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PROJECT PERFORMANCE ASSESSMENT REPORT

MOROCCO

LAKHDAR WATERSHED MANAGEMENT PILOT PROJECT
(SCL-44260 TF-29346)

June 1, 2009

Sector Evaluation Division
Independent Evaluation Group (World Bank)

Currency Equivalents (annual averages)

Currency Unit = Moroccan Dirhams (MAD)

1998	US$1.00	MAD 9.28	2003	US$1.00	MAD 8.84
1999	US$1.00	MAD 10.03	2004	US$1.00	MAD 8.22
2000	US$1.00	MAD 10.61	2005	US$1.00	MAD 9.15
2001	US$1.00	MAD 11.60	2006	US$1.00	MAD 8.46
2002	US$1.00	MAD 10.27	2007	US$1.00	MAD 7.81

Abbreviations and Acronyms

AADEC	Azilal Association for Development, Environment, and Communication / Association Azilal pour le Développement, l'Environnement et la Communication
ADS	Agency for Social Development / Agence de Développement Social (Non-profit Government organization)
AGR	Department of Rural Works / Administration du Génie Rural
AFD	Agence Française de Développement / French Development Agency
AMSED	Maroccan Association for Solidarity and Development / Association Marocaine de Solidarité et de Développement
DC / CD	Development Committees / Comité de développement
DDP / PDD	Douar Development Plan / Plan de développement de douar
ERR	Economic Rate of Return
FAO	Food and Agriculture Organization of the United Nations
GoM	Government of Morocco
HCWF / HCEFLCD	High Commission for Water, Forests and for Fighting Desertification / Haut commissariat aux eaux et forêts et à la lute contre la désertification
ICR	Implementation Completion Report
IEG	Independent Evaluation Group
IEGWB	Independent Evaluation Group (World Bank)
LDA / ADL	Local Development Associations / Association de Développement Local
LWMPP	Lakhdar Watershed Management Pilot Project
M&E	Monitoring and Evaluation
MAD	Moroccan Dirhams
MARDF/ MADRPM	Ministry of Agriculture, Rural Development and Fisheries / Ministère de l'agriculture, du développement rural et des pêches maritimes
MFP	Ministry of Finance and Privatization / Ministère des Finances et de la Privatisation
NGO	Non-Governmental Organization
NPV	Net Present Value
ORMVA	Regional Agricultural Development Authority / Office Régional de Mise en Valeur Agricole
PAD	Project Appraisal Document
PAGER	Rural Water Supply and Sanitation Project / Programme d'approvisionnement en eau potable des populations rurales
PC / CP	Program Contract / Contrat Programme
PDA / DPA	Provincial Department of Agriculture / Direction provinciale de l'agriculture
PHRD	Population and Human Resources Development (Japanese Grant)
PMU	Planning and Monitoring Unit
PPAR	Project Performance Assessment Report
PSWF / SPEF	Provincial Department for Water and Forests / Service provincial des eaux et forêts
SAR	Staff Appraisal Report

Fiscal Year

Government: Until 2000: July 1 – June 30
After 2000: January 1 – December 31

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The Independent Evaluation Group assesses the programs and activities of the World Bank for two purposes: first, to ensure the integrity of the Bank's self-evaluation process and to verify that the Bank's work is producing the expected results, and second, to help develop improved directions, policies, and procedures through the dissemination of lessons drawn from experience. As part of this work, IEGWB annually assesses about 25 percent of the Bank's lending operations through field work. In selecting operations for assessment, preference is given to those that are innovative, large, or complex; those that are relevant to upcoming studies or country evaluations; those for which Executive Directors or Bank management have requested assessments; and those that are likely to generate important lessons.

To prepare a Project Performance Assessment Report (PPAR), IEGWB staff examine project files and other documents, interview operational staff, visit the borrowing country to discuss the operation with the government, and other in-country stakeholders, and interview Bank staff and other donor agency staff both at headquarters and in local offices as appropriate.

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

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

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

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

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

Contents

This report was prepared by Silke Heuser, who assessed the project together with Antoine Boussard in September 2008 under the supervision of Ronald S. Parker. Marie Charles provided administrative support.

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Principal Ratings

	*ICR**	*ICR Review**	*PPAR*
MOROCCO − *Lakhdar Watershed Management Pilot Project (Loan 4426); (P005519)*			
Outcome	Satisfactory	Satisfactory	Satisfactory
Institutional Development Impact**	Substantial	Modest	———
Risk to Development Outcome	———	———	Significant
Sustainability***	Likely	Non-evaluable	———
Bank Performance	Satisfactory	Satisfactory	Satisfactory
Borrower Performance	Satisfactory	Satisfactory	Satisfactory

* The Implementation Completion Report (ICR) is a self-evaluation by the responsible Bank department. The ICR Review is an intermediate IEGWB product that seeks to independently verify the findings of the ICR.
**As of July 1, 2006, Institutional Development Impact is assessed as part of the Outcome rating.
***As of July 1, 2006, Sustainability has been replaced by Risk to Development Outcome. As the scales are different, the ratings are not directly comparable.

Key Staff Responsible

Project	*Task Manager/Leader*	*Division Chief/ Sector Director*	*Country Director*
Appraisal	---	M. Salah Darghouth	Christian Delvoie
Completion	Abdelkrim Oka	Inger Andersen	Theodore O. Ahlers

Preface

This is the Project Performance Assessment Report (PPAR) prepared by the Independent Evaluation Group (IEG) for the Lakhdar Watershed Management Pilot Project (LWMPP).

The LWMPP was approved in FY99 for a loan of US$4 million. The project implementation was initially planned for 5 years. This time frame was reduced at government's request to 4 years, and subsequently extended to 6 years. The project was closed in December 2004. In 2003, GoM had requested that US$1.0 million of the loan be cancelled. At the end of the project, actual loan disbursement amounted to US$2.57 million.

The PPAR was prepared by the Independent Evaluation Group (IEG). The report is based on the Project Appraisal Document (PAD), sector and economic reports, special studies, Country Assistance Strategies (CASs), Policy Framework Papers, credit documents, review of the project files, and discussions with Bank staff. An Implementation Completion Report (ICR, Report No. 32292, dated June 17, 2005) was prepared by the Middle East and North Africa Region. An IEG mission visited Morocco in September 2008 and discussed the effectiveness of the Bank's assistance with government officials, other development organizations, beneficiaries, and stakeholders (see Annex E). Their cooperation and assistance in the preparation of this report are gratefully acknowledged. Special thanks go to Ms. Sabah Bencheqroun, Ms. Francoise Clottes, Mr. Hassan Lamrani, and Ms. Laila Moudden.

The IEG PPAR mission selected representative sites for on the ground verification. Sites with project intervention in community watershed management were compared with sites without project intervention. Based on these field visits and interviews with officials and beneficiaries, this PPAR supports ICR findings in all important particulars and finds it to be an accurate portrayal of the achievements encountered during implementation. Furthermore, this report reviews changes in the country's approach to watershed protection in order to inform an upcoming Evaluation of World Bank Support for Water—a major IEG evaluation that will examine the development impact of increased attention to water resources management and water services. In addition, this PPAR will inform a case study on Morocco's water sector.

Copies of the draft PPAR have been sent to the relevant government officials and agencies for their review and comments. No comments were received from the borrower.

Summary

The Lakhdar Watershed Management Pilot Project (LWMPP) was developed to promote sustainable solutions to a deteriorating natural resource and land use situation in the High Atlas Mountains of central Morocco. These mountains receive the bulk of the rainwater that ultimately makes its way into numerous reservoirs, or filters down into subterranean aquifers.

More than two million people, among the poorest in Morocco, live off marginal land with fragile soils within this watershed, using agricultural practices that rely on environmentally destructive techniques. Steady population growth has increased pressure on the land. Over-exploitation of the natural resource base has led to soil erosion and landslides. Taken together these have caused a nearly irreversible decline in agricultural production, and the quantities of soil and water streaming down the hillsides dump silt in downstream river channels and water bodies, reducing dam storage capacity and increasing the risk of flooding.

The LWMP project was approved in December 1998 to support the strategy developed in the 1995 National Watershed Management Plan. This plan recommended taking a participatory approach to natural resources management, though it recognized that stakeholder support for environmental goals could only be attained through the promotion of livelihoods. The initial project implementation period was 5 years which was subsequently extended to 6 years (closing in December 2004).

The overall outcome for the LWMPP is rated as satisfactory. The objectives were highly relevant given the enormous challenges facing farmers in the mountainous areas of the Lakhdar watershed. Project objectives were also relevant to the 1997 CAS, since watershed management projects were included in that document, as were improvements in environmental and natural resources management. It also supported other key CAS objectives, and a review of the 2001, and 2005 CASs which succeeded the 1997 document, reveals that the issues dealt with in the LWMPP were of even greater relevance to the more recent documents.

With respect to its efficacy, some 14,700 people living in harsh climatic conditions in the high Atlas mountains benefited from the project through an increase in their agricultural income, livestock improvements, income generating activities, and improved living standards (due to the construction of wells, irrigation systems, and access roads). The project also achieved better protection against soil erosion by involving communities in protecting newly planted trees, terracing, and other soil conservation measures. There were moderate shortcomings in the way the project's financial viability was measured, in its results monitoring system, and in its inclusion of women in the decision-making process. Risk to development outcome was assessed as substantial and Bank and Borrower performance as satisfactory. Given that this was a pilot project, the lack of a monitoring system to track results hampered learning as well as potential replication or scaling up of the approach. Even though this was a pilot operation, no follow-on operation was implemented.

Lessons from the **LWMPP** were the following:

- *Communities need to see results early.* The LWMPP approach depended on active community involvement, but was able to deliver goods and services only after a long period of time. Establishing credibility with farmers long accustomed to empty promises requires that tangible rewards for their efforts commence as soon as practicable following those efforts.

- *Projects with beneficiary involvement generally take a while to build up momentum.* Designing activities to be implemented by beneficiaries using a participatory approach takes considerable time. Start-up should be expected to be slow, and allowances made during design for a realistic implementation period.

- *Successful pilot efforts that are abandoned dampen expectations and make subsequent development efforts harder to promote.* Pilot projects create high expectations. In this case, there is no alternative: reforestation, soil stabilization, and runoff control will need to take place in the high Atlas mountains. Farmers were expecting to build on the successful experience of the LWMPP, and not building on the momentum created will make it far harder to generate farmer enthusiasm the next time around.

- *Projects need to take gender patterns of work into account.* Promoting natural resources management with men when women collect firewood and herd the cattle is inefficient, to say the least. Careful targeting of the gender whose activities are most likely to cause natural resource degradation greatly increases the potential impact of consciousness-raising efforts. Even where there are deep-rooted traditions of excluding women from traditional community decision-making processes, outreach campaigns can make use of women trainers, market days, etc.

- *In a project with substantial environmental objectives, and often complex efficacy and efficiency treatment trade-offs, it is important to measure at least local environmental impacts.* This data may later be modeled into broader environmental impacts as treatment coverage spreads.

- *Actively including NGOs in participatory projects can increase sustainability of project activities.* This is especially true if NGOs continue project activities after the project closes, as was the case in the LWMPP.

- *Local authorities need to be involved in sub-project planning from the start.* Otherwise the project will create parallel structures to the local government that weakens the government rather than strengthening it.

- *A good Monitoring and Evaluation system is always important, but it is a must for pilot projects.* Projects which may be replicated at a larger scale require a comprehensive and effective M&E system with timely, meaningful and easily quantifiable outcome and performance indicators to guide efficient implementation and deployment of resources. M&E measurements and findings should be transparent and made available for use to all the parties involved, including the communities which are affected by project decisions and actions.

Vinod Thomas
Director-General
Evaluation

1. Background and Context

1.1 The Lakhdar watershed is situated in the province of Azilal in the High Atlas (see Map in Annex F, Figure 5 and 6). Mountains reach an elevation of 3,700 meters. Mud huts cling precariously to the hillsides and donkeys are a common means of transportation on the steep slopes. Mountain creeks are muddy, of a reddish brown color, caused by the burden of silt they carry.

1.2 The 1999 LWMPP was developed to promote sustainable solutions to a deteriorating natural resource and land use situation in the mountains of central Morocco. These mountains receive the bulk of the rainwater that ultimately makes its way into the numerous reservoirs, or filters down into subterranean aquifers.

1.3 More than two million people, among the poorest in Morocco, live off of marginal land with fragile soils using environmentally destructive agricultural practices. Population growth has increased pressure on the land and led to over-exploitation, soil erosion, water runoff, and landslides. The degradation of the natural resource base has caused a nearly irreversible decline in agricultural production and downstream siltation of river channels and water bodies.

2. Objectives and Design

2.1 In 1995 a National Watershed Management Study was carried out to take stock of past experiences in watershed management and to identify the lessons learned that would help to develop a more sustainable approach to land use and natural resource management in mountainous areas. These lessons lie at the heart of the LWMPP project. The project's development objective (as listed in the Project Appraisal Document [PAD]) was to test on a pilot basis participatory approaches to improve land use and natural resource management in mountainous areas. To achieve this objective, the project provided a package of inputs and services which were expected to lead to improved living conditions and incomes for the local population.

2.2 According to the PAD, the components for the LWMPP and their appraised and actual costs are as shown in Table 1. Neither project objectives nor project components were revised.

Table 1. MOROCCO − Lakhdar Watershed Management Pilot Project (Loan 4426)

Objective	Components	Costs	
		Appraisal (US$ million)	Actual (US$ million)
To test on a pilot basis participatory approaches to improve land use and natural resource management in mountainous areas	Improved Natural Resource Management (erosion control, participatory forest management, small-scale irrigation rehabilitation and agricultural development)	3.4	2.4
	Socio-Economic Infrastructure (access roads and potable water supply facilities)	1.2	0.8
	Institution Building (strengthening of DPA Azilal and local branch of the Ministry of Water and Forests)	1.2	0.8
Total		**5.8**	**4.0**

Source: WB Database

2.3 The project took a participatory approach to natural resources management, learning a lesson from earlier projects that followed a top-down approach and then failed to significantly raise stakeholders' awareness of the need to preserve the environment.[1,2]

2.4 A 2001 Morocco Country Assistance Evaluation undertaken by the IEG (formerly OED) as well as an IEG study on Rural Development — From Vision to Action (2000) found that soil erosion continued unabated. The reviews pointed out, however, that the Lakhdar Watershed Management Pilot project (FY99) was piloting participatory approaches to land use and natural resource management in order to test whether this was a more effective way to promote soil conservation.[3]

[1] Studies conducted with World Bank and FAO funding during the late 1980s and 1990s also supported a participatory approach, especially one that would provide communities with additional income in return for actions that would preserve the environment, stop soil erosion and run-off, and reduce sedimentation in the reservoir downstream. Notwithstanding the above, forest rangers generally perceived villagers' grazing, land clearing and forest product-collection activities as wanton destruction that needed to be punished, and they did not take to the new approach whole-heartedly.

[2] "Kingdom of Morocco - Rural Development Strategy (1997-2010)", prepared jointly by the Bank and GoM (Report No. 16303- MOR, dated March 28, 1997). National Watershed Management Plan / Plan National d'Aménagement des Bassins Versants, 1995. Prior to these studies in 1985/86, UNDP and FAO undertook research about rural development in the central High Atlas and the province Azilal, which recommended taking a participative and decentralized approach.

[3] IEG-The World Bank (2000). In this respect the report noted that "Effective implementation of the government's rural strategy in Morocco will require a synergy between, on the one hand, sustainable cost effective sectoral approaches (primarily health, water, education, infrastructure, and agricultural development) and, on the other, decentralized participative processes. The Bank's major efforts have been directed toward the former. To a much lesser extent, it has supported local participative processes. The Lakhdar Watershed Management Pilot Project is a pilot scheme intended to develop such processes."

PROJECT COSTS

2.5 For the LWMPP, total project cost was estimated at US$5.8 million. The Bank loan represented US$4.0 million; the government and beneficiaries contribution US$1.4 million and US$0.4 million respectively. In 2003, the borrower requested a cancellation of US$1.0 million of the loan and a one-year extension of the closing date up to December 31, 2004. At completion actual loan disbursement was only US$2.57 million, representing 64.3 percent of the initial loan (US$4.02 million). Total project cost was US$4 million, of which US$2.57 million was paid out of the Bank loan and US$1.45 million of the government's contribution. Beneficiaries' contribution was in-kind. In addition, a Japanese grant for Population and Human Resources Development (PHRD) in the amount of about US$300,000 (or JPY 34 million) was provided. It financed training in the preparation of two Douar Development Plans (DDPs), monitoring and evaluation (M&E), as well as a study tour to Tunisia. The undisbursed balance of about US$14,000 (or JPY 1,623,821) was canceled as of July 31, 1999.

3. Implementation

IMPLEMENTATION EXPERIENCE

3.1 The government's 1995 National Watershed Management Plan identified three priority watersheds where people were extremely poor and, as a consequence had no other recourse than to over-exploit and degrade the natural resources to which they had access. Based on the Plan, the Ministry of Agriculture, Rural Development and Fisheries (MARDF) prepared the LWMPP with FAO/CP help. In response to a request from the Government, the World Bank fielded two multidisciplinary missions in 1997 and 1998 to identify and appraise a project in the Lakhdar watershed. Similar projects were funded in neighboring watersheds by other donors.[4]

3.2 Under the LWMPP, four rural counties were selected for intervention: Ait M'hamed, Ait Abbes, Ouaoula, and Ait Bououlli. Within each county are many *communes*, and below that there are small settlements (known locally as *douars*), in which extended families live together. Of the originally estimated 40 *communes*, 26 were selected, serving about 14,700 people. The project area comprised 16,000 hectares, or

[4] For example, interventions in the Tessaout and Msoun watershed were supported by UNDP, interventions in the Tazekka-Tefrata watershed in the province of Taza were supported by FAO and Italy, and interventions in the Srou watershed were funded by the German GTZ and the GEF/RIF under the MEDA program. The MEDA Regulation is the principal instrument of economic and financial cooperation under the Euro-Mediterranean partnership. It was launched in 1996 (MEDA I) and amended in 2000 (MEDA II). It enables the European Union (EU) to provide financial and technical assistance to the countries in the southern Mediterranean: Algeria, Cyprus, Egypt, Israel, Jordan, Lebanon, Malta, Morocco, the Palestinian Territory, Syria, Tunisia and Turkey. Retrieved on 11/30/2008 from: http://europa.eu/scadplus/leg/en/lvb/r15006.htm.

about 10 percent of the Lakhdar watershed.[5] (Annex F, Figure 3 and 4 present two maps of the project area.)

3.3 After Board approval, a project Planning and Monitoring Unit (PMU) was set up with a unit head, four subject-matter specialists and six extension agents (four male and two female *animateurs*). At the central level, the project was located in the MARDF with staff assistance from the High Commission for Water, Forests, and Desertification (HCEFLCD). In addition, the project's PMU promoted formal partnerships with other public service providers.[6]

3.4 Given the participatory and demand-driven approach, Bank staff mobilized a Japanese Population and Human Resources Development grant to simultaneously finance sub-project preparation consultancies and to jumpstart staff training. The grant covered the preparation of *Douar* Development Plans (DDPs) and basic research to help identify target communities and feasible activities. Project staff were trained in participatory techniques. A detailed Project Implementation Plan and manual was developed. Local authorities in 41 villages were briefed about the project objectives and consulted about implementation mechanisms, and village representatives to liaise with the project were identified.

3.5 The participatory approach called for community involvement in sub-project appraisal, planning, implementation, monitoring, and evaluation. As project implementation went forward, local staff found the implementation of participatory and demand-driven activities to be a challenge, requiring mutual trust, flexibility, and timely responses to stated preferences.

3.6 During implementation, the following difficulties arose:

- *High staff turn-over*: The PMU head changed three times; the four community organizers left after receiving extensive training (which had to be repeated when replacements were found).
- *Weak institutional set-up*: While an administrative and accounting unit was set up, it was staffed with only one accounting officer. A Provincial Coordinating Committee was established to ensure coordination between the various rural development activities in the province and in the project area. Although it was expected to meet at least once a year, it met far less frequently than planned.
- *Delays*: Sub-project identification was slow and planning and implementation delays negatively affected implementation and nearly led to the project's cancelation.
- *Cumbersome procurement procedures*: Both the government's and the Bank's financial and procurement procedures were followed, which created a heavy

[5] According to project progress reports, "the testing phase of the pilot project showed good results, but addressed only a small part of the watershed (26 douars). However, the global and integrated development policy to protect dams calls for a more complete coverage of the region (35,000 ha including 100 douars)."
[6] Including inter alia Health, Education, and Handicrafts, a social fund called Agency for Social Development (ADS), and NGOs such as the Moroccan Association for Solidarity and Development (AMSED), and the Azilal Association for Development, Environment, and Communication (AADEC).

workload for the one budget staff member in the Project Management Unit. In addition, the government changed the fiscal year from June 30 to December 31, which negatively affected sub-project planning.

- *Harsh climatic conditions:* Snow in winter did not allow access to some of the project areas.

3.7 In the end, the project overcame many of the above-listed difficulties to some degree. According to a FAO-published study which compared 15 rural development interventions,[7] and in the perception of project staff and other officials consulted by the IEG PPAR mission, the project was a successful pilot effort, establishing a replicable model for participatory approaches to natural resources management. The following sections will assess the degree to which the objectives described in the PAD were actually met.

4. Outputs and Outcomes by Objectives

RELEVANCE

4.1 Relevance of project objectives is rated **high**: The objectives are highly relevant given the changing rainfall patterns in Morocco and the enormous challenges facing farmers in the mountainous areas of the Lakhdar watershed trying to make a living without using up all the available natural resources at the same time. The objectives are also relevant for communities living further downstream, since reducing the amount of silt transported to the Hasan I reservoir will secure investments in the reservoir and make water available for communities living in the plains.

4.2 Project objectives were also relevant to the 1997 CAS, since watershed management projects were included in that document. The project supported the CAS-stipulated improvements in environmental and natural resources management. It also supported the key CAS objective of reducing poverty and closing the rural-urban gap through improved access to basic infrastructure and job creation through increased community participation. In addition, the project was in line with the CAS objective of encouraging greater decentralization: it provided a vehicle for practical experimentation at the local level. A review of the 2001, and 2005 CASs which succeeded the 1997 document, reveals that the issues dealt with in the LWMPP was of even greater relevance to the more recent documents (see Annex B). The 2005 CAS highlights the importance of the preservation of natural resources in the mountain ranges, and stresses the threat of prolonged drought. Social inclusion, especially of the rural poor and especially women and children maintains its strategic relevance. With respect to decentralization, the 2005 CAS emphasizes the importance of context.

[7] Royaume du Moroc, MADRPM / FAO / the World Bank (2006). *Etat des Lieux de la Mise en Œuvre de La Stratégie 2020 de Développement Rural*. Rapport Principal. Rome. The study compared projects funded by the GoM which had inputs from various donors.

4.3 The project objectives were also highly relevant to the Rural Development Strategy 2020, outlined in 1999.[8] This strategy focused on closing the urban-rural gap in Morocco in terms of rural electrification, all-season rural roads, and access to safe drinking water. The LWMPP contributed to this effort even though it was appraised before the strategy became effective.

4.4 Relevance of project design is rated **substantial**: The project's two main design elements were 1) taking a participatory approach to watershed management and rural development, and 2) implementing a pilot project which could be scaled up in the future.

4.5 With respect to the approach, requiring the active participation of stakeholders, project design was relevant. Not only was it based on years of research,[9] it was also congruent with the prevailing national strategy. The GoM-prepared National Watershed Management Plan (1995) characterized the province of Azilal as a priority watershed for intervention. The Rural Development Strategy (1997-2010, produced by the GoM and the Bank in 1997) recommended taking a participatory and decentralized approach to watershed and natural resources management and rural development.

4.6 With respect to the *pilot* approach, the choice of a pilot project was justified because the project was complex and involved an integrated multi-sector approach to rural development. The ICR described the participatory approach as risky because "top-down" approaches were then the rule. This description seems odd, given that in 1985-86, UNDP and FAO undertook a study on rural development in the central High Atlas and the province of Azilal that highlighted the importance of stakeholder buy-in. In addition, a 2006 evaluation of the 2020 Strategy documented the multitude of parallel experiences with participatory approaches in the late 1990s.[10]

4.7 As a pilot effort, the LWMPP was expected to be implemented in four years. This timeframe proved unrealistic: preparation of sub-components using a participatory approach took considerable time, and the start-up was generally slow—not unusual for projects with beneficiary involvement, which generally take a while to build up momentum. Furthermore, the target area was a place where people were not used to stating opinions and concerns to government officials. Given that the project had to be extended by one year, and might have benefited from a longer time horizon, planning for a longer-term intervention from the outset would have given the beneficiaries the time to both acquire and use new skills, which would possibly have been reflected in the project's results.

4.8 As will be further explained in paragraph 5.1, this PPAR rates overall monitoring and evaluation as modest. However, a results framework had been prepared for the LWMPP that linked the project objective to CAS goals and components to expected

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[8] The 1999 Rural Development Strategy 2020 has the objective to close the rural – urban gap in Morocco and at the same time focus on natural resources management.

[9] In 1985-86, UNDP and FAO undertook a study on rural development in the central High Atlas and the province of Azilal that highlighted the importance of stakeholder buy-in.

[10] The World Bank et. al. (2006). *Etat des Lieux de la Mise en Œuvre de La Stratégie 2020 de Développement Rural*. Rapport Principal. Rome.

outputs and the project objective. Since the PAD formulated only one objective, indicators were provided to further define desired project results in ways amenable to monitoring.

4.9 With respect to the results framework in the PAD, overall key performance indicators had been defined, which described the causal chain between inputs and expected outputs and outcomes. Information sources for monitoring and evaluation were described and critical assumptions listed. One of the assumptions was that existing budget procedures might cause excessive delays in the implementation of agreed actions—and this risk was correctly identified. Other risk factors, mostly tied to foreseeable delays included the inaccessibility of the project area during winter, and the need to teach participatory techniques and to gain the confidence of the villagers were not identified. In addition, high staff turnover among the PMU and extension agents should have been identified as risks.

EFFICACY

4.10 Achievements (by objective) for the **LWMPP** were as follows:

4.11 **Project Development Objective:** *To test on a pilot basis participatory approaches to improve land use and natural resources management in mountainous areas.* The key performance indicators set against this very broad Project Development Objective (from the PAD) were: (i) *community participation* as reflected in the number of active village committees and the extent of community participation in the investments; (ii) *improved land use,* including increased incomes from crop and livestock production; and (iii) *improved natural resources management,* including an increase in vegetative cover and erosion treatment. This PPAR will use these indicators to better structure and describe project results.

4.12 **Indicator 1:** *Community participation as reflected in the number of active village committees and the extent of community participation in the investments*; this indicator is rated **modest**.

4.13 The project was largely successful in its use of participatory approaches to natural resources management. In order to prepare the LWMPP, extension agents trained in participatory approaches visited target communities. They organized informal meetings, which everyone was welcome to attend. Sub-project preparation took about 35 days per community. Conclusions were reflected in a *Douar* Development Plan. Extension agents explained the project to beneficiaries, helped them to prioritize their main concerns, and appraised what would be required in terms of investments. Subsequently, they negotiated an agreement with the Development Committee to provide local communities with irrigation infrastructure, access roads, and wells, in return for the right to construct protective gabion structures in the hills to combat soil erosion. In addition, local communities had to plant fruit trees on terraces for soil protection and agree to prevent goats and sheep from entering newly planted forest areas. At the end of the sub-project

appraisal phase, extension agents scheduled works and training sessions to be undertaken the following year. Communities contributed from four to six percent of subproject cost in labor (as compared with the 10-20 percent anticipated at appraisal; Annex C). At the end of each year, communities assessed the implementation progress in a participatory manner. Lastly, towards the end of the project, the informal groupings were formalized and 13 community committees were registered as legal entities.

4.14 In total, 26 *Douar* Development Plans (DDPs) were formulated and 104 Project Contracts (PCs) signed. Of these, 101 PCs were completely implemented by project closing date. It is estimated that the PCs benefited more than 14,700 people (compared to 13,000 targeted at appraisal). The 13 Local Development Associations (LDA) created under the project were still functioning as of the 2008 PPAR mission.

4.15 Despite the considerable achievements that stemmed from the participatory approach used, the following problems occurred:

- It took extension agents a long time to obtain the trust of the local communities, and to get villagers to speak their minds, especially since their relations with government officials had been limited to command, control, and punishment previously.
- Even so, establishing credibility was difficult. Delays between the negotiation and delivery of infrastructure a year later fostered doubt and insecurity. Worse, community priorities had often changed in the meantime and many of the beneficiaries that had been involved in subproject identification had moved away.
- In the beginning, communities prioritized irrigation systems and roads over soil conservation measures—a situation that prevailed for the first two years of the project. Although disbursements were slow initially, once the communities understood and accepted what the project could give them—which happened in the last two years of the project—disbursement picked up. Villages also came to see the benefits of soil conservation and reforestation as time passed and patches of environmental improvement became visible.
- While participation may have been very beneficial during subproject design, an over ambitious participation during implementation led to technical problems. Construction firms and engineers adhered to the wishes of the most vocal community members, which often resulted in suboptimal technical solutions.
- Local government officials were sidelined by the participatory process, and this was ultimately problematic for project sustainability. This PPAR finding has also been made in another context by IEG: it is reflected in a recent major evaluation, *The Effectiveness of World Bank Support for Community-Based and -Driven Development* (2005). The study found that ad hoc parallel arrangements set up to implement Bank projects have hindered the long-run enhancement of local government capacity.[11]
- Although two women extension agents were involved, cultural norms prevented women from participating in District Committees. As a result, women's voices and

[11] IEG – The World Bank (2005). *The Effectiveness of World Bank Support for Community-Based and -Driven Development: An OED Evaluation*. Washington, D.C.

gender divisions of labor were neglected during sub-project planning, as was evidenced by the priority given to roads over wells, and to goats and sheep over chickens, for example.

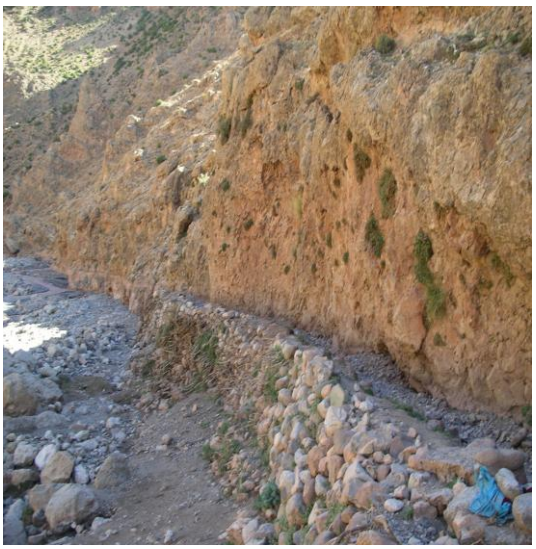
4.16 **Indicator 2**: *Improved land use, including increased incomes from crop and livestock production;* is rated **substantial**.

4.17 ***Increased incomes:*** Project effects on increased income from crop and livestock production are difficult to estimate because of a lack of baseline data. The PAD did not specify measurable targets or baseline or benchmarks for this outcome indicator. Although qualitative assessments were conducted during sub-project preparation, no quantitative summary statistics on incomes from crop and livestock production were collected.

4.18 At project closing, no beneficiary survey and no impact evaluation was undertaken. However, according to the ICR, the incremental net revenue per hectare was between US$523 to US$1,233 for irrigated areas and US$166 per hectare for rainfed areas. Activities benefitted a total of 14,700 people in the community. It must be kept in mind that people living in the project area were amongst the poorest in Morocco and several families shared one hectare of land. The rehabilitation of 554 hectares of small-scale irrigation schemes (against a target of 500 hectares) helped increase annual net returns of cereals, fodder and horticultural products by at least US$500 per ha. According to estimates in the completion report, on rainfed land, farmers who adopted improved technical packages for cereal, fodder and vegetable crops recorded increased annual returns of over US$160 per ha. At full maturity, the olive and almond tree plantations on rainfed land and the apple and walnut trees on irrigated lands are expected to generate yearly net returns from about US$600 to US$2,900 per ha. The IEG PPAR mission spoke with beneficiaries. Informants asserted that farm income from fruit tree plantation alone increased five fold.

4.19 The IEG PPAR mission compared a village with project intervention to one village that had been selected for the intervention, but had decided against it. In the village without project intervention, irrigation channels were made out of stones and sticks (Figure 1). Seepage is more than 50 percent. A small dam diverts water from the river into the irrigation channel. During heavy rains, the dam collapses and needs to be rebuilt.

Figure 1. Traditional Irrigation Channels **Figure 2. Improved Irrigation Channel**



Source: IEG

4.20 In the project with the intervention, a well was constructed and water was collected in two basins for irrigation. Irrigation channels were concrete-lined, which reduced the time of water reaching the fields from two hours to ten minutes (Figure 2).

4.21 Water is allocated according to the size of the field and every farmer has his turn. If a farmer abuses the system and channels more water to his fields, he has to serve a meal for forty people. There is one farmer responsible for enforcing water allocations. This water warden also takes care of channel maintenance. Whereas before the project intervention, every farmer helped maintain the channels, farmers are now paying a fee for channel maintenance. The IEG PPAR mission found canals functioning and irrigation channels well maintained.

4.22 Livestock improvement activities (including some 490 crossbreeding operations) under the project helped to improve livestock fertility rates and birthweights. The 84 km of access roads constructed under the project (against a target of 80 km) facilitate the supply of agricultural inputs and they make it easier to market produce, thereby improving the users' incomes. Although not included in the PAD, many other activities were organized; for example, income-generating activities for women leading to the (temporary) creation of 201 vegetable gardens.

4.23 In terms of output indicators, physical achievements were mostly satisfactory. Rehabilitation of small irrigation schemes was 11 percent above target, and access roads were about the same as estimated at appraisal (see Key Performance Indicators, Annex C). The shortfalls were in water supply schemes. Out of the 40 water supply schemes planned, only 15 water supply schemes were constructed. These schemes were to be financed under the Rural Water Supply and Sanitation Project (PAGER). According to the ICR, this was due to lack of a formal working agreement with PAGER as well as a failure to reach a consensus on the criteria for selecting priority schemes.

4.24 The project was to focus especially on women, since their daily tasks made them the ones most directly involved in natural resource depletion. During Bank supervision missions, staff repeatedly tried to focus the PMU's attention on women's issues.[12] Besides the cultural barriers that prevented women from participating in Development Committees, making the voices of women heard was more difficult than expected. According to the PMU, the problem was that no specific component or budget allocation had been made for the women's intervention, so that it tended to be neglected. One example with respect to animal husbandry was the preference of women for beehives. In the Moroccan bureaucracy bees were considered insects, not animals, and therefore no beehives could be bought under the project. Another example was the purchase of environmentally friendly gas stoves, which could not be purchased under existing regulations.

4.25 Nevertheless, the project organized demonstrations of income-generating activities for women such as vegetable gardening, sewing, weaving and knitting. A sewing instructor was recruited by one LDA. Six literacy courses were organized for 305 villagers (265 of whom were women) and the Ministry of Health provided 21 days of health education courses attended by 1,200 women. The effectiveness of these courses is hard to discern, however. The IEG PPAR mission saw sewing machines and knitting gear lying idle in a newly constructed community center. Three stacks of carpets collected dust because no system has been put in place to effectively market carpets. Of the 201 vegetable gardens established, the mission was not able to see evidence of a single one, which makes their sustainability unlikely. However, NGOs, such as AADEC, involved under the project, are continuing to work with communities, especially women.

4.26 ***Improved land use:*** Land use was improved through terracing and the planting of fruit trees. A total of 4,844 m^3 of terracing walls were constructed (against a target of 1,600). In addition, 1,095 ha of fruit trees were actually planted against a target of 900 hectares. The project also organized a demonstration program, including information field days with audiovisual presentations and farmer visits to other projects. Despite delays in preparation of the Agriculture Reference Manual and the Applied Research Program, the lack of training for the technicians and the difficulty of accessing remote villages, project targets were exceeded in terms of demonstrations carried out (on 103 ha compared to the targeted 44 ha). The program showed farmers how average yields on existing crops could be increased substantially and introduced new varieties of wheat, lentils, potatoes and forage. The livestock improvement program effectively demonstrated that crossbred animals maintained on improved feeding through forage diversification and supplementation with concentrates achieved noticeable gains in fertility rates and birthweights. No data were available about farmers' uptake of new technologies.

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[12] Women in mountainous areas of Morocco tend to marry in their teens, which has negative effects on their school attendance and their health condition because of the large number of children they bear. While women are responsible for rearing children and attending to the household, they also work as agricultural labor, herd animals, and weave carpets. Water is not easily accessible and needs to be carried over distances between one and two hours per day. In addition, firewood and fodder to feed sheep and goats during winter needs to be collected, and women loaded with stacks of braches, are a common feature in these areas.

4.27 However, the IEG PPAR mission found farmers knowledgeable about how to trim fruit trees, and it heard that four years after project closing there was high production of apples per tree. Trees could be seen bearing ample fruit. According to some farmers, the benefits they most appreciated were not the infrastructure investments, but the training sessions and extension services they received under the project.

Indicator 3: *Improved natural resources management, including increase in vegetative cover and erosion treatment*; this indicator is rated **substantial**.

4.28 Compared to the appraisal assumptions, physical achievements were mostly satisfactory. Implementation of terraces and bunds for erosion control was three times the appraisal estimate, and fruit tree plantations were 22 percent above the appraisal target. The survival rate ranged from over 95 percent for olive trees to about 25 percent for almond and carob trees. According to the ICR, the main shortfalls were in sylvopastoral land improvement (20 percent of the appraisal estimates for forests and pastures) by project closing. The IEG mission found, however, that an additional 50 hectares of forest were planted since project closing that had been prepared under the project. The survival rate of trees was 100 percent and the community was doing a good job of keeping sheep and goats from entering the newly planted forest. This is a sign of successful awareness raising.

4.29 Relations between forest officials and members of the community clearly improved. The IEG PPAR mission observed that while forest rangers were welcomed in the villages that had a project intervention, relations were tense in the village without the intervention. The problem is that communities fear that once the government replants a forest, the community loses its customary grazing right on that land. In villages with project intervention, beneficiaries understood that once forests were re-established, grazing would be allowed once again.

4.30 Despite the low priority given to erosion control measures by the communities in the first two project years, the project successfully created awareness such that in the last two to three project years, demand increased and the PAD targets for investments in erosion control were exceeded. ICR estimates of vegetative cover on sylvopastoral land in the project area indicate an increase by 4% in the upper part of the watershed, by 16% in the middle part where gullies and ravines are located, and by 11% in the lower part. This can be considered as a success, given the extremely harsh conditions of the area and the erosion of soils in the watershed.

4.31 About 50 gabion structures were constructed to stabilize topsoil and to keep it from being washed away in heavy rains. The mission visited 18 of them and found that they were functioning largely as anticipated. The space behind the gabions was filled with topsoil that had washed away from upland fields. In some villages, gabions served a purpose not originally anticipated: they trapped water-borne plastic and other garbage. As happens often with erosion-control structures, they have become filled, and they will need to be raised in height if they are to continue to provide protection to the lands below. Although they have worked just as they were designed to do, four years after project

completion, these structures have nearly lost their original function, either because no maintenance system had been put in place to remove garbage, or because they require additional labor and materials.

4.32 The government's long-term strategy was to reduce silt in the Hassan 1 reservoir through the concerted effort of several pilot projects implemented in parallel and funded by several different donors. While no statistics are available to demonstrate any impact from project soil conservation works, it is clear that the scale of the pilot was way too small relative to the extent of environmental degradation for it ever to have been measurable.[13] The Hassan I dam had been constructed in 1986 for US$180 million. The initial capacity of the dam was 272 million m^3. According to the 2004 National Report on Water Resources in Morocco, by 2003 the Hassan 1 reservoir had lost 24.9 million m^3 (or 9.2 percent of its volume) and was losing on average 2.5 million m^3 per year.[14] Actual siltation of the Hassan 1 dam was three times the amount estimated.[15] Although two priority areas, Ait Abbas and Ouaoula, were part of the project intervention area, no reduction of siltation at the Hassan 1 dam was measured. A more localized erosion management and monitoring system is needed to monitor actual effects of these activities on erosion and siltation rates, particularly in the 16,000 ha of the Lakhdar watershed covered by the project. The fact that the gabions trapped all the silt they were capable of retaining offers important lessons for effective erosion management in the remaining 144,000 ha of the watershed (90% of the total area) that lie outside the project area. They should also be applied.

EFFICIENCY

4.33 In terms of efficiency, project outcome is rated **substantia**l. The cost-benefit estimation in the PAD and the actual results calculated during the ICR preparation process demonstrate that the agricultural investments yielded economic benefits that exceeded what was expected. Most projects that achieve environmental improvements produce a series of benefits that are quite difficult to quantify. This PPAR identifies a series of second order benefits, not to criticize the analytic work that went on under the project, but rather to suggest that the project achievements are potentially more significant than the actual numbers have been able to capture.

4.34 The cost-benefit analysis conducted for the ICR quantified the economic benefits of increased production of cereals, fodder, olives, fruits, and vegetables. These were the benefits contemplated in the PAD. In that document, the Economic Rate of Return (ERR)

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[13] In any event, no monitoring system had been set up, and it can take years for vegetative barriers (ground and forest cover) to reduce erosion downstream.
[14] Retrieved on 12/12/2008 from: http://www.pnud.org.ma/pdf/Rappt_national_1%20juin_fr.pdf.
[15] http://www.planbleu.org/publications/atelier_eau_saragosse/Maroc_rapport_final_FR.pdf. « Les données disponibles indiquent que le taux d'envasement du barrage Hassan 1° est de 2,87 m3 par an, trois fois supérieur (1750 m3/km2) aux prévisions initiales en raison de dégradations bien plus fortes que les résultats des calculs retenus à l'origine du projet (504 m3/km2). Les analyses entreprises montrent que les principales sources de sédiments couvrent près de 17 000 ha, où les interventions sont particulièrement urgentes, dont 11 000 situés dans les communes Aït Abbès et Ouaoula. »

was estimated at 17 percent over 30 years, with a Net Present Value (NPV) of US$2 million equivalent at an opportunity cost of capital of 10 percent. Using the same working assumptions, the ERR at project completion was found to be 21 percent with a NPV of US$3.3 million.[16]

4.35 Additional benefits that accrued from the project include reduced transportation costs stemming from more and better-sited access roads. The project–built water supply schemes have health benefits (including the value of work/school days not missed due to sickness, medical and pharmaceutical costs foregone, and so on) as well as direct economic benefits stemming from commercial use of the water to produce crops and artisan foodstuffs and beverages. The terracing/retaining walls constructed help to reduce siltation, preventing the loss of downstream river and dam water storage capacity—the cost of such losses, not to mention potential disaster-caused damages associated with reduced capacity are considerable. In addition, the cost-benefit analysis did not include livestock revenues which benefited from improved fertility rates and increased birthweights due to cross-breeding.[17] Thus, even though the efficiency rating of substantial would be justifiable on the ERR results alone, the ex post cost-benefit analysis excluded important benefits, which are at least worthy of mention.

4.36 The community outreach effort undertaken in this project had a high up-front cost in terms of staff costs, staff training, staff transport, etc. The longer the extension work could be implemented (with a concomitant increase in number of families attended) the lower the per/family cost of the operation. In other words, efficiency in staff cost terms was dependent 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 the case 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. US$0.8 million were spent to educate and motivate beneficiaries in natural resources management. Another US$0.8 million was spent on training and equipping government officials. Although almost half the project costs were 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 PPAR 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.

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[16] The main reason for the higher ERR is that the cancellation of U$1.0 million of the loan (proceeds intended mostly for training) plus the under-disbursement of 20 percent of the loan did not adversely impact the agricultural development activities carried out under the project and the resulting agricultural production.

[17] The ICR noted about 490 crossbreds by the closing date, the PPAR was not able to update this number, although anecdotally it has increased apace.

4.37 The above-described "overlooked" benefits have been stressed in this PPAR because recent analytic work on the water sector highlights the need for increased environmentally focused work within the context of water projects, and because more work needs to be done Bank-wide in estimating the economic benefits of such work. The approach adopted in this project was abandoned because results were slow to appear and, in the absence of painstaking quantification of the actual benefits, the project's achievements were widely seen to be expensive. In an increasingly water-stressed world, and especially in a country where most of the dams that are affordable to build already exist, making the most environmentally efficient use of the water that falls from the sky is critical.

OUTCOME OF THE LWMPP

4.38 The outcome of the LWMPP is rated as **satisfactory (Table 2)**. The project successfully pilot tested approaches to improve land use and natural resource management in mountainous areas of Morocco. This pilot project demonstrated that communities in Morocco's mountain areas are willing to adopt soil conservation measures if they receive compensation—in this case infrastructure and training in return. However, adoption may have been wider if public awareness had been pursued more actively, and whatever the reduction in silt transported to the Hassan 1 dam downstream might have been, it has not been measured. Anecdotally, localized changes in erosion and sedimentation were described by project staff and some villagers.

Table 2. Development Objective and Outcome for the LWMPP

Development Objective	Relevance	Efficacy	Efficiency
To test on a pilot basis participatory approaches to improve land use and natural resource management in mountainous areas	High	Substantial	Substantial
Overall Project Outcome		**Satisfactory**	

4.39 The project's objective was highly relevant given the enormous challenges facing farmers in the mountainous areas of the Lakhdar watershed. Project objectives were also relevant to the 1997 CAS, since watershed management projects were included in that document, as were improvements in environmental and natural resources management. It also supported other key CAS objectives, and a review of the 2001 and 2005 CASs, which succeeded the 1997 document, reveals that the issues dealt with in the LWMPP were of even greater relevance to the more recent documents.

4.40 With respect to its efficacy, the project increased living standards for poor communities in harsh climatic conditions. It also achieved better protection against soil erosion by involving communities in protecting newly planted trees, terracing, and other soil conservation measures. There were moderate shortcomings in the way the project's financial viability was measured, in its results monitoring system, and in its inclusion of women in the decision-making process. Given that this was a pilot project, the lack of a monitoring system to track results hampered learning as well as potential replicating or scaling up of the approach.

RISK TO DEVELOPMENT OUTCOME

4.41 The risk to development outcome is evaluated as **significant** for the following reasons:

- The project demonstrated that participatory approaches can increase living standards of Morocco's rural poor. It also demonstrated that awareness can be raised about natural resources management and that communities' relations with government officials trying to preserve the environment can be improved through such approaches. However, although this project demonstrated that the approach can work, for the involved authorities with relevant decision-making authority, it proved too expensive to be replicated in other areas. The government and the donor community did not invest further in participatory natural resources management and moved to approaches, such as improving marketing of products by involving the private sector. Therefore, despite high hopes in the local ministry and among beneficiaries, the participatory approach to natural resources management as tested by this pilot project was not scaled up.

- PMU staff trained in participatory approaches are not able to use their acquired skills because of a lack of follow-on projects. They went back to their originating agencies or moved to other cities.

- Project beneficiaries do not expand gabion structures when and as needed. Therefore, while gabions may have trapped sediment and reduced run-off for a few years, any future stream of benefits stemming from these structures is unlikely.

- There is a risk that at least some of the infrastructure provided under the project may have a detrimental effect on natural resources management. The 2007 IEG Evaluation Brief on Development Actions and the Rising Incidence of Disasters showed that without adequate attention to extreme weather events during design, roads may increase run-off, siltation and even deforestation (which was actually observed by the PPAR mission).[18] A 2008 study conducted by the Water Sector Board voices similar concerns when it states that expansion of the road network can have as great an impact on watersheds as farming or herding. Road construction removes vegetation, leaving the area susceptible to surface erosion.[19] The purchase of sheep and cattle may further reduce vegetative cover on hillsides.[20] And the use of terraces for the plantation of forest and fruit trees may have an unintended effect on water availability further downstream.

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[18] IEG – The World Bank (2007). Development Actions and the Rising Incidence of Disasters. Evaluation Brief. Washington, D.C.

[19] The World Bank (2008). Watershed Management Approaches, Policies, and Operations: Lessons for Scaling Up. Water Sector Board Discussion Paper Series, No. 11.

[20] According to the IEG 2004 PPAR on Turkey, the relationship between livestock pressure and erosion and water in such dryland areas is usually extremely complex. […] While the decline in livestock pressure may result over time in vegetation cover improvements, it is also possible that, at least for an interim period, lack of livestock pressure may be a cause of either slower recovery or further deterioration. (This would be due to lack of sometimes beneficial soil disturbance by animal hooves and due to accumulation of smothering uneaten dry material.)

BANK PERFORMANCE

4.42 Overall Bank performance is rated **satisfactory**.

4.43 Quality at entry is rated as **moderately satisfactory** by IEG. No QAG review was undertaken for this project.

4.44 The Bank was responsive to the Borrower's need for assistance and fielded two major multidisciplinary missions between identification and appraisal. It mobilized a PHRD grant to finance project preparation and consultancies, and simultaneously to jump-start staff training, DDP planning and basic research to help identify target communities and feasible project activities.

4.45 The participatory approach taken to natural resources and rural development was relevant for the mountainous areas of Morocco. However, project design should have included a specific component to involve women, since they play an important role in natural resource preservation (especially considering that their daily chores include cutting down trees for firewood, herding their animals on degraded hills, etc.). Including a subcomponent to explicitly address women's needs and awareness levels could have had many positive impacts: facilitating the creation of appropriate administrative structures, and making a lasting difference in the way women's issues are dealt with by the administration, for example.

4.46 The same is true for monitoring and evaluation. According to project reports, creating a component/disbursement category for monitoring and evaluation would have forced project staff to focus more on monitoring and evaluation.

4.47 Quality of supervision is rated as **satisfactory**: Bank supervision is considered satisfactory despite the succession of three task team leaders during the project's implementation period. Nine Bank supervision missions were fielded, including one which undertook a comprehensive mid-term review in 2002.

4.48 The missions correctly identified the major implementation issues and risks, including organizational issues faced by the PMU. In addition, the missions raised technical issues related to formulating sound DDPs, by requiring PMU staff to include economic and financial evaluations in DDPs. Another issue, which was raised in detailed supervision mission reports, was the need to organize self-evaluation meetings with the communities and to implement a monitoring and evaluation system using proper outcome and performance indicators. Furthermore, supervision missions focused PMU staff repeatedly on including women's needs in the DDPs and on organizing events for awareness raising and skill building.

BORROWER PERFORMANCE

4.49 Overall, Borrower performance is rated as **satisfactory**.

4.50 Government performance is rated **satisfactory**. Government's strong support for the intensive planning and pre-project training activities was evident throughout the project preparation period. Despite a number of organizational changes as well as transfers of key project staff, the High Commission for Water, Forests and for Fighting Desertification (HCWF) and Ministry of Agriculture, Rural Development and Fisheries (MARDF) supported the project well at critical moments. HCWF made scarce staff available to the project to replace those who had left the project.

4.51 Initially proposed for five years, project duration was reduced to four years at the Government's request. Though mitigated in part by an extension, this time-frame proved insufficient to fully strengthen local institutional capacities and significantly measure project impact in terms of vegetative cover and land degradation.

4.52 Implementing agency performance is rated **satisfactory**. The project allowed younger staff in the administration to prove themselves, and helped in their career development. During project implementation, extension agents lived closely with communities. During meetings with the PMU team and extension agents, project staff stressed repeatedly that they were proud of project achievements. It is certainly the case that, given the training and experience project staff received under the project, they can also be seen as project beneficiaries. Difficulties occurred, however, during the implementation process.

4.53 The project PMU was set up with a unit head, four subject-matter specialists and six extension agents. The PMU head changed three times during project implementation; the four extension agents left and had to be replaced. An administrative and accounting unit was also set up but was staffed with only one accounting officer. Thus, problems occurred when administrative procedures the project had to follow proved complicated and beyond the responsible person's experience. Another difficulty occurred with the coordinating agencies, which were not used to working together. While a Provincial Coordinating Committee was established to ensure coordination between the various rural development activities in the province and in the project area, this agency met less often than planned.

4.54 In addition, the project did not succeed in setting up an effective M&E system. This prevented the PMU from efficiently managing time, resources and project data, and from taking appropriate and timely action. This shortcoming was compensated for in large part by staff commitment and hard work, as well as by field observations, feedback and technical advice provided by Bank supervision missions.

5. Monitoring and Evaluation

5.1 Overall monitoring and evaluation is rated as **modest**.

5.2 ***M&E Design***: The LWMPP did not set up an effective monitoring and evaluation system. This was partly a design issue due to the fact that M&E was not an explicit component of this project. Since the LWMPP was a pilot project, an M&E with well-defined output and outcome indicators would have been useful. In the performance measurement framework, output indicators have been well defined. Outcome indicators in the LWMPP, however, were less capable of measuring progress toward the achievement of the objective. Measuring income and expenditure levels of the local population, as well as sedimentation levels in the Hassan 1 dam, vegetation cover, and soil erosion would have facilitated capturing project results.

5.3 ***M&E Implementation***: No comprehensive M&E program was implemented. There was anecdotal data, field observations and feedback from farmers encountered during site visits. The lack of systematic quantitative data collection was somewhat mediated by qualitative assessments, however. Additionally, the project conducted background research for 26 DDPs, which provide valuable baseline information. Indicators provided in the PAD were tracked on an annual basis. Supervision missions focused the attention of PMU staff on improving the M&E system in every mission since 2000. Overall, PMU staff produced some 70 studies, including detailed socio-economic beneficiary assessments. Participatory self-evaluation meetings were organized at the end of each year to assess progress with implementation, and a study was undertaken, which assesses and compares 15 similar project interventions in rural development in Morocco. Among the projects assessed is the LWMPP. Despite the absence of an all-inclusive monitoring and evaluation framework and in the absence of any beneficiary survey at the end of the project, the project experience was ultimately captured in a myriad of ways.

5.4 ***M&E Utilization***: Since there was no formal M&E data to use, piecemeal information and informed staff "hunches" have guided staff actions. A better quantitative M&E system would have probably helped to focus the PMU's attention on achieving results more expeditiously--work planning was an issue that supervision reports bring up repeatedly. However, meetings with beneficiaries and the collecting of output indicators compensated to some extent for the lack of M&E.

SAFEGUARDS, FIDUCIARY COMPLIANCE, AND UNINTENDED OUTCOMES

5.5 The 1999 Lakhdar Watershed Management Pilot Project, the LWMPP was classified as Category "B" in terms of environmental screening as well, which was appropriate given Morocco's and the Bank's environmental guidelines. No safeguard issues occurred during implementation.

6. Conclusions and Lessons

6.1 This project largely achieved objectives that were highly relevant in 1995, and the importance of those objectives has increased dramatically from the perspective of 2009. The inability of one of the most ambitious networks of dams ever created to provide sustainable water supplies to a water-stressed country dramatically highlights the importance of environmental restoration, especially given today's awareness of climate change.

6.2 It is widely accepted that restoring the environment cannot be done without the involvement of those that are destroying it. That is what this project achieved, after a fraught start-up period. The project also demonstrated that participatory approaches can increase the living standards of Morocco's rural poor. And it proved that awareness can be raised about natural resources management to the degree that farmers are moved to action.

6.3 For the moment, the borrower and the Bank seem to have decided that the project approach is not cost effective. Despite high hopes in the local ministry and among beneficiaries, the participatory approach to natural resources management has not been scaled up. The government and the Bank did not invest further in participatory natural resources management and moved to other strategic approaches, such as improving marketing of agricultural products through private sector involvement. This report argues that this decision was short-sighted, but that without a more careful analysis of benefits (see para 4.35), the cost effectiveness of the LWMPP approach cannot be well determined.

6.4 The cost-benefit analysis did not consider that preventing the dam system from filling with silt is an extremely valuable benefit. It did not quantify the additional benefits of forests that slow run-off after torrential rains, gabions that build fertile and well-watered agricultural land where none had existed before, access roads that (potentially) channel water to where it is needed and prevent it from taking more damaging routes, or even the value of off-farm income-generating activities promoted under the project. The only benefits considered in the relatively high ERR were benefits from agricultural investments. Had all investments been included, the ERR would have been even higher.

6.5 The question this PPAR feels compelled to raise is: what other alternative to villager involvement can improve the fragile environment in the high Atlas mountains? There may be no other feasible approach to the work that was begun by this project. Almost by definition, the poorer the members of a community, the lower the levels of its leaders' technical skills and formal education. Consequently, Bank projects need to be ready to address skills deficits (whatever they may be) when they work with villagers. At the outset it is likely to be costly. Bank projects that leave infrastructure behind in poor communities cannot assume that putting hardware into place is a contribution to sustainable development in the absence of a functioning social structure to support it. Projects aiming at restoring degraded environments need to be able to work effectively with poor communities until they are ready to become involved in effective change.

6.6 The Bank and its borrowers need to develop the skills they need to work with poor communities on environmental restoration and to adapt to climate change. There is no evidence that smaller, more agile organizations do this task consistently well. Each pilot develops a few champions. A major challenge is to identify champions and to use them as extension agents during scaling up. This practice, and using visits to successful project sites, lowers costs and speeds implementation. This report concludes that further efforts at involving farm families in soil and water conservation and environmental restoration are warranted, and that they will ultimately prove to be cost-effective.

6.7 Lessons from the **LWMPP** were the following:

- *Communities need to see results early.* The LWMPP approach depended on active community involvement, but was able to deliver goods and services only after a long period of time. Establishing credibility with farmers long accustomed to empty promises requires that tangible rewards for their efforts commence as soon as practicable following those efforts.

- *Projects with beneficiary involvement generally take a while to build up momentum.* Designing activities to be implemented by beneficiaries using a participatory approach takes considerable time. Start-up should be expected to be slow, and allowances made during design for a realistic implementation period.

- *Successful pilot efforts that are abandoned dampen expectations and make subsequent development efforts harder to promote.* Pilot projects create high expectations. In this case, there is no alternative: reforestation, soil stabilization, and runoff control will need to take place in the high Atlas mountains. Farmers were expecting to build on the successful experience of the LWMPP, and not building on the momentum created will make it far harder to generate farmer enthusiasm the next time around.

- *Projects need to take gender patterns of work into account.* Promoting natural resources management with men when women collect firewood and herd the cattle is inefficient, to say the least. Careful targeting of the gender whose activities are most likely to cause natural resource degradation greatly increases the potential impact of consciousness-raising efforts. Even where there are deep-rooted traditions of excluding women from traditional community decision-making processes, outreach campaigns can make use of women trainers, market days, etc.

- *In a project with substantial environmental objectives, and often complex efficacy and efficiency treatment trade-offs, it is important to measure at least local environmental impacts.* This data may later be modeled into broader environmental impacts as treatment coverage spreads.

- *Actively including NGOs in participatory projects can increase sustainability of project activities.* This is especially true if NGOs continue project activities after the project closes, as was the case in the LWMPP.

- *Local authorities need to be involved in sub-project planning from the start.* Otherwise the project will create parallel structures to the local government that weakens the government rather than strengthening it.

- *A good Monitoring and Evaluation system is always important, but it is a must for pilot projects.* Projects which may be replicated at a larger scale require a comprehensive and effective M&E system with timely, meaningful and easily quantifiable outcome and performance indicators to guide efficient implementation and deployment of resources. M&E measurements and findings should be transparent and made available for use to all the parties involved, including the communities which are affected by project decisions and actions.

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Annex A. Basic Data Sheet

LAKDHAR WATERSHED MANAGEMENT PROJECT (SCL-44260 TF-29346)

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

	Appraisal estimate	*Actual or current estimate*	*Actual as % of appraisal estimate*
Total project costs	5.8	4.0	69
Loan amount	4.0	2.6	65
Cofinancing	NA	NA	---
Cancellation	---	1.4	---

Project Dates

	Original	*Actual*
Initiating memorandum		11/09/1997
Negotiations		04/07/1998
Board approval		12/22/1998
Signing		09/29/1999
Effectiveness	01/03/1999	11/29/1999
Closing date	12/31/2003	12/31/2004

Staff Inputs (staff weeks)

Stage of Project Cycle	*Actual/Latest Estimate*	
	No. Staff weeks	*US$ ('000)*
Identification/Preparation	60	200
Appraisal/Negotiation	20	62
Supervision	50	206
Other	16	58
Total	146	526

Mission Data

	Date (month/year)	*No. of persons*	*Specializations represented*	*Performance rating Implementation Progress*	*Performance rating Development Objective*
Identification/ Preparation	04/15/1997	5	ECONOMIST (2), FINANCIAL MANAGEMENT (1), NATURAL RESOURCE SPECIALIST (1), INSTITUTIONAL SPEC. (1)	S	S
Appraisal/Negotiation	04/07/1998	5	ECONOMIST (2), NATURAL RESOURCE SPECIALIST (1), INSTITUTIONAL SPECIALIST (1), PROCUREMENT SPECIALIST (1)	S	S
Supervision	05/27/1999	2	TEAM LEADER (1); AGRIC. ECONOMIST (1)	S	S
	03/02/2000	4	TEAM LEADER (1); AGRONOMIST (1); PARTICIPATION SPEC. (1); FINANCIAL MANAGEMENT (1)	S	S
	11/23/2000	5	TASK TEAM LEADER (1); AGRIC. SERVICES SPEC. (1); AGRONOMIST (1); PARTICIPATION SPEC. (1); FINANCIAL MANAGEMENT (1)	U	S
	06/22/2001	2	PARTICIPATION SPEC. (1); FINANCIAL MANAGEMENT (1)	S	S

	Date (month/year)	***No. of persons***	***Specializations represented***	***Performance rating Implementation Progress***	***Performance rating Development Objective***
	11/15/2001	2	TEAM LEADER (1); NEW TEAM LEADER (1)	S	S
	03/07/2002	6	TEAM LEADER (1); IRRIGATION ENGINEER (1); FINANCIAL MANAGEMENT (2); PARTICIPATION SPEC. (1); NATURAL RESOURCE SPEC. (1)	S	S
	10/11/2002	5	TEAM LEADER (1); FINANCIAL MANAGEMENT (1); PARTICIPATION SPEC. (1); NATURAL RESOURCE SPEC. (1); CIVIL SOCIETY/GENDER (1)	S	S
	04/30/2003	1	TEAM LEADER (1)	S	S
	12/18/2003	5	TEAM LEADER (1); NATURAL RESOURCE SPEC. (1); FORMER TTL (1); PARTICIPATION SPEC. (1); FINANCIAL MANAGEMENT (1)	S	S
	12/12/2004	6	TEAM LEADER (1); OUTGOING TEAM LEADER (1); AGRONOMIST (1); NATURAL RESOURCE SPEC. (1); PARTICIPATION SPEC. (1); AGRIC.	S	S

	Date (month/year)	*No. of persons*	*Specializations represented*	*Performance rating Implementation Progress*	*Performance rating Development Objective*
			ECONOMIST (1)		
Completion ICR	03/02/2005	1	AGRONOMIST (1).	S	S
	04/02/2005	4	TEAM LEADER (1); AGRIC. ECONOMIST (1); AGRONOMIST (1); INSTITUTIONAL SPEC. (1)	S	S

Annex B. Morocco - Country Assistance Strategies

Table 3. Comparing Morocco CASs

	Natural resources management	Closing the rural-urban gap	Decentralization
1997 CAS	To promote consensus and awareness, and strengthen integrated water management.	To implement programs to improve basic services in poorest provinces; launch major effort in rural infrastructure to reduce existing social gaps; and support dialogue on education reform, coverage of health services, safety net efficiency, integrated rural development, and gender issues.	To accelerate public enterprise reform and privatization; reduce wage bill; initiate dialogue on public administration reform
2001 CAS	A particular effort must also be made to stop the degradation of natural resources on which many rural poor depend (water, rangeland, etc.), and to help build consensus for a more sustainable and equitable global policy of utilization of scarce water resources.	To promote human development and inclusion policies in the "second Morocco", focusing on the delivery of basic education and health and on gender equality, is the key to enhancing Morocco's long-term growth potential. To this end, assistance would be targeted towards developing disadvantaged rural areas.	Key instruments would be infrastructure and social programs that promote decentralization
2005 CAS	To improve water management and access to water and sanitation services. There is urgent need to support infrastructure development to reverse widespread environmental water quality	Increase access to basic services by poor and marginalized groups.	Some Bank approaches, in particular support for the decentralization process and integrated rural development, should be refined during the next CAS period.

	degradation and resource depletion, promote the sustainable use and conservation of water resources, and open more equitable access to services in urban, peri-urban and rural areas.

Source: IEG

Annex C. Key Performance Indicators from ICRs

Table 4. Morocco - Lakhdar Watershed Management Pilot Project – Key Performance Indicators/Log Frame Matrix

Outcome / Impact Indicators	Projected in last PSR	Actual/Latest Estimate
1. COMMUNITY PARTICIPATION	X	X
1a. To Investments:		
- for SSI schemes (% of costs)	20%	14%
- for access roads (% of costs)	10%	11%
- for fruit tree rehabilitation/planting (% of costs)	10%	6%
1b. To maintenance:		
- for SSI schemes (work day/km)	non-defined	10
- for access roads (work day/km)	non-defined	35
- for fruit tree rehabilitation/planting (work day/ha)	non-defined	7
1c. To Investment plus maintenance during project implementation (% of costs)	7%	8%
2. HIGHER COMMUNITY INCOMES	X	X
2a. for SSI (incremental net revenue/ha)	---	US$ 523 - 1,233
2b. in rainfed areas (incremental net revenue per ha)	---	US$ 166
3. INCREASED VEGETATIVE COVER (% of previous situation)	X	X
3a. in sylvopastoral areas	non-defined	4%
3b. on hillsides	non-defined	16%
3c. in rainfed areas	non-defined	11%

Source: Self-evaluation report (ICR)

Table 5. Morocco - Lakhdar Watershed Management Pilot Project – Key Performance Indicators/Log Frame Matrix

Output Indicators:

Output Indicators	Projected in last PSR	Actual/Latest Estimate
A. NATURAL RESOURCE MANAGEMENT	X	X
A1. Construction of terracing walls (m3)	1,600	4,844
A2. Sylvopastoral land improvement (ha)	600	120
A3. Rehabilitation/planting of fruit trees (ha)	900	1,095
A4. Rehabilitation of small-scale irrigation (ha)	500	554
B. SOCIO ECONOMIC INFRASTRUCTURE	X	X
B1. Construction of Access Roads (km)	80	84
B2. Creation of Water Supply Schemes (unit)	40	15
C. INSTITUTIONS BUILDING	X	X
C1. Vehicles Provided (unit)	4	5
C2. Training of personnel (PMU, PDA. PSWF) (person/day)	1,050	377 (+1061) (Note1)
C3. Training of DC members and elected local representatives (person/day)	1,168	274 (+780) (Note2)
C4. Technical Assistance Provided (person/ month)	6	1.8 (+4.2) (Note3)

Note1: In addition 377 person-days of training during project implementation, 1,061 person-days were realized in the context of the initial training with the Japanese funds during preparation.
Note2: In addition to the 274 person-days off-site training, there were 780 person-days of On-site training given (in compensation) by the PMU to the DC members and elected local representatives.
Note3: Consultancy for training in participatory approach provided with the Japanese funds(1.8 person-month). The rest (4.2) was provided by Bank missions.

Annex D. Sites Visited by the IEG PPAR Mission

Table 6. Site Visits to Rabat, Agadir, Beni Melall, Azial, and Fkih ben Salah

	Site Visit	Assessment
	Rabat	
1.	Experimentation, Trials and Standards Unit / Service des Expérimentations, des Essais et de la Normalisation	The mission visited a laboratory equipped under the WRMP to test irrigation pipes and tubes imported to Morocco or produced in Morocco. Pipes are being put under pressure to test their resilience. Elaborate systems were constructed to test the effectiveness of the material for drip irrigation. Morocco has a new program for drip irrigation in which farmers receive a subsidy of 60 % if they invest in drip irrigation. All material being subsidized has to be tested in this Rabat agency.
	Souss Massa Bassin - Agadir	
2.	Souss Massa RBA	Meeting with five employees of the Agency. Presentation of research and report on measures to recharge the Souss aquifer artificially. Under the WRMP, a mathematical model was developed for the Souss aquifer. It helped document the alarming yearly decline of the water table by between 1.5 and 3 meters. In response to this decline, nine weirs were constructed or improved (five of them financed under the WRMP) to artificially recharge the aquifer. The mission visited two of the weirs (see below).
3.	Aoulouz Dam	The dam built in 1991, has a storage capacity of 100 million m^3. It was constructed to mitigate flooding and to store irrigation water for years of drought. Water from the reservoir irrigates citrus fruit and vegetable plantations further downstream. Water is released from the dam 3-4 times per year in order to artificially recharge the aquifer. The date for the release is negotiated with farmer associations. When the mission visited the dam, a release had been scheduled, but was postponed because it rained. The study of the WRMP found that artificially recharging the aquifer is effective only within 80 kilometers of the dam. This is why the private sector now financed a pipe transferring water directly to the citrus plantations of Sebt-Guerdane, more than 100 kilometers from the reservoir.

4.	Talekjount Weir	Built in 2005 on an effluent of Oued Souss. Three layers of concrete quarters block the river and force the water to infiltrate the aquifer. The weir was designed to modify the path of the river and improve the aquifer recharge in lower-lying areas. The mission noticed sediment accumulated upstream of the weir, reducing its effectiveness. Officials discussed the idea of involving farmers in silt removal because it contains a high level of nutrients. However, as of 2008, no maintenance action has taken place.
5.	Freija Amont Weir	Weir on the Oued Souss, renovated under the WRMP. The 4 m high dam has been completely filled with silt and bushes, which reduces the effectiveness of the weir. Maintenance of the weir was not visible.
6.	**Oum-er-R'bia RBA - Beni Mellal**	
7.	Information system	Modern computer network was partly funded by the WB WRMP. It is composed of two systems. The first is for management (accountability, logistics, HR, and user fees) and the second for technical information and decision making. With the help of this Oracle software, water allocations can be based on actually available water resources. The mission noticed a number of staff using the system for updating information on surface and groundwater levels.
8.	Laboratory	The mission visited the office laboratory stocked with new equipment (a UV-Visible Spectrometer, an Avanta Σ Atomic Absorption Spectrometer, and a distillator) under the WRMP. The three-room lab was well equipped for chemical, physical and biological analyses. On-site measurement devices were also available. Three old kits procured under the WRMP were stored away, while five newer ones seemed to be in use.
9.	Irrigation mitigation work	The mission visited the rehabilitation of a flood evacuation channel crossing the city to prevent future floods. The section visited was 800 m long, about 2 m deep and about 4 m wide. The site was identified as a black spot by the flooding study funded by the WB under the WRMP. As a result of this study, flood protection works were undertaken with the agency's own funds. The agency not only addressed flooding in the city, but it protected hillsides with check dams and gabion structure to prevent torrential rains from damaging topsoil and causing flooding further downstream.
10.	Meteorological station	Simple station equipped with a pluviometer, a flow meter,

		and a water level meter. The station was under the surveillance of a ward living on-site.
11.	Illegal drilling site	The mission noticed a drilling station in the fields. Officials from the basin office asked to see the driller's permission. Since no such document was issued, the basin officers exercised their role of policing against illegal drilling, and the drilling was stopped. It was to be taken up again only after the acquisition of a permit, which the agency had to issue.
12.	**Oum-er-R'bia Basin – Azilal**	
13.	Provincial Agriculture Direction Office	Meeting with staff from the implementing agency under the LWMPP (extension agents, coordinators). The NGO (AADEC) provides continuous support for the local population, building on the achievements of the LWMPP. AADEC provides some continuity, and makes project achievements sustainable.
14.	Rural community of Ait M'Hamed	The mission met with seven members of Bernat's and Amzray's villages. These two villages benefited from the LWMPP. They appreciated the new species of fruit trees planted (apple production multiplied by five), the improvements of the irrigation system, and the access roads built. The mission visited 14 gabion structures to prevent erosion and saw 50 hectares of forest replanted. Tree planting had a 100 percent success rate. Replanting forest was one of the project outcomes, even if not funded under the LWMPP. The community was sensitized not to enter the forest, and the forest department was motivated to plant trees in order to prevent soil erosion in the watershed.
15.	Rural Community of Ait Bououli – Douar Association of Asamer	The mission visited three villages with seven members of the village association, a forest officer and a local government official. It saw the improvement of the irrigation system, three gabion structures, the water storage tank, and a spring, which was framed by a concrete structure.
16.	Rural Community of Ait Bououli – Douar Association of Aarous	The mission met with about 10 representatives of the village. Villagers had participated in the initial screening process for the project, but decided that they did not want to participate. Therefore, no infrastructure construction or awareness raising took place in this village. While villagers were aware of the environmental degradation in the hills, they did not want forest to be planted there, because of their customary right to have their animals graze in the hills. The

		mission also visited the local irrigation system of earthen channels and dams. A dam to store and deviate the irrigation water had been destroyed a few days earlier by floods. The whole system from the dam to the channels was poorly designed and materials used were prone to large water losses through seepage.
17.	**Fkih ben Salah Office Régional de Mise en Valeur Agricole du Tadla**	Meeting on the irrigation component under the WRMP.
18.	ORMVA water and soil lab	Large and very well equipped lab for water and soil quality monitoring. The lab currently undertakes a study on soil parameters for more than 2,500 farmers to optimize the fertilizer use and gather data to feed into the information system. Two staff work full time and three have been hired for this particular mission. The farmers pay for this test. The WRMP bought 25 lab devices (verified by the mission) as well as chemicals. Most of the equipment is being used on a regular basis and well maintained.
19.	Laboratoire du Système d'Information Géographique et de Télédétection Spaciale	A database collects information from about 500 stations for water quality monitoring and about 200 for soil analysis. Parameters on salinity, water table, boreholes, etc. are regularly updated. This database is being analyzed to produce regular reports for monitoring and decision making. In addition, satellite images are used to assess concrete structure in the irrigation perimeter. A law has been issued to prevent new construction in the perimeter. This GIS tool based on satellite imagery provides information on illegal construction.
20.	Drip Irrigation Farm	The WRMP equipped a five ha farm with one ha drip irrigation devices under the condition that the farmer would extend the equipment over all 5 ha. Thanks to drip irrigation, the farmer more than doubled his production and used 50 times less water.
21.	Station des Expérimentations Hydro Agricoles de l'Oued Gnaou	The mission visited a water and agricultural experimentation station, which was equipped under the WRMP by a basin and drip irrigation devices.
22.	Agrohealth	282 ha olive trees plantation equipped with a drip irrigation system. The trees were planted eight months ago. The olives are processed on site for oil production.

Source: IEG

Annex E. Informants and Agencies Consulted

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Abdeslem El Fouzi, Ingénieur Sociologue et coordinateur du PABVOL
Mohamed Bouakli, Chef du Bureau des Grandes Cultures, Animateur du PABVOL
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Fatima-Zolua Cherkaoui, Chef du Bureau Environnement
Mohamed Laakali, Bureau des Techniques d'Irrigation
Elarhi El Habach, Bureau des Cultures Sucrières
Rachid Amediaz, Ingénieur d'Etat à la Gestion Environnement
Boudrouss Abdelali, Technicien Supérieur en Système d'Informations Géographiques et Télédétection

Oued Gnaou Experimental Station for Water and Agriculture / Station des Expérimentations Hydro Agricole del'Oued Gnaou
Sidi Bouidahoihen, Chef des Expérimentations

NGO / ONG
Lahoucine Ouall, Responsable de l'Association Azilal pour le Développement, l'Environnement et la Communication (A.A.D.E.C)

Rural Community of Ait M'Hamed

Seven members of Bernat and Amzray village committees
Local forest officer
Local government official

Rural Community of Ait Bououli – Village Committee of Assamer

Seven members of the Asamer village committee

Rural Community of Ait Bououli – Village Committee of Aarous

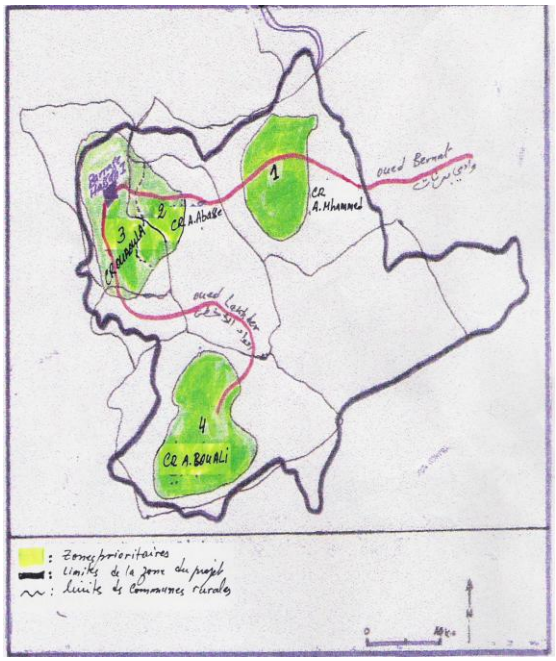
10 villagers of the Aarous village committee (this village committee did not benefit from the LWMPP)

Annex F. Maps

Figure 3. Project Area for the LWMPP — 1

Source: M. Abdellah Herzenni (2006), p. 8.

Figure 4. Project Area for the LWMPP — 2



Source: Haut Commissariat aux Eaux et Forêts et à la Lutte Contre la Désertification

Figure 5. Lakhdar Watershed Map

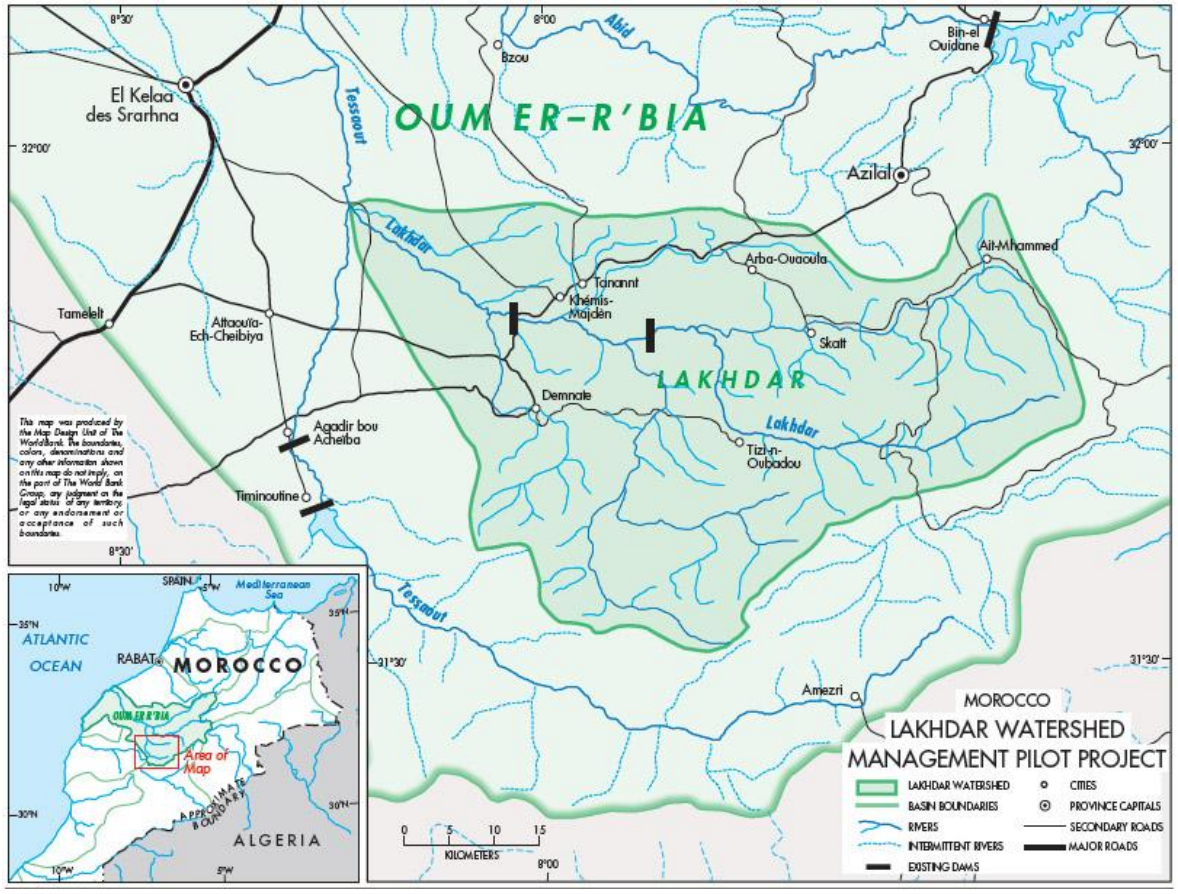


Figure 6. Oum-er-R'bia Basin