

Watershed Management in World Bank Operations A 15 Year Review (1990-2004)

SUMMARY (February 24th, 2005)

Erika Styger, Consultant, ARD, The World Bank

1. Introduction

In this review, World Bank watershed management (WSM) projects are analyzed as to what kind of activities were undertaken in watershed management, how they were implemented, what worked, and what didn't work. It also considers if important elements were missing, lessons learned, and proposes some avenues for improved design and implementation of WSM programs.

The review is based on internal Bank project documentation: SAR (Staff Appraisal Reports), PAD (Project Appraisal Documents), ICR (Implementation Completion Reports), and PPAR (Project Performance Assessment Reports). Watershed management projects were identified through the Water Resources Data Base (1993-2004) and from projects identified in a previous WSM portfolio review (1990-1999) by Boerma (2000). From 1990 to 2004, 53 projects applying an integrated and spatial watershed management approach were identified, of which 24 projects were WSM projects *per se* and 29 projects--irrigation projects, forest management projects, and water resources management projects, among others--had a WSM component.

2. The Watershed Management Approach

The watershed management approach became prominent in the 1970s and 1980s when governments turned their attention away from the Green Revolution as applied to the productive lowlands and focused on the upland and rainfed areas to address the emerging problems of upland degradation, forest cover loss, overgrazing of common land, decreasing agricultural yields, poverty, and soil erosion that produced damaging impacts on downstream infrastructure. National and regional programs were created using this approach. In 1976 Indonesia created a National Watershed Development Program (Regreening and Reforestation). From the mid-1970s, Brazil launched soil conservation programs that evolved into the Integrated Soil and Water Management Program in Microcatchments (PMISA) in the mid-1980s. In 1989, the *Club du Sahel* endorsed the '*Terroir*' management approach for testing on a larger scale in the region. In 1990, India created the National Watershed Development Program for Rainfed Areas.

Most watershed management projects concentrate their efforts on upland development. Upland characteristics can be summarized as follows:

- Areas with steeper slopes, resulting in dynamic land and water interactions
- Remote and isolated areas, under-serviced (roads, extension, markets etc), and politically often not a priority (in contrast to urban, and lowland agriculture)
- Rural poor predominate
- Soil fertility management is challenging: thin soil surface layer are vulnerable to erosion by water run-off
- Higher agro-ecological diversity than lowlands
- Less amendable to large scale investments (esp. irrigation)
- Areas of remaining primary forests (biodiversity)
- Diverse forms of land uses in relation to private vs common-pool resources, arable vs non-arable land
- Farmers often depend on non-arable land (forest, grazing land), especially the poor
- Land tenure situations are often complex

The WSM approach is a spatial and systems approach that allows us to:

- Improve management of land and water, their interactions and externalities
- Link upstream and downstream areas
- Provide stakeholders a platform for decision-making, planning and equitable sharing of benefits
- Address technical, institutional and policy issues
- Integrate environmental objectives with economic, social and cultural goals

3. The World Bank and Watershed Management

Three major periods of World Bank involvement in Watershed Management are distinguished in this analysis:

- 1st generation: 1980s (lessons learned, resulting in Asia 'strategy')
- 2nd generation: Early to mid-1990s, focus for this review (ICRs and some PPARs available)
- 3rd generation: Late 1990s to today (only PADs available)

1st generation WSM projects in the 1980s were characterized by:

- Expensive construction of erosion control infrastructure
- Little involvement from local communities
- Subsidies as incentive to participate
- Centralized project management
- Lack of collaboration across sectors
- Fixed, long term targets, little learning and adapting
- Limited attention to land tenure
- Problems of sustainability of project interventions.

In 1988 a colloquium on WSM was held at the WB. Working papers on 6 issues of direct operational concern were presented and are regrouped in the World Bank Technical Paper: *Watershed Development in Asia* (Doolette and Magrath, 1990). The 'Asia Strategy' developed therein should provide operational guidance (identify strategic issues, provide methodological guidance and frameworks of analysis).

Lessons learned from the 1980s projects and key issues identified in the 'Asia strategy' led to recommendations for the project design for the 1990s.

- Use participatory approaches
- Build on existing social structures and institutions (decentralization)
- Develop a farmer oriented, integrated approach to farming system (for extension and research)
- Use a problem and demand driven approach
- Provide a larger set of techniques, promote low cost vegetative techniques for erosion control
- Create win-win situations: environmental protection with agricultural production.

4. Watershed management project analysis 1990-2004

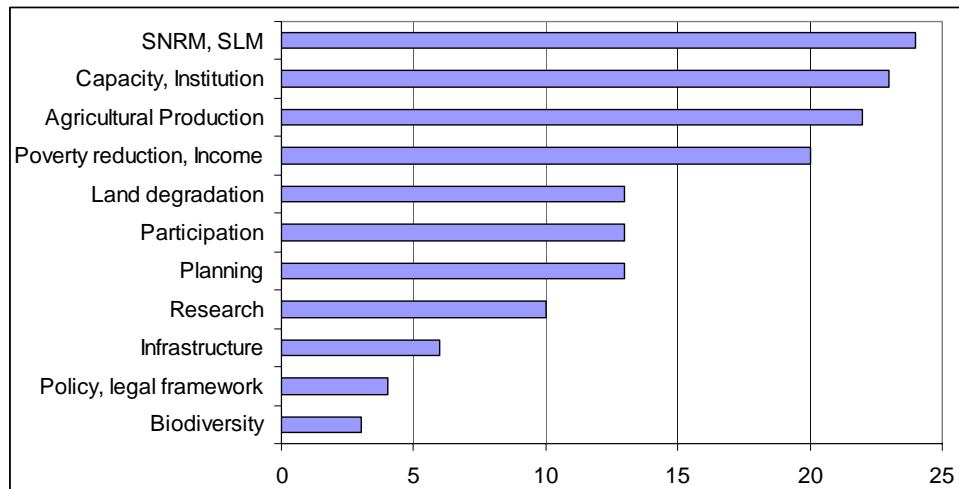
Details of the 59 identified projects shown in the Annex 1 are 1) project name and ID, 2) country, 3) region, 4) total project cost, 5) total WB contribution (IBRD, IDA, GEF), 6) WSM as % of project cost, and 6) WB contribution to WSM. A summary of WB lending for WS Projects and the % of WS within their sector boards is presented in Table 1. (96% of all 54 WSM projects are in the sector boards of environment ENV and rural development RDV)

Table 1: Total WB lending in WSM (in US\$ millions)

	WS Projects	WS Components	Total WS Lending	Sector Board ENV+RDV	% WS of Sector Board
90-94	702	113	814	18958	4.30
95-99	522	80	601	16078	3.74
00-04	217	30	247	10805	2.28
	1440	222	1662	45841	

Objectives and main strategies of WSM projects (n=24)

The focus of analysis in this summary report is directed towards the 24 WSM projects. Analysis for the 29 WSM project components will be presented in the main report. The objectives and main strategies of the 24 projects are summarized in the following graph:



Project objectives and main strategies reflect the integrated nature of the WSM project designs. These address simultaneously environmental and agricultural production goals, institutional development, and poverty reduction. Over half of the projects address land degradation. Participation is the main approach to work with stakeholders. A clear shift in priorities in comparison to the projects in the 80s is visible. Noteworthy is that little attention is paid to policy and legal framework support. There are no land tenure or water components. Water management is integrated in NRM.

Scale

Most projects were implemented at the Micro-WS scale (Micro-WS: < 1000ha, Sub-WS: 1000-5000ha, WS >5000ha). Treatments were applied across the Micro-WS and were based in most projects on community-based land use planning.

What worked:

Micro-WS (<1000ha) has been proven to be a good size for
 + integration of land, water, infrastructure development

- + site specific solution finding
- + locally adapted planning
- + participatory approaches
- + building community capacity and local institution strengthening

What did not work:

Implementations at Micro-WS did not yield satisfactory results if:

- Conditions were heterogeneous:
 - land capability
 - complex land tenure
 - different stakeholder interests
- Communities resisted organization
- Existing social organization were not well understood
- Equity concerns remained unaddressed

Natural resources management and agricultural production

What has been done? The two major categories were:

1. Slope stabilization, erosion control, land and water conservation techniques

The two main objectives were:

 - Stabilization of upland soils
 - Protection of downstream infrastructures
2. Improvement of soil fertility and landscape productivity
 - Intensification and diversification of annual/perennial crops
 - Pasture improvement, fodder production
 - Reforestation, natural forest management
 - Aquaculture

What worked:

- + Most projects achieved or exceeded physical targets!
- + Project rational worked: soil protection - higher yields and production – higher income, (in Loess I the improvements resulted also in labor input decline for agricultural production)
- + Crop diversification helped balance against risks
- + Low cost vegetative techniques for erosion control worked well and were easily adaptable by farmers
- + High technical standards and good knowledge base were essential for successful adoption of improved techniques
- + Adoption of technologies was more likely if farmers could choose from a range of technological options

What did not work:

Less participation and adoption if

- Farmers' needs and problems were not well understood
- Soil and water conservation was too labor intensive or expensive for farmers
- Farmers did not perceive any short term benefits
- Marketing opportunities for products were lacking

Institutional development and capacity strengthening

The WSM approach requires new forms of organization. There is a need to improve government capacity at all levels to plan, implement, monitor locally based initiatives for upland development.

What worked:

- + If primary focus was directed towards local level development, and, in parallel, government capacity was strengthened at all levels

- + In some projects, decentralized institutional structures proved to be effective and efficient for project implementation (Tunisia)
- + If multi-disciplinary and multi-agency collaboration (across ministries) could be initiated
- + If project activities could be integrated into the existing regional and country programs, it encouraged conformity with regional and national strategic objectives (important for scaling up)
- + If project organization and coordination was simplified
- + If continued support, capacity strengthening, and training (at all levels) was provided

What did not work:

- If complex project set up was overloading institutional capacity (Indonesia)
- Weak integration in existing structures left little impression on institutional memory of authorities at regional and local level.

Participation

WSM requires community organization. Participation of all stakeholders is desired but participation is not a neutral concept. It touches on the power of decision-making, the right to access and benefit from resources. Interests in participation may vary if benefits are mostly individual or are social and environmental in nature. In addition, participation may differ for the improvement of private land or common-pool resources (pastoral zones, forests, fallows).

What worked:

- + If community could be organized around a common interest (road, water, erosion control)
- + If special efforts were undertaken *beyond* common participatory instruments to reach the poor, women and vulnerable groups.
- + If sufficient time was provided in beginning of project for initiating the participatory processes, and if the project design was flexible

What did not work:

- If stakeholders interests and the local social organization were not sufficiently understood
- If training in participatory approaches was insufficient and mind-set of implementing agencies didn't change accordingly
- Participation can have many different forms, and can still remain top-down

Research

There were three types of research:

1. Studies to support project implementation, M&E
2. Agricultural field research: site specific innovation development
3. Regional/national information systems

What worked:

- + demand driven, adaptive research
- + include farmers in experimentation and dissemination
- + when quick results were obtained to be integrated in project activities
- + regional computerized project monitoring facilities (Loess I)

What did not work:

- On station research and technology displays were too far removed from farmers' priorities and realities
- Production of studies with little practical relevance and poor technical quality
- Delay/failure in establishing a national environmental monitoring system (Burkina)

Policies and legal framework

Only few projects included a component of policy and legal framework support at national level

Lessons learned:

- There is a need to provide government support to issue preferential policies (esp. for forest management, common resources)
- Misunderstanding of prevailing legislation can jeopardize project activities (Eastern Anatolia, pastoral zone)
- Land tenure very critical for sustainable WSM

Monitoring and evaluation (M&E), Externalities

M&E systems were often weak. This was due either to the lack of baseline data, or to major delays in starting the monitoring (at times at the end of the project). This made it impossible to assess economic and environmental impact of project implementations.

Externalities that look at environmental and economic project impact at a wider geographic scale such as downstream impact have almost never been apprehended.

- Positive impacts are claimed on anecdotal basis
- No measurements on downstream water flow (Plains, Hills, Tunisia, EAnatolia)
- Measurements on sedimentation (Loess)

As for the newly designed projects, most projects don't integrate measurements on externalities

- Karnataka, India (2001) provides still no measurements on environmental downstream benefits

With exception of a few

- Land Management III Brazil (1997) monitors sedimentation, water quality and soil erosion in 12 Micro-WS pilot areas
- Anatolia, Turkey (2004) integrates pollution reduction control for the Black Sea

Conclusions and what is missing

Micro-WS has been shown to be an appropriate scale for integrated NRM, sustainable agricultural production and livelihood improvement. It has allowed many of the projects to efficiently organize communities, to strengthen local organizations and institutions, to work from the bottom-up and apply participatory approaches, to design site specific interventions, to adapt land use technologies to local needs, and achieve protection of the local environment.

Learning from experience is happening in WB projects at different rates depending on a specific country's experience and commitment. Designs for the 3rd generation projects (from mid-1990s to today) build on the consolidation of approaches developed in the 1990s, on developing a deeper understanding of local and country specific conditions, and on fine-tuning approaches and responding to lessons learned in an 'organic' way.

It could be argued that World Bank WSM projects are not primarily managing water but are rather land projects that pursue an integrated land and water management approach. Interventions are targeted at land management and their impact is most often assumed to provide benefits to the water cycle. Water flows have seldom been monitored. To cite one example, the impact of reforestation activities in the dry region of Eastern Anatolia on downstream water flow is not known, let alone how it may impact the livelihoods of people living downstream in the future. Thus, there is a need to include at least some targeted water monitoring.

Land and water interventions happen mostly at the field level. It is not clear from the project reports if specific planning was undertaken that accounts for how environmental benefits are

accumulating across the Micro-WS. In a similar sense it remains unclear how demand-driven participatory decision-making coincides with environmental requirements for SNRM.

As ecological and economic issues and potentials at a larger scale may differ from micro-scale priorities, there is a need to initiate Sub-WS/WS environmental and economic planning, monitoring and analysis. This should integrate downstream areas and work across larger upland areas integrating higher level natural resources dynamics (e.g., forest corridor protection for biodiversity, identification of hotspots for erosion control, etc.). In the discussion of project design and implementation, and complementary to the bottom-up approaches, a good meso-scale analysis would allow the project designers and managers to think about the most environmentally and economically effective ways to stimulate regional development. To this end, a standardized methodology is needed from plot, to farm, to micro-WS, sub-WS and eventually to WS level (*such a methodology has apparently been developed by PARDYP in the Himalaya region*).

In addition to larger scale geographical planning and monitoring of project implementation, it is equally important for reasons of scaling up and sustainability to apply a micro-macro vision in policy, legal, institutional matters from the beginning of a project (The World Bank, 2003).

It is often unclear how the projects address the management of common-pool resources and how they are integrated in the overall applied WSM approach. Common-pool resources (forests, pastures) make up large areas within the WS and their sustainable management is often more complex and difficult than for individual resources. It often concerns the land tenure situation, social dynamics on resource use, interests in the resources, official laws and legal agreements with the government, and migration, among others. Although land tenure was identified being a critical issue in the 'Asia Strategy' and was a major determinant for success or failure of land improvement activities in many of the projects, it has not received increased emphasis in the project designs of the 3rd generation projects.

It has often been unclear who paid for all the land investments. Were they subsidized, was there free labor contribution, credits, have people financially contributed? For reasons of sustainability and empowerment it is critical to work on sustainable financing mechanisms from the beginning of the project. This concern is reflected for instance in the newly designed India project in Karnataka (2001) and Uttaranchal (2004).

Bibliography and Reading List

- Banerjee, A.K. 1990. Revegetation Technologies. *In* Doolette, J. B.,Magrath, W. B., (eds). Watershed Development in Asia; Strategies and Technologies, Vol. 127. The World Bank, Washington, DC, p. 109-130.
- Boerma, P. 2000. Watershed Management: A Review of the World Bank Portfolio (1990-1999). Rural Development Department, The World Bank, Washington, D.C.
- Doolette, J.B., Smyle, J.W. 1990. Soil and Moisture Conservation Technologies: Review of Literature. *In* Doolette, J. B.,Magrath, W. B., (eds). Watershed Development in Asia; Strategies and Technologies, Vol. 127. The World Bank, Washington, DC, p. 35-70.
- Farrington, J., Turton, C., James, A.J. 1999. Participatory Watershed Development; Challenges for the Twenty-First Century Oxford University Press, New Delhi, India.
- Magrath, W.B. 1990a. Economic Analysis of Soil Conservation Technologies. *In* Doolette, J. B.,Magrath, W. B., (eds). Watershed Development in Asia; Strategies and Technologies, Vol. 127. The World Bank, Washington, DC, p. 71-96.
- Magrath, W.B. 1990b. Economic Analysis of Off-Farm Soil Conservation Structures. *In* Doolette, J. B.,Magrath, W. B., (eds). Watershed Development in Asia; Strategies and Technologies, Vol. 127. The World Bank, Washington, DC, p. 97-108.
- Magrath, W.B., Doolette, J.B. 1990. Strategic Issues in Watershed Development. *In* Doolette, J. B.,Magrath, W. B., (eds). Watershed Development in Asia; Strategies and Technologies, Vol. 127. The World Bank, Washington, DC, p. 1-34.
- Molnar, A. 1990. Land Tenure Issues in Watershed Development. *In* Doolette, J. B.,Magrath, W. B., (eds). Watershed Development in Asia; Strategies and Technologies, Vol. 127. The World Bank, Washington, DC, p. 131-158.
- Morgan, G.S., Ng, R.C. 1990. A Framework for Planning, Monitoring and Evaluating Watershed Conservation Projects. *In* Doolette, J. B.,Magrath, W. B., (eds). Watershed Development in Asia; Strategies and Technologies, Vol. 127. The World Bank, Washington, DC, p. 159-172.
- Perez, C., Tschinkel, H. 2003. Improving Watershed Management in Developing Countries: A Framework for Prioritizing Sites and Practices. AGREN Network Paper; ODI, Agricultural Research and Extension Network 129(15).
- Pitman, G.K. 2002. Bridging Troubled Waters: Assessing the World Bank Water Resources Strategy The World Bank, Washington, DC.
- Shah, A. 2001. Who Benefits from Participatory Watershed Development? Lessons from Gujarat, India. *Gatekeeper Series; IIED (International Institute for Environment and Development)*.
- The World Bank. 2001. Watershed Management Window, Technical Note. The Bank-Netherlands Water Partnership Program (BNWPP), the World Bank, Washington, DC.
- The World Bank. 2003. Scaling-Up the Impact of Good Practices in Rural Development; A working paper to support implementation of the World Bank's Rural Development Strategy 26031. Agriculture and Rural Development Department, The World Bank, Washington, DC.
- Turton, C. 2000. Enhancing Livelihoods Through Participatory Watershed Development in India ODI, London, UK.
- Turton, C., Bottrall, A. 1997. Water Resource Development in the Drought-Prone Uplands ODI, London, UK.
- Turton, C., Warner, M., Groom, B. 1998. Scaling Up Participatory Watershed Development in India: a Review of the Literature. AGREN Network Paper; ODI, Agricultural Research and Extension Network 86, p.16.

World Bank Watershed Management Projects (1990 - 2004)

Country	Fiscal Year	Project ID	Project Name	Total Project Cost US\$ million	Total Bank US\$ million	WB of total %	IBRD US\$ million	IDA Loan US\$ million	GEF US\$ million
<u>Africa</u>									
Burkina Fa	FY91	290	Environmental management project	25.5	16.5	65		16.5	
Mali	FY92	1745	Natural resources management project	32.1	20.4	64		20.4	
Niger	FY96	1967	Natural resources management project	42.7	26.7	63		26.7	
<u>East Asia and Pacific</u>									
Indonesia	FY91	3912	Yogyakarta Upland Area Development Project (Bangun Desa II)	25.1	15.5	62	15.5		
China	FY94	3595	Second Red Soils Area Development Project	296.4	150	51		150	
Indonesia	FY94	3985	National Watershed Management and Conservation Project	487.8	56.5	12		56.5	
China	FY94	3540	Loess Plateau Watershed Rehabilitation Project	248.7	150	60		150	
China	FY99	56216	Second Loess Plateau Watershed Rehabilitation Project	252	150	60	100	50	
Philippines	FY04	70899	Laguna de Bay Institutional Strengthening and Community Part.	12.45	5	40	5		
<u>Eastern and Central Asia</u>									
Turkey	FY93	9023	Eastern Anatolia Watershed Rehabilitation Project	115.5	82.1	71	77		5.1
Turkey	FY04	70950	Anatolia Watershed Rehabilitation Project	45.11	27	60	20		7
Tajikistan	FY04	77454	Community Agriculture and Watershed Management Project	15.29	15.3	100		10.8 (5.8grar	4.5
<u>Latin America and the Caribbean</u>									
Brazil	FY90	6473	Land Management II Project - Santa Catarina	71.6	33	46	33		
Peru	FY97	42442	Sierra - Natural Resources Management and Poverty Alleviator	93.2	51	55	51		
Brazil	FY97	43868	Natural Resources Management and Rural Poverty Alleviation F	208	100	48	100		
Brazil	FY98	6474	Land Management III Project	124.7	55	44	55		
<u>Middle East and North Africa</u>									
Tunisia	FY94	5733	Northwest Mountainous Areas Development Project	50.7	27.5	54	27.5		
Morocco	FY99	5519	Lakhdar Watershed management Pilot Project	5.8	4	69	4		
<u>South Asia Region</u>									
India	FY90	9860	Integrated Watershed Development (Plains) Project	91.8	62	68	7	55	
India	FY90	9882	Integrated Watershed Development (Hills) Project	125.6	88	70	13	75	
India	FY99	41264	Integrated Watershed Development (Hills-II) Project	193	135	70	75	60	
India	FY01	67216	Karnataka Watershed Development Project	127.6	100	78		100	
India	FY04	78550	Uttaranchal Decentralized Watershed Development project	89.35	69.62	78		69.62	
Total				2780	1440.12	60	583	829.72	16.6
Additional project included in further analysis (as one of the classic WSM project, FY 1989):									
Brazil	FY89*	6448	Land Management I Project - Parana	138.3	63	46	63		

Watershed Management Components in WB Projects (1990-2004)

Country	Fiscal Year	Project ID	Project Name	Total Cost US\$ million	WS cost US\$ million	% WS of Tot %	Total Bank US\$ million	WB of total %	WB in WSM US\$ million	IBRD US\$ million	IDA Loan US\$ million	GEF US\$ million
Africa												
Malawi	FY95	1667	National Water Development Project	94.1	1.6	2	79.2	84	1		30	20.8
Madagascar	FY97	1537	Second Environment Program	155	43.5	28	50.8	33	14		35	35
Ugan/Tanz/Ken	FY97	46836	Lake Victoria Environmental management Project	77.6	37.5	48	70	90	34		30	
Ghana	FY97	41150	Ghana Village Infrastructure Project	60	13.8	23	30	50	7		79.2	
Ghana	FY98	946	Natural resources management project	25.7	6	23	11.4	44	3		9.3	2.1
East Asia and Pacific												
China	FY94	3557	Forest Resource Development and Protection Project	356	37.4	11	200	56	21		200	
China	FY96	3649	Shanxi Poverty Alleviation Project	182.8	15.9	9	100	55	9		100	
Philippines	FY97	4613	Water resources Development Project	85.2	13.4	16	58	68	9	58		
Vietnam	FY04	65898	Vietnam Water Resources Assistance Project	176.2	2.6	1	157.8	90	2		157.8	
China	FY03	70191	Shanghai Urban Environment Project	512.2	45.7	9	200	39	18	200		
Eastern and Central Asia												
Estonia	FY95	8406	Haapsalu and Matsalu Bays Environmental Project	8.37	0.48	6	2	24	0	2		
Lithuania	FY96	35783	Siauliai Environment Project	22.85	0.7	3	6.2	27	0	6.2		
Poland	FY00	50660	Rural Environmental Protection Project	15.8	0	0	5.5	35	0	2.5		3
Armenia	FY02	57847	Natural Resources Management and Poverty Reduction Pr.	16	5.8	36	13.52	85	5		8.31	5.21
Romania	FY04	75163	Hazard Risk Mitigation and Emergency Preparedness Project	203.65	0.7	0	150	74	1	150		
Latin America and the Caribbean												
Uruguay	FY94	8173	Natural resources management and Irrigation Development F	74	3.1	4	41	55	2	41		
Colombia	FY94	6868	Natural Resource Management Project	65.3	25.7	39	39	60	15	39		
Paraguay	FY94	7918	Natural Resources Management Project	79.1	42.8	54	50	63	27	50		
Dominican Rep	FY95	7020	Irrigated Land and Water Management Project	43.2	2.36	5	28	65	2	28		
St. Lucia	FY96	39455	Watershed and Environmental Management Project	7.1	1.2	17	5.3	75	1	2.65	2.65	
Brazil	FY00	6449	Ceara Integrated Water Resources Management Project	247.2	5	2	136	55	3	136		
Brazil	FY02	43869	Natural Resource Management and Rural Poverty Reduction	107.5	2.3	2	62.8	58	1	62.8		
Middle East and North Africa												
Algeria	FY92	4944	Pilot Forestry and Watershed Management Project	37.4	9	24	25	67	6	25		
Yemen	FY92	5836	Land and Water Conservation Project	47.6	9.2	19	32.8	69	6		32.8	
South Asia Region												
India	FY91	9958	Agricultural Development Project -Tamil Nadu	133.3	17.6	13	112.8	85	15	20	92.8	
Sri Lanka	FY91	10378	National Irrigation Rehabilitation Project	49.8	0.7	1	29.6	59	0		29.6	
Pakistan	FY92	10399	Environmental protection and Resource Conservation Projec	57.2	24.3	42	29.2	51	12		29.2	
India	FY93	10418	Karnataka Rural Water Supply and Enviornmental Sanitation	117.8	9.2	8	92	78	7		92	
Pakistan	FY94	10453	Balochistan Natural Resources Management Project	17.8	0.5	3	14.7	83	0		14.7	
Total				3076	378	16	1833	61	222	823	943	66