i>	<i>Total number of projects (n=102)</i>
Partial assessment B	216	149	365	28	22	50
Full environmental assessment A	56	73	129	16	12	28
Not required	73	19	92	13	4	17
Freestanding ENV project	8		8	3	1	4
U	2	1	3	1		1
F	1	11	12		1	1
(NA)	2	18	20		1	1

Source: IEG water database

Figure J18. Projects Conducting Full Environmental Assessments Are not Implementing the Most Water Quality Monitoring Projects



Source: IEG water database. n=731. Water quality monitoring projects (n=102), all other projects in the WQM portfolio (n=629)

Table J30. Snapshot of Monitoring Activities at the Bank

<i>WQM activities</i>	<i>Total number of projects</i>	<i>%</i>
All projects that intended to monitor water quality	61	100
A monitoring process was begun that continued (at least) until project closing, or a monitoring system was designed	55	90
Projects that reported collecting water quality data	48	79
Projects that used appropriate data parameters given the nature of objectives	40	66
Projects that reported improved water quality	29	48

Source: IEG water database n=61

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Table J31. Water Quality Monitoring Analysis: Where Is Monitoring Taking Place?

<i>Subsector category</i>	<i>All other projects in the WQ management portfolio (n=629)</i>	<i>Total projects that monitored water quality (n=102)</i>	<i>Sum of all projects by subsector</i>	<i>% of WQ monitoring by subsector</i>
Petrochem and fertilizer	4	2	6	33
Oil & gas	7	3	10	30
Mining & other extractive industries	14	5	19	26
Other industry	28	9	37	24
Forestry	19	5	24	21
Sewerage	88	21	109	19
Central government administration	223	51	274	19
Animal production	25	5	30	17
Sanitation	66	13	79	16
Agricultural extension and research	71	13	84	15
Power	40	7	47	15
Water supply	154	23	177	13
Health	42	6	48	13
Ports/water/shipping	14	2	16	13
Flood protection	48	6	54	11
Irrigation and drainage	99	11	110	10
General water/sanitation/flood sector	92	10	102	10
General agriculture/fisheries/forest sec	92	10	102	10
Agro-industry	16	1	17	6
Roads and highways	122	1	123	1
Crops	23	0	23	0

Source: IEG water database

Table J32. Project Documents Show Little about the Effectiveness of Monitoring Systems.

<i>Project ID</i>	<i>Monitoring systems, sampling and analysis methods</i>
P057927 (Bulgaria)	Industrial monitoring systems were established. Monitoring data is generated on industrial effluent waters. Sampling is described in project documents as “regular.” There is no report of analysis methods but the data collected is sent to the regional inspectorates.
P046838 (Kenya)	A “network of monitoring spots in the lake and rivers” was installed in 3 neighboring countries. A water quality analysis laboratory exists which is “functioning” and “operational.” Multiple sample gathering sites have been “harmonized” within the water quality monitoring network. Sampling is described as “episodic,” which could be interpreted as suboptimal given that management measures for pollution reduction were identified but not developed or implemented.
P034081	A “complete environmental monitoring system” was installed for the duration of the project. The documents

<i>Project ID</i>	<i>Monitoring systems, sampling and analysis methods</i>
(China)	indicate that monitoring tasks were assigned to technical institutes. Sampling methods are not described in detail. Documents mention the generation of “large amounts of monitoring data” which were used to take corrective actions to resolve “environmental issues.” Sampling is described as being “periodic” and “systematic.”
P010485 (India)	A set of “rational networks” were installed for “the first time” for surface and groundwater monitoring. Documents do not describe the sampling techniques utilized but mention the use of “state-of-the-art” equipment and note that “standards for sample collection” had been developed. Hydrological information is said to be collected and banked “systematically.” Other “historical data” was computerized but agencies have only been able to “partly validate” it.
P009906 (India)	A “network of air and water quality monitoring stations” was established. It is taking “routine” sample collection and performing analysis. The monitoring tasks were assigned to certified laboratories. They are supposed to run “legal” and “random cross testing of private lab tests” as well as “surprise testing of industries.” A database is mentioned. It collects inventory data on industries, types of waste, brands of equipment, costs of controlling pollution “monitoring equipment costs, availability and suitability.”
P008586 (Poland)	“Four mobile groundwater monitoring stations” are said to be producing “regular reliable” information on groundwater quality for use in policy-making. The sampling techniques are not described in detail but the project was going to demonstrate “new techniques to monitor groundwater on an operational level.” Computer systems were introduced to equip and modernize three new GIS “environmental laboratories.”
P007846 (Panama)	One new laboratory and the upgrade of six existing ones was done to support “on-going water quality testing programs that had stopped” due to a lack of funding. No further details are mentioned on the types of tests conducted or data parameters used. The water quality control program according to the documents was supposed to conduct the monitoring on a “systematic basis” but it had actually done it based on an “on demand [basis] from communities.”
P005347 (Morocco)	Sampling of effluent quality was going to be analyzed to ensure that it would be complying with the MARPOL 73/78 Convention standards. Three governments and the Bank negotiated an agreement whereby a set date, and “under TOR acceptable to the Bank” a laboratory would conduct “analysis and produce a report on the findings of the analysis every three months.” Governments gave assurances that this would occur but no further information was found in documents to determine the outcome of the monitoring activities.
P005237 (Jordan)	Monitoring of marine water quality is reported to be “regular.” The documents do not mention the sampling methods used. Monitoring equipment that was purchased for the project is “functioning” and providing “monthly reports on monitoring data” which are being sent to local authorities. A GIS Division that was created was reported to have been “completed beyond expectations” which is supporting authorities in planning and decision-making and “sharing the results [of aquifer monitoring] with its neighbor” which could be interpreted as a neighboring country.
P005146 (Egypt)	A “routine monitoring network for drainage water quality in the Nile Delta and Fayoum” were established. Three laboratories were built and “two regional units were established” to monitor water quality “using a “before’ and ‘after’ drainage approach.” “Chemical, physical and biological” analyzes are being done of the collected water samples are mentioned took place during the project. No further information is given on the frequency of these analyses or the frequency of other “site investigations of groundwater pollution” implemented though it is mentioned that a publication was developed that helped local authorities to “integrate qualitative and environmental aspects in the management and development of groundwater resources.”
P004938 (Algeria)	A “monitoring program for water salinity/quality” and quantity was created. The documents state that “useful data are now available for developing improved methodologies and strategies.” Nevertheless, the information available indicates that “more analytical and preparatory work needs to be carried out for the full benefits of these studies.” The Government had given assurances that it will continue drainage and groundwater quantity and quality monitoring activities which were “foreseen this year.” Documents on the implementation of the project outline “limited” “usefulness” of studies given that they were not deemed to be sufficient to develop a master-plan.
P004871 (Algeria)	Sampling of effluent quality was going to be analyzed to ensure that it would be complying with the MARPOL 73/78 Convention standards. Three governments and the Bank negotiated an agreement whereby a set date, and “under TOR acceptable to the Bank” a laboratory would conduct “analysis and produce a report on the findings of the analysis every three months.” Governments gave assurances that this would occur but no

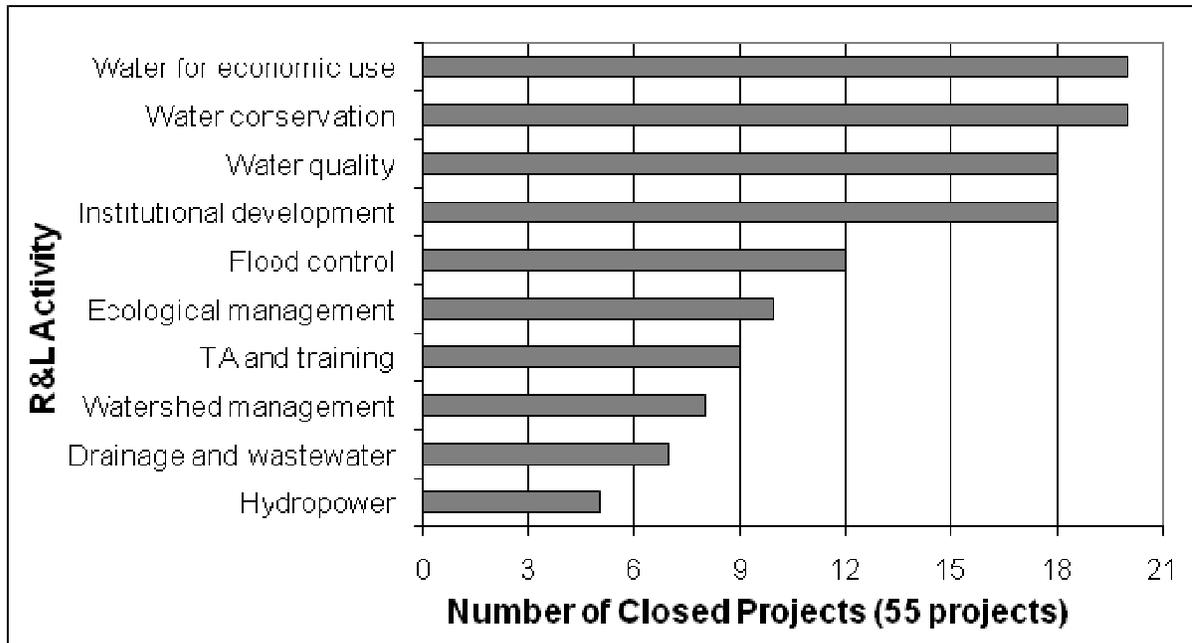
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<i>Project ID</i>	<i>Monitoring systems, sampling and analysis methods</i>
	further information was found in documents to determine the outcome of the monitoring activities.
P004799 (Thailand)	Water quality monitoring studies taken during the “pre-project phase” according to documents had helped to determine that “water quality in the reservoir had not measurably changed.” These studies are mentioned will be continued “four times each year for 5 years.” Data on parameters used is not given but it is mentioned that “six new environmental monitoring systems” had been acquired, which with the use of an “Integrated Environmental Management Information System” provided capacity to analyze data “required for environmental studies and analysis.”
P003632 (China)	“Automatic, trans-boundary water quality monitoring stations” were installed to monitor water in 20 cities in 12 Provinces/regions within the central and western regions of the country. A “satellite communications system” links these stations to the local authority in charge of monitoring the water quality of nine major lakes. No further information is mentioned on the monitoring/testing methods. This system, however, is described that assisted to “strengthen” the capacity of participating authorities which were able to increase the number of “scientific papers” and competency to develop other “key projects.”
P003602 (China)	Water quality monitoring and data management equipment” were procured to strengthen the capacity of local Environmental Monitoring Center, which is in “operation and responding to national and provincial demands.” Methods of analysis the data are not given in documents. Nevertheless, “training” of staff in environmental management is mentioned to be an “important aspect of this component.” Air and water quality monitoring is mentioned to be performed “regularly and reliably.”
P003586 (China)	A water quality monitoring laboratory with equipment to monitor water quality near a water supply intake was built. The laboratory is sampling water and analyzing a “range of specific micropollutants.” Monitoring data “has been enhanced by the provision of LIMS (laboratory information management systems)” and it is mentioned that a set of monitoring indicators were developed which are “reported regularly by SEPO.”
P003585 (China)	The SIWMS [water monitoring system] was built and equipped and “gradually put into use.” The documents estimate that the system in place can “precisely monitor 40% industry waste water from important industrial pollution sources and accurately monitor 100% of urban sewage waste water on a real-time basis.” All gathered data are being sent to a management center “in time” and information was expected to be made available to the public as well as it was suggested that the system “should” support the “enforcement of regulations on water quality.”
P002175 (Nigeria)	The monitoring system consists of an industrial database and map that provided baseline data for industrial effluent and other industrial emissions to improve the quality of water bodies in Lagos State. This system is mentioned facilitates “effective pollution control of industrial discharges.” The use of the map helped to “enforce effluent limitation, standards and guidelines.” The Government developed a monitoring program in “13 mini and major water works” and the monitoring is done “3 times weekly for physical, chemical, biochemical, microbiological” parameters. Rivers and streams are sampled “3 times weekly. Groundwater pollution is sampled “twice weekly.”

Source: IEG water database

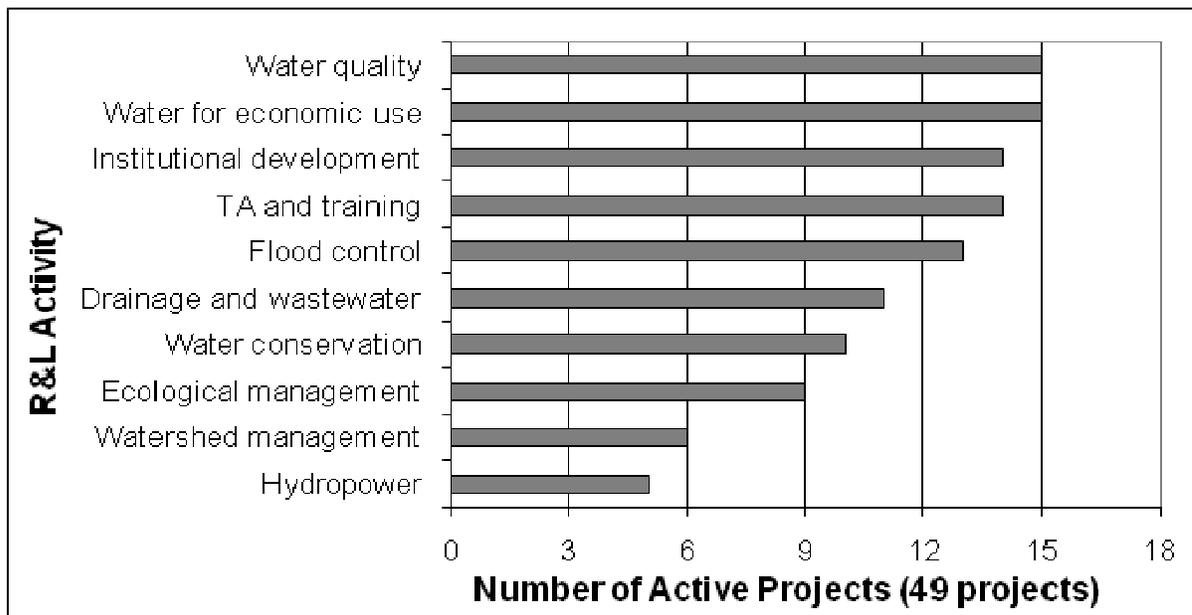
RIVERS AND LAKES

Figure J19. Distribution of River and Lake Objective Categories among All Completed Projects



Source: IEG water database

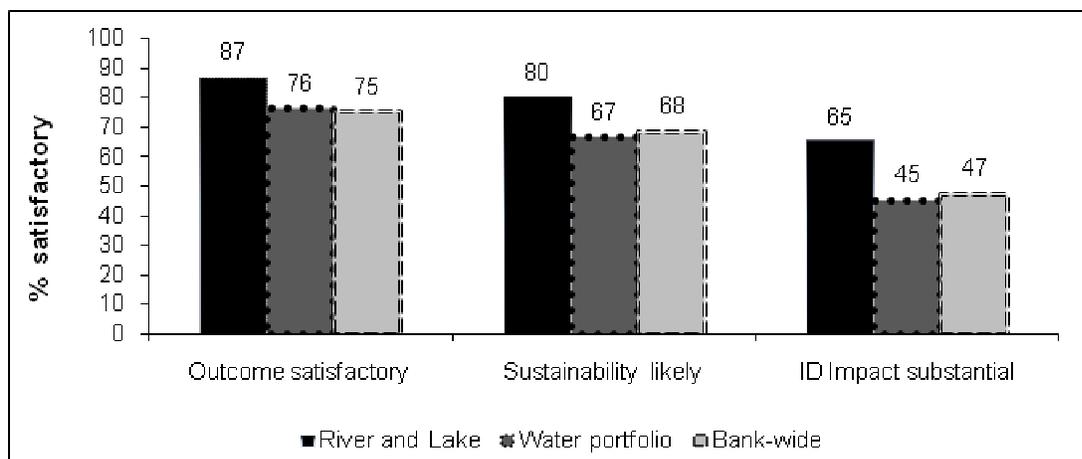
Figure J20. Distribution of River and Lake Objective Categories among All Active Projects



Source: IEG water database

IEG OUTCOME RATINGS FOR RIVERS AND LAKES PROJECTS

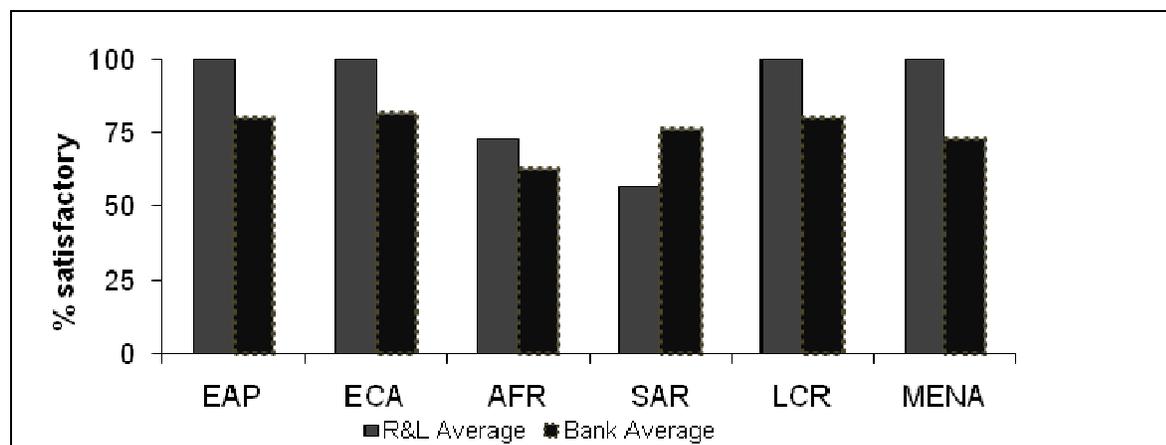
Figure J21. The River and Lake Portfolio Performs Better than Average on Outcome, Sustainability, and Institutional Development Impact



Source: IEG water database

IEG OUTCOME RATINGS BY REGION

Figure J22. SAR Performs Significantly Worse than other Regions in the Bank When it Comes to River and Lake Management, Exit FY97-07



Region	IEG Outcome			
	R&L projects		All projects	
	No. of projects	% Satisfactory	No. of projects	% Satisfactory
EAP	14	100	450	80
ECA	11	100	584	82
AFR	11	73	759	63
SAR	8	57	290	76
LCR	5	100	646	80
MNA	1	100	237	73
Total	43	87%	2966	75%

Source: IEG water database; The relationships between the ratings of the following regions was statistically significant at the 95% Confidence Level: SAR & EAP; SAR & ECA; EAP & ECA; EAP & LCR; EAP & MNA; ECA & LCR; ECA & MNA; LCR & MNA.

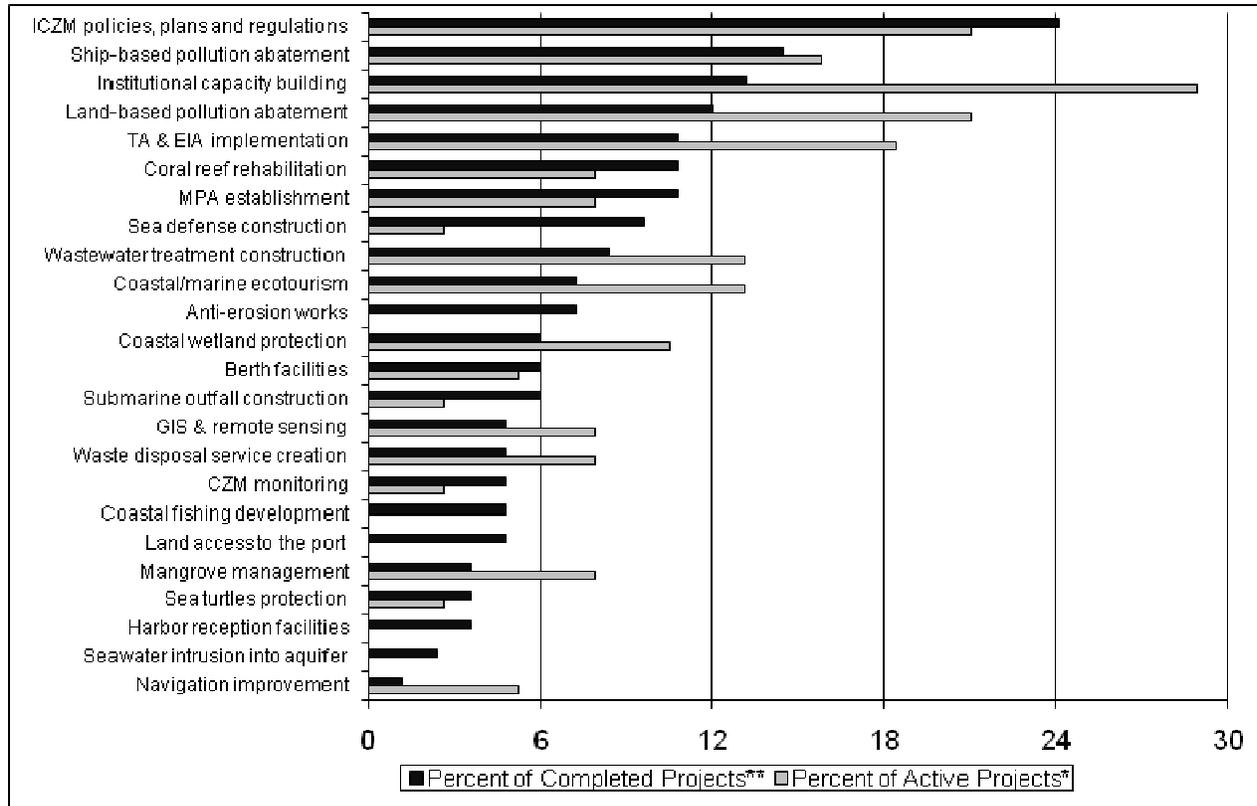
Table J33. The Most Common Project Results for Rivers and Lakes

<i>Positive results</i>	<i>Number of projects</i>	<i>Negative results</i>	<i>Number of projects</i>
Access to water supply was improved or the amount of water available increased	14	No financial incentive was created for conservation; or water pricing targets were not met	13
Riverine areas were reforested	12	Water pollution levels unchanged by project closing	12
Institutional reorganization took place	11	Weak existing legal framework slowed implementation	10
Embankment strengthening works took place	10	Agricultural production and/or irrigation rehabilitation did not meet its appraisal targets	9
Water availability was increased through upgrading physical infrastructures (need for conservation reduced)	10	Unaccounted for water or water lost in transport increased during project implementation	9
New water quality analysis laboratories established or capacity expanded at existing laboratories	9	Technical assistance was of inadequate quality (example, infrastructure collapsed)	9
Flood monitoring and forecasting systems were installed	8	WSS services not improved enough in certain project areas to permit anticipated economic use of water	9
New power stations (hydropower plants) were built or existing ones upgraded	8	Institution strengthening did not take place	9
Water measuring devices (or gauging stations) were installed	7	Implementing agencies failed to coordinate	7
Flood risks were reduced through by increasing bridge clearances and/or roadbed height	7	Water losses remained unchanged after project closure	5
Training was of good or acceptable quality	7	Infrastructure design did not respond to stakeholder priorities	5
Basin-level management institutions were established	6	Flood control structures constructed by project were destroyed by a flood	5
Water quality was improved through expansion of WTP	6	Species targeted for conservation actually declined in number	4
Erosion was eliminated in slope-lands through terracing, barrier construction, or other agricultural practices	6	Afforestation appraisal target was not met	4
Untreated runoff or dumping of solid waste stopped	6	Water quality deteriorated due to untreated domestic wastewater	3
Capacity of water treatment plants were increased	5	Treatment of non-household effluents did not take place	3
River or watercourse capacity increased or river channels deepened by dredging	5	Training target group missed, or trainees had excessively poor attendance	3
Wetlands were restored	4	Training had no impact because trainees lacked critical prerequisites	3
Flood hazards were eliminated through dam construction	4	Research results intended for sharing were not disseminated	3
Illegal fishing declined	4	No data was produced to verify water quality improvements	3
New parklands created to conserve species	4	Maintenance essential for water conservation did not take place	3
Pollution load was reduced through construction of new disposal sites or landfills	4	Insufficient data to confirm that flood risks were reduced	3
Sediment control dams were built	4	Ecological problem addressed by project remained unchanged after project closure	3

Source: IEG water database

COASTAL ZONES

Figure J23. Coastal/Marine Activities in Bank-Financed Projects



*38 active projects; **83 completed projects

Chapter 5

WATER SUPPLY, SANITATION, AND SEWERAGE

Table J34. Top 25 Activities for all Water Supply, Sanitation, and Sewerage Projects

<i>Activity</i>	<i>Number of projects</i>
Institutional strengthening/capacity building*	166
Rural water supply and sanitation*	149
Urban water supply and sanitation*	148
Technical assistance*	110
Environmental management	73
Studies	69
Training	69
Wastewater treatment	66
Financial capacity building	49
Equipment purchase	47
Pollution abatement	46
Operations and maintenance	44
Poverty targeted intervention	43
Community or beneficiary participation	42
Rehab water supply*	41
Water quality improvement	40
Community-Driven Development (CDD)	39
New sewers	38
New pipes	37
Policy	36
Project management	36
Construction of general drainage	34
Private sector participation	33
Construction of new potable water systems	32
Privatization	30

* Activities were put in this general category when no further detail was available in the component description to allow us to put categorize it more specifically.

URBAN WATER SERVICES

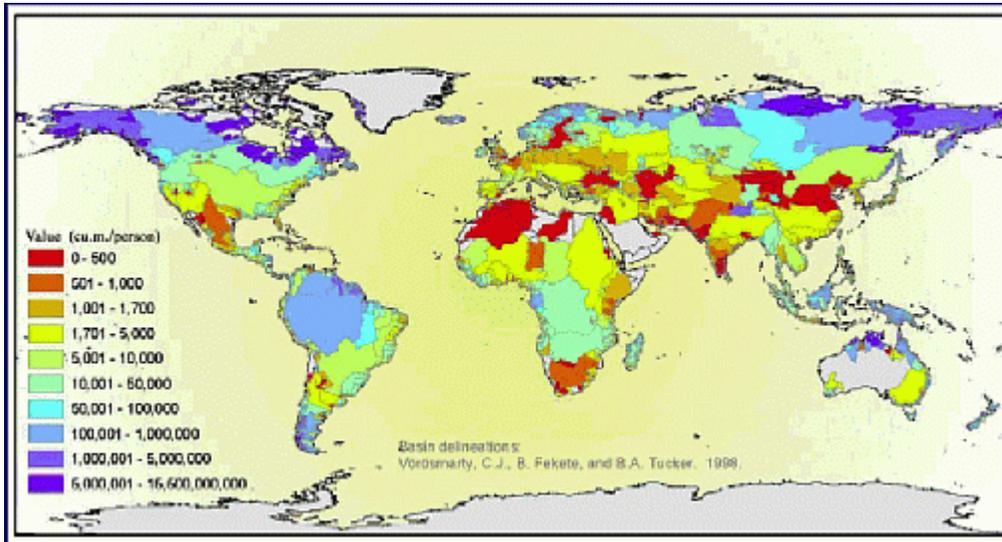
Table J35. Subsectors in the Urban Water Supply and Sanitation Portfolio

<i>Sector</i>	<i>No. urban water projects</i>	<i>Percent urban water projects</i>
Access to urban services and housing	287	52%
Pollution management and environmental health	235	42%
Water supply	229	41%
Municipal governance and institution building	201	36%
Sewerage	149	27%
Water resource management	129	23%
Municipal finance	81	15%
Infrastructure services for private sector development	74	13%

**ANNEX J
SUPPLEMENTAL DATA**

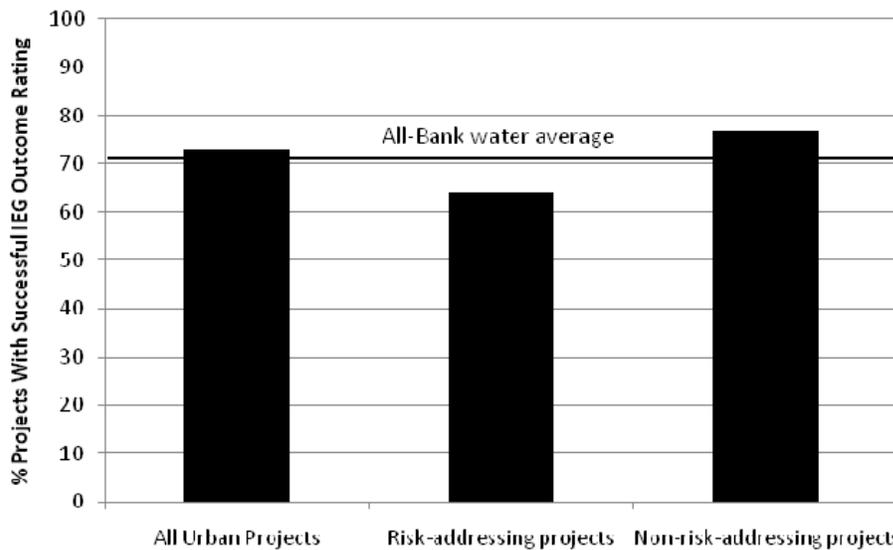
Sanitation	72	13%
Power	71	13%

Figure J24. Population Growth in the World's River Basins



From "Potential for Water Wars in the 21st Century", Erwin E. Klaas¹

Figure J25. Outcome Ratings of Risk-Addressing Urban Water Projects



Source: IEG water database

1. <http://www.public.iastate.edu/~mariposa/waterwars.htm>

SANITATION

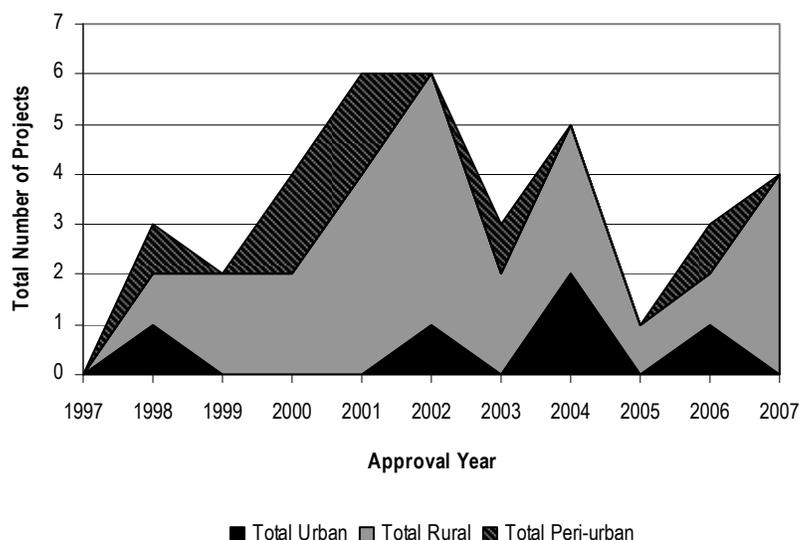
Table J37. Projects Implementing Dry or Compost Latrines

<i>Project ID</i>	<i>Country</i>	<i>Project name</i>	<i>Approval year</i>	<i>Total amount</i>
P000035	Angola	Lobito/Beng. Rehabilitation	1992	45.6
P006206	Bolivia	Rural Water Sanitation	1996	20
P055974	Bolivia	Bo El Nino Emergency	1998	25
P003509	China	Changchun Water Supply & Environmental Project	1993	120
P003637	China	CN-National Rural Water Supply Project 3	1997	70
P003644	China	CN – Xiaolangdi Resettlement	1994	110
P003587	China	Rural Water Supply and Sanitation Project	1992	110
P057352	China	CN-Rural Water IV	1999	46
P003602	China	Hubei Urban Environment	1996	150
P095315	China	CN-Western Provinces Rural Water Supply, Sanitation & Hygiene Promotion Project	2007	25
P039264	Eritrea	Community Development Fund	1996	17.5
P007392	Honduras	Nutrition and Health Project	1993	25
P010484	India	Uttar Pradesh & Uttaranchal Rural Water	1996	59.6
P009890	India	Hyderabad Water Supply and Sanitation Project	1990	89.9
P079675	India	Karn Municipal Reform	2006	216
P059477	Indonesia	Second Water & Sanitation for Low Income Communities Project	2000	77.4
P056418	Lesotho	LS-Water Sector Improvements APL (FY05)	2005	14.1
P086877	Morocco	MA-Rural Water Supply and Sanitation	2006	60
P001789	Mozambique	Urban Rehabilitation & Employment Generation Project	1989	60
P010478	Pakistan	NWFP- Community Infrastructure Project	1996	21.5
P007846	Panama	Rural Health	1995	25
P100390	Sri Lanka	Sri Lanka: Puttalam Housing Project	2007	32
P005906	Yemen, Rep.	RY-Rural Water Supply & Sanitation Project	2001	20

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SUBSIDIES FOR BASIC SANITATION

Figure J26. Sanitation Subsidies in Rural Areas Are the Most Common



Source: IEG water database (n=37). Ten projects were double counted because they gave subsidies in more than one geographic area.

HIGH UPTAKE AND SUBSIDY LEVELS

Table J38. Results for the Highest Percentage of Target Beneficiary Uptake: The 5 Best

<i>ID and country</i>	<i>Approval year</i>	<i>Appraisal project subsidy # (%)</i>	<i>Revised % Subsidy</i>	<i>Beneficiary number at appraisal</i>	<i>Beneficiary number actual</i>	<i>% Total beneficiaries actual of appraisal</i>
P037709 Honduras	1996	60	No	70,000 beneficiaries	376,378 beneficiaries	538
P003990 Indonesia	1993	100	No	1.7 million people	3.1 million people	182
P000924 Ghana	1994	50	No	20,000 people, 250 schools	36,000 people, 140 schools	180
P057352 China	1999	50 and 100	No	N/A 53,370 people (estimated by using the number of latrines at appraisal times 5 people per household)	87,760 people (estimated by using the actual number of latrines built times 5 people per household)	164
P050616 Ghana	2000	90	No	550,000 people	794,900 people	144

Source: IEG water database (n=5)

LOW UPTAKE AND SUBSIDY LEVELS

Table J39. Results for Percentage of Target Beneficiary Uptake: The 5 Lowest

<i>ID and country</i>	<i>Approval year</i>	<i>Appraisal project subsidy # (%)</i>	<i>Revised % subsidy</i>	<i>Beneficiary number at appraisal</i>	<i>Beneficiary number actual</i>	<i>% Total beneficiaries actual of appraisal</i>
P009873 India	1987	80	No	356,000 beneficiaries	380,000 beneficiaries	107
P000973 Ghana	1996	50	No	200,000 beneficiaries	190,000 beneficiaries	95
P009467 Bangladesh	1988	100	No	24,000 people	22,305 people	92
P009890 India	1990	80	No	120,000 people	107,300 people (reported in quarter ending December 1997), 104 settlements	89
P006206 Bolivia	1996	70	No	346,929 beneficiaries	64,500 beneficiaries	18

Source: IEG water database (n=5)

PROJECTS WITH NUMBER OF VILLAGE AND TOWN ATTAINMENT TARGETS

Table J40. Results for the Percentage of Target Town/Village Beneficiary Attainment

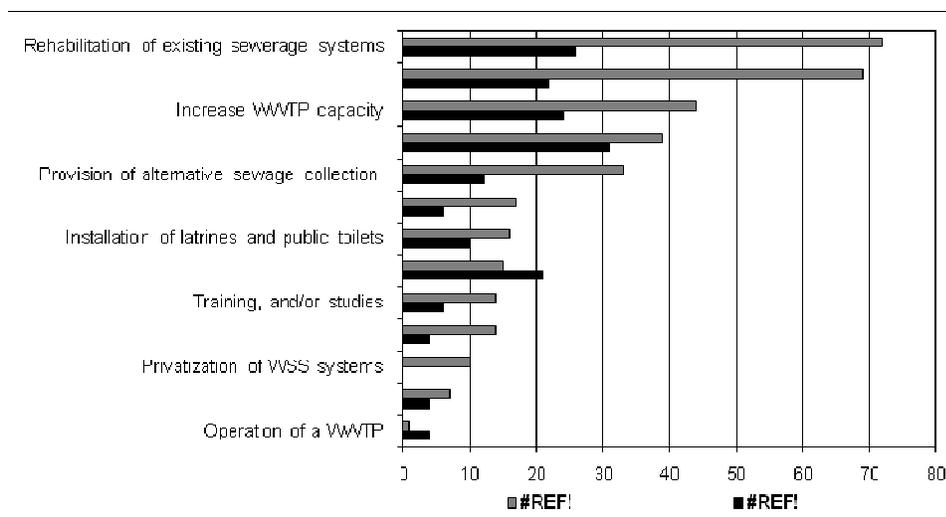
<i>ID and country</i>	<i>Approval YEAR</i>	<i>Appraisal project subsidy # (%)</i>	<i>Revised % subsidy</i>	<i>Beneficiary number at appraisal</i>	<i>Beneficiary number actual</i>	<i>% Total beneficiaries actual of appraisal</i>
P064008 Nigeria	2000	30	No	16 towns, 325,000 people	13 towns (5 partially finished)	81
P010418 India	1993	33-69	Yes	1,200 villages	918 villages	77
P010484 India	1996	80	Yes	1,550 villages	1,000 villages	65
P003587 China	1992	70 and 100	No	150 demonstration villages	84 demonstration villages	56
P010369 India	1991	100	No	2,100 villages	560 villages 1100,000 people	27

Source: IEG water database (n=5)

ANNEX J
SUPPLEMENTAL DATA

WASTEWATER TREATMENT

Figure J27. Rehabilitation of Existing Sewerage Systems Was the Preferred Strategic Approach in the Past— Currently More Attention Goes to Wastewater Treatment Plants



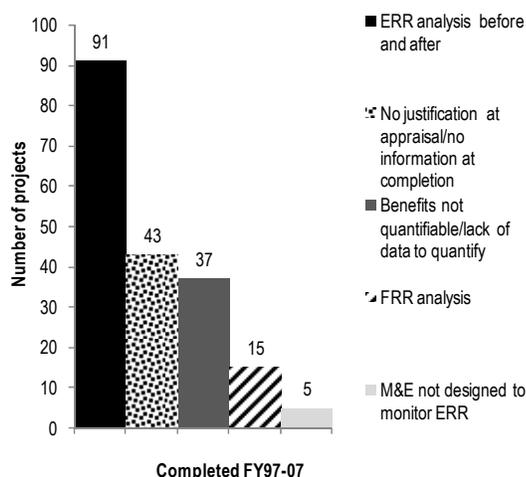
Source: IEG water documents review

Table J41. “What Happened Analysis” for the 191 Completed Wastewater Treatment Projects

<i>Positive achievements</i>	<i>Number of projects</i>	<i>Negative results</i>	<i>Number of projects</i>
Existing sewerage systems were rehabilitated	49	Planned sewerage construction works did not take place or incomplete by project closing	24
New sewerage networks were constructed	48	Existing sewerage systems were not rehabilitated	22
Existing WWTP was rehabilitated	25	WWTP was not constructed or the construction incomplete by project completion	10
WWTP capacity was increased as anticipated	25	O&M was not improved as anticipated. Financial institutional capacity did not occur	9
Sewerage system capacity was increased	14	Planned WWTP rehabilitation works did not take place	9
Public toilets and latrines were installed as planned	13	Alternative sewage collection facility was not carried out	8
Training and/or studies carried out	12	Intended privatization of WSS systems did not carried out	6
Envisioned WWTP construction work took place	11	Septic tank systems were not installed and/or improved as planned	6
Alternative sewage collection facilities were provided	10	Wastewater effluent quality remained poor	5
WSS systems were privatized	5	WWTP capacity was not increased	4
O&M was improved for WWTP and sewerage	4	Studies and/or capacity building programs did not take place	4
Septic tanks were built	1	Leakage from sewer pipes remained after project closure	3
		Planned latrines and/or communal toilets were not installed	2

ECONOMIC ANALYSIS FOR WATER, SANITATION, SEWERAGE, AND WASTEWATER TREATMENT PROJECTS

Figure J28. Project Economic/Financial Analysis for Water Treatment and Sewage Projects



Source: World Bank project documents, n=191

Note: Only 26 projects (out of 312 analyzed) supported improvement of sanitation services through the installation of latrines and public toilets. Of the 26 projects, 16 were completed and 10 were yet to close. Among the completed projects, 5 projects planned to quantify economic benefits but only 3 did so by completion. The majority of sanitation-related projects claimed that economic benefits were too difficult to quantify.

Chapter 6

DECENTRALIZATION

Figure J29. Activities of Completed Decentralization Projects

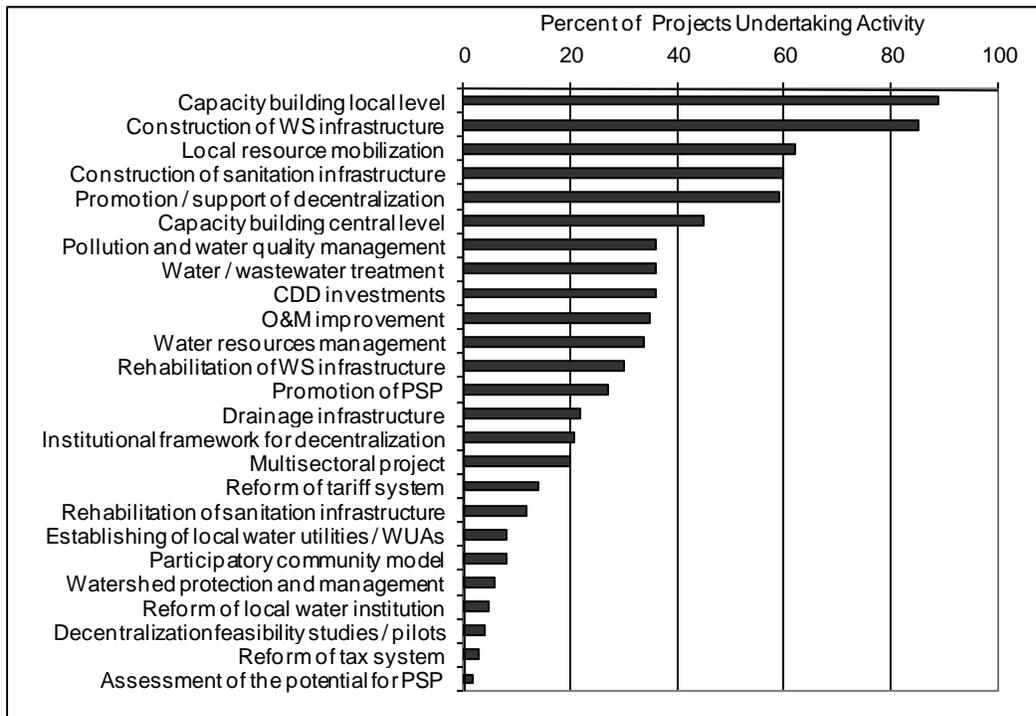


Figure J30. Positive Outcomes of Completed Decentralization Projects

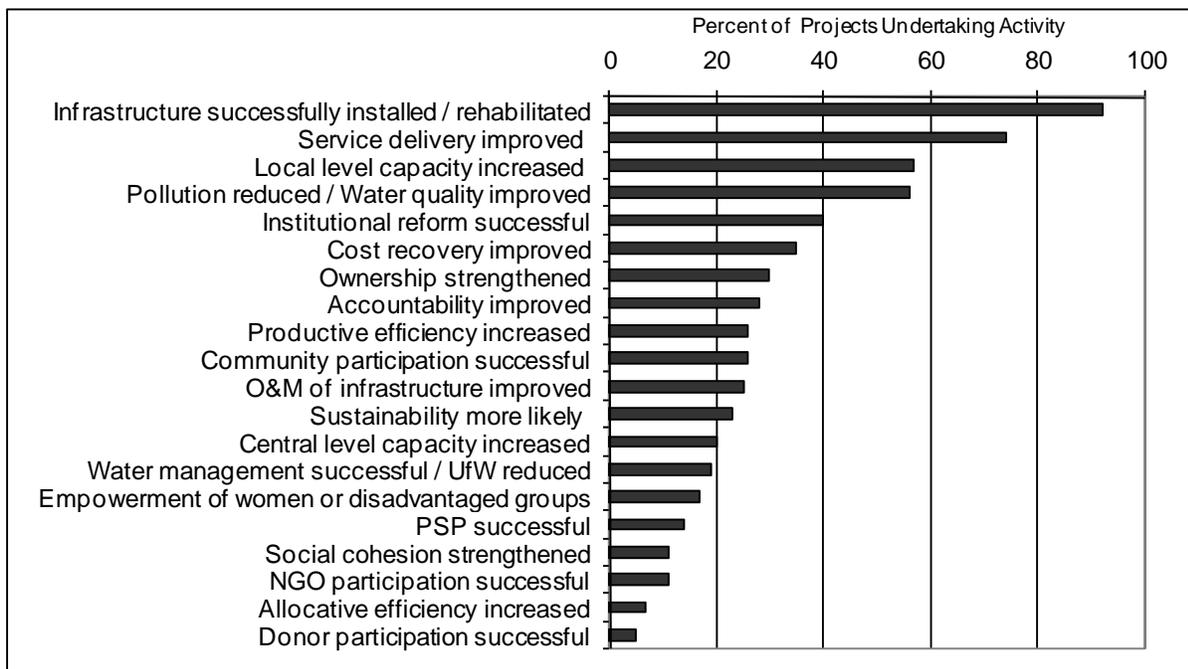
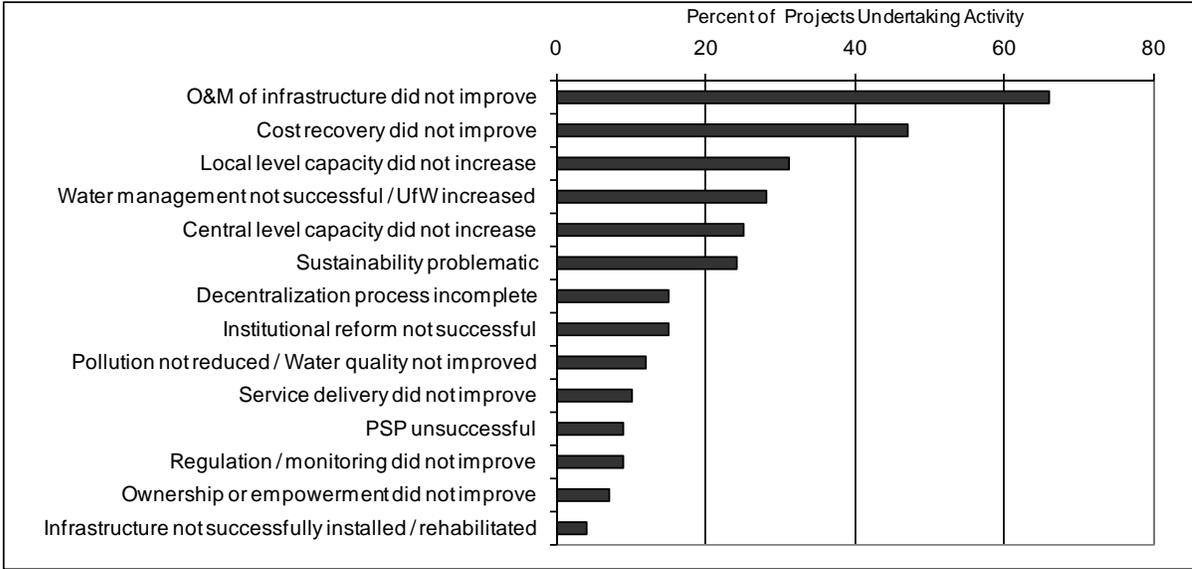


Figure J31. Negative Outcomes of Completed Projects



**ANNEX J
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Table J43. Ordinary Least Squares (OLS) Regression for Decentralization Success

<i>Variable</i>	<i>Coefficient (Std. Error)</i>
<i>Decentralization Type</i>	
Devolution	0.5963*** (0.1360)
Delegation	0.4353** (0.1999)
<i>Setting</i>	
AFR	-0.1944 (0.1448)
Rural	-0.0808 (0.1709)
Actors	0.1798*** (0.0596)
Approval Year	0.0325** (0.0164)
<i>Activity</i>	
Water Supply	0.2634 (0.2360)
Sanitation	0.1693 (0.1360)
CDD	0.1719 (0.1596)
Decentralization-related Activity	0.2529 (0.1601)
<i>Negative influences</i>	
Lack of Capacity	-0.1176 (0.1773)
Inadequate Cost Recovery	-0.2367* (0.1363)
Decentralization Insufficient	-0.3443* (0.1806)
Observations	90
R ²	0.5235

Notes: [1] OLS Regression with robust standard errors. [2] ***denotes significant at the 1 percent level, **at the 5 percent level, and *at the 10 percent level.

TRANSBOUNDARY WATERS

Table J44. World Bank Funding Is Going to the Basins Shared by Highest Number of Riparian Countries

<i>Basin name by region</i>	<i>Number of basin sharing countries</i>	<i>Number of projects in IEG water database supporting transboundary basins</i>
AFR		
Congo/Zaire	13	1
Nile	13	18
Niger	11	4
Lake Chad	9	6
Zambezi	9	2
Volta	6	2
Lake Turkana	5	
Lotagipi Swamp	5	
Orange	4	9
Senegal	4	1
Limpopo	4	1
EAP		
Yellow Sea	Sea	1
Bohai Sea	Sea	1
Mekong	6	2
Tarim	5	1
Amur	4	
Strait of Malacca	3	1
ECA	18	12
Danube	8	8
Aral Sea	6	7
Adriatic Sea	5	4
Kura-Araks	5	2
Caspian Sea	5	1
Oder/Odra		
MNA	SEA	3
Caspian Sea	Sea and Gulf	1
Red Sea and Gulf of Aden	7	1
Jordan	7	
Euphrate and Tigris	6	
Awash	3	
Hari/Harirud	3	
Asi/Orontes	3	
Gulf of Aqaba	3	1
LCR		
Patagonian Large Marine Ecosystem	Marine Ecosystem	1
Chetumal Bay and the Gulf of	Bay	1

**ANNEX J
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<i>Basin name by region</i>	<i>Number of basin sharing countries</i>	<i>Number of projects in IEG water database supporting transboundary basins</i>
Honduras		
Caribbean Sea	22	1
Amazon	9	1
La Plata	4	3
SAR		
Ganges-Brahmaputra-Meghna	6	3
Indus	6	2

Source: Oregon State University's database on International River Basins of the World and IEG water database

Figure J45a. Variation in Regional Attention to Water Focal Areas

	AFR	EAP	ECA	LCR	MNA	SAR	Total Projects
Irrigation	13%	22%	16%	15%	15%	19%	311
Groundwater	12%	24%	14%	10%	17%	24%	229
Hydropower/Dams	27%	22%	17%	15%	4%	15%	211
Flood	16%	20%	14%	22%	10%	17%	177
Urban Water Supply	26%	15%	18%	24%	10%	6%	229
Rural Water Supply	27%	17%	11%	17%	12%	16%	218
Wastewater Treatment	14%	22%	21%	20%	17%	6%	312
Urban Sanitation & Sewerage	17%	24%	19%	23%	12%	5%	190
Rural Sanitation & Sewerage	26%	16%	15%	21%	11%	12%	108
Watershed Mgmt.	21%	21%	7%	24%	11%	16%	218
Rivers and Lakes	21%	20%	26%	18%	4%	11%	174
Coastal Zone Mgmt.	19%	22%	20%	19%	11%	9%	121
Inland Waterways & Ports	33%	30%	6%	18%	6%	8%	104
Fisheries	31%	30%	7%	18%	3%	10%	87
Transboundary	41%	7%	37%	7%	6%	4%	123

Source: IEG water database

Note: The percentage of the total number of projects that took place in each Focal Area was calculated. The number of projects per Region can be determined by multiplying the percentage by the focal area total. The region with the highest percentage of projects for every Focal Area is represented in black and the second highest in gray.

Chapter 7

Table J45. Coverage of Water Resources Management Objectives by World Bank Strategic Documents

<i>Water Management Objective</i>	<i>1993 WRM Policy Paper</i>	<i>2003 WR Sector Strategy</i>	<i>Results</i>	<i>Chapter</i>	<i>Section</i>	<i>Paragraph</i>
Alleviate Poverty	X	X	+ - - +	Chapter 3 Chapter 4 Chapter 4 Chapter 5 Chapter 6	Watershed Management Flood Management Drought Management Sanitation Rural PSP	3.6 4.2-4.5 4.13 5.17-5.18 6.12
Promote Private Sector Participation	X	X	+ +	Chapter 6 Chapter 6	Urban PSP Rural PSP	6.2-6.7 6.8-6.13
Encourage Women to Participate in WRM	X	X	+ +	Chapter 3 Chapter 5	Watershed Management Rural Water Services	3.5 5.16, Box 17
Restore Ecosystems (wetlands, swamps, coastal zones, marinas, estuaries)	X	X	+ + - - + + +	Chapter 3 Chapter 3 Chapter 4 Chapter 4 Chapter 4 Chapter 4 Chapter 6	Watershed Management Groundwater Mangroves Wetlands Rivers and Lakes Coastal Zones Transboundary Waterways	Box 2 3.10 and Box 5 4.39 4.37-4.39 4.25-4.30 4.31-4.36 6.33-6.35, Box 24
Support Basin-level Institutions	X	X	+ +	Chapter 3 Chapter 6	RBM Transboundary Waters	3.15-3.20 6.29-6.35
Enhance Stakeholder Participation	X	X	+ -	Chapter 3 Chapter 5	Watershed Management WUAs	3.3 5.5-5.7
Employ Demand Management Practices (Promote Incentives to Water Conservation and Establish "Polluter-pays" principle)	X	X	- - + - + - - + +	Chapter 3 Chapter 3 Chapter 3 Chapter 3 Chapter 3 Chapter 4 Chapter 4 Chapter 6 Chapter 6	Watershed Management Groundwater Demand Management Cost Recovery Economic Analysis Drought Management Rivers and Lakes Decentralization IWRM	3.4, Box 2 3.10, 3.12 3.26-3.31 3.34-3.37 3.32-3.33 4.13 4.28, 4.29 6.15 6.20-6.24
Strengthen Policies and Develop ESW	X	X	+	Chapter 2	ESW	2.6
Improve Water Institutions	X		+ - + +	Chapter 2 Chapter 3 Chapter 3 Chapter 5	Portfolio H&MM River Basin Organizations WSS	2.25 3.21-3.25 3.15-3.20 5.12

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<i>Water Management Objective</i>	<i>1993 WRM Policy Paper</i>	<i>2003 WR Sector Strategy</i>	<i>Results</i>	<i>Chapter</i>	<i>Section</i>	<i>Paragraph</i>
			- - - + +	Chapter 5 Chapter 5 Chapter 6 Chapter 6 Chapter 6	Sanitation WWT Decentralization IWRM Transboundary Waters	5.17-5.18 5.23-5.28 6.16 6.24 6.29
Coordinate WR Activities Across Sectors (cross-sectoral)	X		+ -	Chapter 2 Chapter 6	Portfolio Inland Waterways	2.21-2.27 6.38-6.39
Support for International Waterways	X	X	+ -	Chapter 3 Chapter 6	River Basin Organizations Transboundary Waters	3.15-3.20 6.25-6.39
Promote Improved WRM	X	X	+ +	Chapter 3 Chapter 6	River Basin Organizations IWRM	3.15-3.20 6.21-6.22, Box 21
Commit to Environmental Improvements			+ - + + -	Chapter 3 Chapter 4 Chapter 4 Chapter 4 Chapter 4	Watershed Management Flood Management Environmental Flows Water Quality Management Rivers and Lakes	Box 2 4.2-4.5 4.16-4.18 4.19-4.21 4.28-4.29
Create Effective M&E (Units) to Measure Results			- - +/- - - +	Chapter 3 Chapter 3 Chapter 3 Chapter 4 Chapter 5 Chapter 6	Watershed Management Groundwater H&MM Water Quality Monitoring WWT Transboundary Waters	3.7 3.14 3.21-3.25 4.22 5.29 6.37
Protect groundwater resources	X	X	+/-	Chapter 3	Groundwater	3.10, Box 5, 3.12
Develop Hydraulic Infrastructure (Dams, Hydropower)		X	- +	Chapter 4 Chapter 4	Drought Management Dams	4.14 5.30-5.35
Reduce Natural Disaster Risks			+	Chapter 4	Floods and droughts	4.2-4.14
Prepare "high-risk/high-reward" Projects		X	+ +	Chapter 5 Chapter 6	Dams and Hydro Inter-basin transfers	4.14 6.32
Promote Decentralization	X		+	Chapter 7	Decentralization	6.14-6.19
Improve Low-Cost Technologies	X		+ -	Chapter 3 Chapter 4	Groundwater Recharging Sanitation	3.12, Box 5 5.17, 5.18
Address Political Economy of Reforms		X	+	Chapter 7	Urban PSP	6.2-6.7
Enhance Donor Coordination	X		+ + +	Chapter 4 Chapter 4 Chapter 6	Water Quality Management Water Quality Monitoring IWRM	4.21 4.22 6.20
Develop Water CASs		X	+	Annex F	Water CASs	

Note: One activity can have mixed outcomes, therefore the use of + and - for the same activity.

References

Relevant World Bank Policies

- OP 4.07 - Water Resources Management - February, 2000
- OP/BP 4.37 - Safety of Dams - October, 2001
- OP/BP 7.50 - Projects on International Waterways
- OP/BP 4.01 - Environmental Assessment - January, 1999
- OP/BP 4.02 - Environmental Action Plans - February, 2000

Relevant World Bank Strategies

- 1993 – Water Resources Management Policy Paper
- 2000 – Cities in Transition: World Bank Urban and Local Government Strategy
- 2001 – Making Sustainable Commitments: An Environment Strategy for the World Bank (being updated)
- 2001 – Commitment to the Millennium Development Goals
- 2002 – Agriculture and Rural Development Strategy – Reaching the Rural Poor (Irrigation)
- 2003 – Water Resources Sector Strategy
- 2005 – Water Supply and Sanitation Business Plan (Water Supply and Sanitation)
- 2006 – Clean Energy and Development: Towards an Investment Framework
- 2008 – Global Food Crisis Response Program
- 2008 – Towards a Strategic Framework on Climate Change and Development for the World Bank Group: Concept and Issues Paper (Ongoing)
- 2009 – Hydropower Business Plan (Multi-purpose Use of Water Infrastructure for Energy Purposes)

- 2009 – The World Bank Urban and Local Government Strategy: Concept and Issues Note (Ongoing)

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