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IMPLEMENTATION COMPLETION REPORT
(CPL-38750 SCL-3875A SCPD-3875S)

ON A

LOAN/CREDIT/GRANT

IN THE AMOUNT OF US\$ 28 MILLION

TO THE

DOMINICAN REPUBLIC

FOR A

IRRIGATED LAND AND WATERSHED MANAGEMENT PROJECT

June 27, 2005

**ENVIRONMENTALLY AND SOCIALLY SUSTAINABLE DEVELOPMENT
CARIBBEAN COUNTRY MANAGEMENT UNIT**

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CURRENCY EQUIVALENTS

(Exchange Rate Effective March 1, 2005)

Currency Unit = Peso
1 Peso = US\$ 0.03
US\$ 1 = 29 Pesos

FISCAL YEAR

January 1 - December 31

ABBREVIATIONS AND ACRONYMS

ADESJO	Association for the Development of San Jose de Ocoa
CAS	Country Assistance Strategy
DR	Dominican Republic
ICR	Implementation Completion Report
INDRHI	National Institute of Water Resources
LN	Loan
PPF	Project Preparation Facility
PROMATREC	Project for the Management of Irrigation and Watersheds
PRYN	Irrigation Project Yaque del Norte
QAG	Quality Assurance Group
SAR	Staff Appraisal Report
SATTT	Technical Assistance and Technology Transfer Service
UEP	Project Implementation Unit
WUO	Water User Organizations
YSURA	Irrigation Project Yaque del Sur

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**DOMINICAN REPUBLIC
DO IRRIG LAND & WATERSH (SIM)**

CONTENTS

	Page No.
1. Project Data	1
2. Principal Performance Ratings	1
3. Assessment of Development Objective and Design, and of Quality at Entry	2
4. Achievement of Objective and Outputs	5
5. Major Factors Affecting Implementation and Outcome	12
6. Sustainability	13
7. Bank and Borrower Performance	14
8. Lessons Learned	17
9. Partner Comments	17
10. Additional Information	18
Annex 1. Key Performance Indicators/Log Frame Matrix	19
Annex 2. Project Costs and Financing	22
Annex 3. Economic Costs and Benefits	24
Annex 4. Bank Inputs	30
Annex 5. Ratings for Achievement of Objectives/Outputs of Components	31
Annex 6. Ratings of Bank and Borrower Performance	32
Annex 7. List of Supporting Documents	33
Annex 8. Borrower Contribution	34

<i>Project ID:</i> P007020	<i>Project Name:</i> DO IRRIG LAND & WATERSH (SIM)
<i>Team Leader:</i> Pierre Werbrouck	<i>TL Unit:</i> LCSES
<i>ICR Type:</i> Core ICR	<i>Report Date:</i> June 27, 2005

1. Project Data

Name: DO IRRIG LAND & WATERSH (SIM)

L/C/TF Number: CPL-38750; SCL-3875A;
SCPD-3875S

Country/Department: DOMINICAN REPUBLIC

Region: Latin America and the
Caribbean Region

Sector/subsector: Irrigation and drainage (64%); Central government administration
(22%); Agricultural extension and research (14%)

Theme: Other rural development (P); Water resource management (P); Land
management (S); Other environment and natural resources
management (S)

KEY DATES

PCD: 09/21/1988
Appraisal: 05/23/1993
Approval: 05/02/1995

	<i>Original</i>	<i>Revised/Actual</i>
<i>Effective:</i>	04/29/1997	04/29/1997
<i>MTR:</i>	01/15/2000	01/28/2000
<i>Closing:</i>	12/31/2003	12/30/2004

Borrower/Implementing Agency: GOVERNMENT OF DR/Instituto Nacional de Recursos Hidráulicos (INDRHI)

Other Partners: Asociación para el Desarrollo de San José de Ocoa, Inc. (ADESJO)

STAFF	Current	At Appraisal
<i>Vice President:</i>	Pamela Cox	Shahid Javed Burki
<i>Country Director:</i>	Caroline D. Anstey	Edilberto Segura
<i>Sector Manager:</i>	Mark E. Cackler	Michael Baxter
<i>Team Leader at ICR:</i>	Pierre Werbrouck	Elizabeth Katz
<i>ICR Primary Author:</i>	Pierre Werbrouck	

2. Principal Performance Ratings

(HS=Highly Satisfactory, S=Satisfactory, U=Unsatisfactory, HL=Highly Likely, L=Likely, UN=Unlikely, HUN=Highly Unlikely, HU=Highly Unsatisfactory, H=High, SU=Substantial, M=Modest, N=Negligible)

Outcome: U
Sustainability: UN
Institutional Development Impact: M
Bank Performance: U
Borrower Performance: U

	QAG (if available)	ICR
<i>Quality at Entry:</i>		U
<i>Project at Risk at Any Time:</i>	Yes	

3. Assessment of Development Objective and Design, and of Quality at Entry

3.1 Original Objective:

The objectives were to (i) improve income of the farmers in the project area; (ii) to test methodologies that can be replicated nationwide both for efficient production support services, water management and operation and maintenance of irrigation systems and for environmentally sound watershed management; and (iii) help reduce the fiscal costs of irrigation schemes through the adoption of appropriate cost recovery policies.

3.2 Revised Objective:

The overall development objective of the project was revised in December 2004 to include the refunding of PPF-341-0-DO and PPF-341-1-DO (US\$ 2.0 Million) related to a Water and Sanitation Management Project in Tourism Areas.

3.3 Original Components:

There were 6 original components:

1. *Irrigation Infrastructure (US\$20.19 million, 47 percent of total base cost):* to rehabilitate, complete and modernize existing schemes, land leveling and drainage in Nizao-Valdesia, YSURA, and PRYN I irrigation schemes.
2. *Nizao Watershed Management (US\$2.89 million, 7 percent of total base cost):* to promote improved management systems in selected micro-catchments in the Nizao watershed.
3. *Agricultural Development (US\$5.0 million, 12 percent of total base cost):* to support farmers in irrigated areas and in the Nizao watershed with agricultural support services, adaptive and applied on-farm research and the diffusion of improved technologies.
4. *Institutional Development (US\$4.00 million, 9 percent of total base cost):* to (i) build up institutional capacity through training programs on administrative and technical matters for water user groups and water user organizations; (ii) help farmers obtain access to credit and to provide them with an incentive to invest in their land via land titling; and (iii) support the implementation agency INDRHI in the areas of management information systems, monitoring and evaluation, and financial management.
5. *Studies: (no separate cost item) ** to carry out several technical studies to improve the overall water management in Nizao-Valdesia, YSURA, and PRYN I, including (i) a technical study on main canal regulation, canal system management, and the design of distribution systems in the selected areas; (ii) a detailed study on the layout of the irrigation and drainage system; (iii) updating of cadastral maps of the irrigated areas; and, (iv) aerial photos to set up an environmental and evaluation unit. Project preparation and agricultural policy studies are also mentioned.

* The SAR mentions an amount of US\$0.9 million in the text, but no amounts are mentioned in the cost tables.

6. *Monitoring and Evaluation (no separate cost item)*: to develop a management information system to improve the technical and financial management of irrigated schemes at the level of water user associations and the INDRHI.

3.4 Revised Components:

The components were revised in the course of the project implementation and three loan amendments were made.

The first amendment to the Loan Agreement was made on December 1, 1998 responding to the effects of Hurricane George. An emergency subcomponent was added covering the rehabilitation of small irrigation schemes, feeder roads, rural aqueducts, dykes, canals, ditches and drainage systems. At the same time, several dated covenants were re-scheduled to delay them for between 18 months and four years.

The second amendment in April 2002 aimed at modifying the disbursement condition for infrastructure investments. The requirement that INDRHI would have had to submit to the Land Tribunal the documentation required for the award of final land titles to at least 80% of the farmers in each Irrigated Area was clarified to mean that 80% of the farmers have to meet all legal requirements for the issuance of provisional land possession certificates (*Carta de Constancia*) and have filed a petition to the Land Tribunal for the issuance of these certificates. The amendment also included a new dated covenant for the implementation of an action plan on cost recovery such as the preparation of a manual for recovery of operation and maintenance costs and a manual for capital cost recovery to be applied to each WUO benefiting from the works under the infrastructure component as well as the implementation of those cost recovery mechanisms.

The third amendment (with Board approval) was made in December 2004 to allow the refunding of PPF-341-0-DO and PPF-341-1-DO (US\$ 2.2 Million) related to a Water and Sanitation Management Project in Tourism Areas (see 3.2 above). Management introduced this amendment considering the difficult financial situation of the country so that those PPFs could be reimbursed over a longer time-period.

In response to the institutional weakness of the implementing agency, the agricultural research subcomponent (appraised at about US\$5 million) was transformed into an agricultural extension component during the course of implementation.

3.5 Quality at Entry: Unsatisfactory

The project objectives have to be assessed within the framework of a long but often cumbersome co-operation between the Bank and the Dominican Republic in the 1970 and 80s during which the Bank's portfolio performed very badly. The New Economic Policy initiated by the Government in the 1991 provided a new opportunity for both partners to engage. The irrigation sector was important as the DR was opening up to the outside world and privatization was a part of Government's policy which motivated an emphasis on transferring irrigation management responsibilities to private Water User Organizations (WUO). The 1995 CAS emphasized growth, poverty alleviation and natural resources management under which this irrigation project was approved. The objectives of the project fit conceptually within the Government and Bank development strategy: increasing productivity in irrigated agriculture through efficiency gains in water management and improved agricultural practices, developing and strengthening WUO that could take over the role of the State in irrigation management, initiating sound watershed management practices in the upper levels of a watershed through participatory community development and ensuring financial sustainability of irrigation through adequate cost recovery mechanisms.

The project components were considered adequate given practice and experience available at the time to achieve these objectives: rehabilitation of irrigation infrastructure (that had not been maintained for several years) and introduction of land leveling techniques were expected to increase water availability, improve water efficiency and support increased productivity and income; new methods in agricultural research and extension in areas that lacked agricultural services would also contribute to increased productivity and income; training and strengthening of WUO would improve overall water distribution and lead to cost recovery and long term sustainability; the upper watershed management component would develop methodologies for sound watershed management; and monitoring and evaluation would help to validate the methodologies and provide feedback on their replicability. Safeguard issues were taken care of through an environmental monitoring component.

The SAR took into consideration the lessons learned from the 1989 Annual Review of Evaluation Results (OED) and of the 1986 Review of Cost Recovery in Irrigation Projects (OED) and was aware of the lessons learned from the Bank's earlier project in irrigation in the Dominican Republic.

However, there appeared to be little ex ante social analysis and preparation for meeting the principal strategic objective of the operation: the creation of WUO in a context where little was known about these emerging organizations. Moreover, as will be clarified later, most of the implementation and institutional risks and issues mentioned in PCR Report No 7747 dated May 12, 1989 and Performance Audit Report No. 11786 of the Nizoa Irrigation Project dated April 12, 1993, were not adequately addressed and resurfaced during the implementation of this project, including effectiveness delays, delays because of counterpart fund problems, incompliance with legal covenants, the weak performance of INDRHI and uncompleted infrastructure works.

Concerning components, insufficient social assessments or preparation of farmers to become WUO prior to undertaking investments removed the possibility of there being a participatory approach to infrastructure planning. In the absence of this, the lack of a clear blueprint and insufficient pre-design of the irrigation rehabilitation works caused considerable implementation problems and delays for the weak implementing agency. The proposed demand driven and participatory arrangements for the research and agricultural extension component were also too complex, particularly since INDRHI performed very poorly under previous Bank projects and had no experience in research and extension. Moreover, although cost recovery goals were mentioned in the SAR there was no clear agreement with the Government on the policies and processes related to collection and levels of water tariffs for operation and maintenance and investment cost recovery. The rationale for the land titling subcomponent was poorly explained and not accounted for as an operational goal. The SAR presented performance (input) indicators but no development impact indicators.

Therefore, in spite of the project's potential to serve significant strategic goals, the quality at entry of the operation was substandard by today's standards in the following aspects: borrower commitment, technical preparation, appraisal of institutional capacity, mitigating known risks and results monitoring.

4. Achievement of Objective and Outputs

4.1 Outcome/achievement of objective:

Project Outcome: *Unsatisfactory.*

The project showed some important achievements but fell short of expectations because of poor implementation of critical components.

The first objective: "to improve the income of farmers in the Project Area" was only partially achieved. A majority of beneficiary farmers claim to have improved their incomes in end-of-project surveys of participating farmers and rural watershed inhabitants. The extent of these perceived gains could not be verified by yield and income data, but were claimed to exceed 15%. The income improvements result from the agricultural development and watershed management components and probably also from high inflation in 2003/2004. Delays in project implementation of irrigation infrastructure rehabilitation / improvement have however significantly reduced the income generating potential outcome of the water management subcomponent. At the closing of the project none of the infrastructure works (amounting to 36 percent of original project costs) were fully completed and overall works progress reached only 50 percent of an infrastructure program that was already significantly reduced to fit the time frame. This has reduced the overall impact of the project. Nevertheless, while this report evaluates what has been completed at project closing, future completion by the Borrower of the initiated works, together with sustained training and extension services as well as cost recovery efforts (see below), if implemented, could have a positive impact on project outcomes.

The second objective of developing and testing new and replicable methodologies for providing

efficient production support services, water management and operation and maintenance of irrigation systems and for environmentally sound watershed management was, likewise, only partially achieved. Viable interagency coordination and a demand-driven system for the provision of agricultural research and agricultural support services was not implemented. Ultimately, after delays the project only implemented a demonstration field extension system managed under a foreign consulting firm over a short two-year period. Further, the training of WUO focused on standard technical, administrative and financial management issues and very little on management for financial sustainability (see below), and could not be considered as a methodological advance. Likewise, the project was expected to test the participatory design of irrigation works, but the WUO had little say in the decisions on which works would be carried out. A community participation methodology for environmentally sound watershed management was successfully tested but the methodology involved little or no self management of financial resources and coordination with municipalities or other important actors in the watershed. In the end, the methodologies developed could not fully demonstrate their effectiveness, efficiency and replicability. Except for the agricultural and WUO institutional development component, the project did not collect any data to measure how the methodologies performed or could be replicated. Apart from the watershed management component, the project was in fact implemented following a traditional and outdated practice of a centrally managed operation, rehabilitating irrigation infrastructure, providing agricultural extension services and strengthening WUO*.

* It is significant that the loan agreement did not mention the “testing of methodologies”.

The objective of reducing the fiscal cost of irrigation schemes through the adoption of appropriate cost recovery policies** has not been reached. INDRHI made very little effort to stimulate water tariff collection and cost recovery. It neither developed nor implemented a strategy to introduce appropriate water charges or recover costs from WUO. The targets for recovery set at appraisal were in any case, low compared to the real costs and were not met. Water charges are now about 20 to 30 percent of the real cost of operation and maintenance. Although WUO formulated strategic plans to progressively increase irrigation tariffs, the base tariffs were low to start with, the plans have not been consistently implemented and inflation fully absorbed all increases. The lack of real cost recovery by WUO limits the replicability and financial sustainability of the investments in infrastructure and agricultural development.

** The loan agreement mentioned cost recovery as a second important objective.

Overall the financial and economic returns to the partially completed investments are estimated to be positive (See Annex 3) but are probably marginal. The returns on the agricultural component are above expectations and the returns on the watershed management component are also positive.

4.2 Outputs by components:

Component 1. Irrigation Infrastructure: *Unsatisfactory (US\$5.89 million or 29 percent of appraisal estimate)*

The component was designed to finance: (i) the completion or rehabilitation of irrigation infrastructure (55 kilometers of secondary and tertiary canals and 20 kilometers of elevated

canals), (ii) the upgrading of main canals and control structures, (iii) completion or rehabilitation of 110 km of surface drainage; and (iv) 7,250 hectares of land leveling.

The works were mainly small works to be designed with the participation of WUO and implemented accordingly. The design was, however, done by an international consultant in a rather top-down manner for an amount of US\$2.5 million. During the design process of the works, INDRHI introduced important changes: it canceled subcomponents (i) and (iii) and selected to construct four irrigation reservoirs and 13 deep wells instead. Delays in the design studies and in the bidding process meant that those works started only in 2003. The construction of two reservoirs was not started. Land-leveling contracts started only in the second half of 2004. Moreover construction was slow, interrupted by lack of counterpart funding, fraught with design flaws, lack of agreement with farmers to stop water flows to carry out the works, and contractual issues arose because of inflation. The Bank extended the project for 12 months to allow the completion of the works, but the initiated works were still only 50 percent completed at project closing.

By the loan's closing date, the rehabilitation of 55 kilometers of the Canal Marco A. Cabral (subcomponent ii) was close to completion and the construction of one reservoir had been completed but was not operational. A second reservoir was 50% completed. Twelve wells had been dug but need to be connected to the electricity grid. The Government has indicated that it will complete the works with its own financing. Only 670 hectares of land have been leveled and the Government will not further finance land leveling.

The component also financed emergency works for the rehabilitation of infrastructure damaged by Hurricane George in 1998. Emergency works amounted to US\$1.2 million and the implementation is rated satisfactory.

The works that have been initiated may show positive results in the future, but the lack of participation by WUO in the selection and financing of the irrigation works is certainly not a method to be replicated.

Component 2. Nizao Watershed Management Systems: *Satisfactory (US\$2.6 million or 91 percent of appraisal estimate)*

The objective of this component was to promote improved management systems in selected (five) micro-catchments in the Nizao watershed through a participatory decision-making process that would later be replicated and adopted.

To implement the component, INDRHI signed an agreement with “*Asociación para el Desarrollo de San José de Ocoa (ADESJO)*”, a church-based non-government organization. ADESJO was already implementing a particular intervention methodology and adjusted its methods somewhat to INDRHI's requirements. The component was implemented in five micro-catchments in the Nizao River, with an area of 19,500 ha, 21% of the total area of the watershed. The component benefited 1,300 families and created 24 community councils. In each micro-catchment subprojects were implemented, financed through community matching grants,

including: (a) forest and land management; (b) agro-forestry management; (c) small-irrigation infrastructure; (d) green-house agriculture; (e) organic production; and (f) assistance to women's groups engaged in agriculture.

From the watershed management point of view, the most significant outputs are: 437 hectares reforested (873 planned), 1,235 (1,762) hectares planted for agro-forestry, 35 (42) community irrigation systems, 1,046 (1,923) hectares of soil conservation. Also the project contributed to the constitution of a community Watershed Council, a fundamental element for people participation in the watershed management. Out of the total expenditure under the component, 47% was used for investments in communities, 25% to pay technical assistance and 28% for administrative support.

An end of project evaluation survey showed that targeted households reported higher income increases over a control group (see Annex 3) and a change in the household expenditure structure in favor of health, education, leisure and savings over food expenditure. On-farm employment was also reported to have increased as farmers obtained more income security from farming. Nonetheless, some shortcomings were identified; namely, the community councils' weakness to manage financial resources*, a low level of technology adoption among some farmers, the absence of economic validation of some proposed technologies and the lack of specific actions to improve access to markets. The program also had very little connection with other important actors in the watershed (municipalities, water companies, etc.). There were further questions about the replicability of the experience as a great part of the success of the component is partly due to the prestige of ADESJO and its charismatic church leader.

* Financial resources of Community Councils were centrally managed.

Component 3. Agricultural Development: Satisfactory (*US\$5.29 million or 110 percent of appraisal estimate*)

The component was designed to carry out adaptive research using a participatory approach and covering all aspects of irrigation, drainage, sustainable conservation and production techniques for the benefit of about 5,000 farmers in the Irrigated Area and about 1,500 small farmers in the Nizao Watershed Area. The methodology to be used was the one implemented in several agricultural technology-oriented schemes in Latin America: using research grants to agricultural technology organizations to be implemented in the three project areas. The component proved to be too complex for an institution that was mainly focused on constructing irrigation schemes. No technical assistance was contracted to help implement the component and the research program was dropped.

During the Mid Term Review, adaptive research (US\$ 5 million) was cancelled, and a substitute two-year program was agreed with the following features: (i) an extension and technology transfer program to 30 associations integrated in the three WUO, covering cultural practices, soil conservation, farming machinery, salinity, integrated management of pest and diseases, management of irrigation systems and farm economy; (ii) intensive training to approximately 1,550 farmers through 467 demonstration plots, and (iii) training of 63 technicians of WUO, INDRHI and other entities. The component also included delivery of heavy earth moving

equipment (US\$1.3 million).

The end-of-project survey indicated that the substitute agricultural development program has been very successful and that the results are spread much more widely than the 1,550 farmers who received direct assistance. The survey shows that a high proportion of all farmers have widely adopted several new technologies such as fertilizing (97% against 86% of baseline situation), pest and disease control (99% against 83%), weed control (100%, no baseline data available), certified seeds (68% against 50%). Above all the survey showed that 80 percent of the 17,000 farmers have increased their productivity and 77 percent their income by 15 percent or more (see Annex 3). The low level of productivity before the program, the integration of several simple new technologies into one single extension message and the generally favorable agricultural policies could explain the fast adoption pace.

Hence, in spite of the cancellation of the main research program, the component has delivered important results and is therefore considered satisfactory. Monitoring data from the implementing consulting firm indicate that the methodology might be replicable in other irrigation systems. The system worked well because, amongst other factors, staff of the Ministry of Agriculture and INDRHI received financial incentives to assist the farmers. It is, however, not clear from the monitoring data how much the Government (Ministry of Agriculture, INDRHI) contributed to this operation independently, and the above-mentioned cost of the program is only a rough estimation.

Component 4. Institutional Development: *Satisfactory (US\$5.6 million or 140 percent of appraisal estimate)*

The component was designed to provide technical assistance to three WUO in the Project Area in order to strengthen their institutional capacity through training in administration, personnel management, financing and accounting, operation and maintenance of irrigation systems, and cost recovery. The component also included a land titling subcomponent to facilitate access to credit. INDRHI was to set up a Project Implementation Unit receiving 41 person months of technical assistance.

WUO Strengthening. Progress was achieved in promoting and mainstreaming the concept and practices of WUO. Training of WUO started in 2002 under a contract with the University of Utah and involved workshops, courses, informal conversations, field visits, etc. All together 174 events were undertaken that included 5,261 participants.

The main outcomes of this WUO strengthening component are: computerized accounting systems are in place; financial management has improved; staff has been trained on administrative matters; farmers have been trained in irrigation and production technology; and water tariff payment collection is being somewhat enforced. Another project output was the creation of the National Council of Irrigation Farmers as a national organization of WUO established by Presidential Decree. All together, the WUO have improved their management capacity, are now more active and more problem solving oriented than in the past.

From a strategic perspective, therefore, the concept of Water User Organizations has been further mainstreamed in Government's irrigation policy. However, the institutional strengthening component had little impact on the costly overlapping functions and responsibilities of the WUO and INDRHI* While transferring some responsibilities for the management of irrigation systems to WUO, INDRHI's field staff numbers and responsibilities were not really changed. Hence in the field there remains confusion about the role of the WUO and the assignment of responsibilities for operation and maintenance and other obligations.

*Iván Pavletich, Recuperación de Costos en los Sistemas de Riego del PROMATREC, December 2004.

Cost recovery.** The outcome of the cost recovery subcomponent is weak. In fact the present water tariffs remain in real terms at about the same level as they were at appraisal. The WUO collect between 60 and 80% of these relatively low tariffs, which is about same percentage as at appraisal in 1993. The real costs of management, operation and maintenance are estimated at US\$140 per hectare as an average for the three WUO concerned *** If capital costs were to be included the figure would increase significantly (see Annex 3). Since at the national level there was no real pressure to recover water charges, the project management did not pay much attention to this element so crucial for reaching sustainability. Only during the last months of the project did INDRHI order a study to estimate real water costs and the significance for water charges and cost recovery. Although there was a clear agreement between the Bank and the Government to recover costs and make larger farmers pay for irrigation investments, no cost recovery agreements were made with those farmers before initiating the infrastructure works and there was no intention to charge farmers for the energy cost of operating water wells (now under construction).

* * Cost recovery is mentioned under Institutional development although the SAR did not specify under which component it was supposed to be implemented.

*** Iván Pavletich, Recuperación de Costos en los Sistemas de Riego del PROMATREC, December 2004.

The lack of firm commitment on the part of the Government to cost recovery reduces the possibilities for sustainability of the gains made by the project. To its credit, INDRHI promoted the formulation of Sustainability Strategic Plans, through which each WUO established a program of activities for the period 2002-2012 including annual budgets and financial sources. Those plans, formulated by WUO, envisage a progressive increase in the low water tariffs to improve operation and maintenance. Until now, however, inflation has been higher than the proposed increases.

INDRHI Institutional Strengthening. There have been a number of training activities with INDRHI staff, in the field and in HQ, but the results in terms of improved management or technical capacities have not been evaluated. In INDRHI a "Service to Water Users Department" was created for training and provision of agro-business services to water users. It is performing reasonably well. INDRHI's Agricultural Development Department is still being established.

The project implementation unit (UEP) staff has been trained on the job through workshops, courses, and mentoring on general management, procurement, and environmental services. In spite of this, project implementation was slow. The project design included the provision of technical assistance to INDRHI in several domains (in particular agricultural research and monitoring). This technical assistance was never recruited with the obvious consequences that

neither a research program nor a monitoring system was initiated.

Land Titling: The component also included a program of land titling, with the specific objective of stimulating private farm investments. The output of the land titling subcomponent is only somewhat below expectations, but the relevance of the subcomponent is not obvious. The subcomponent helped the 4,500 farmers to obtain an intermediate form of land certification (“*Cartas de Constancia*”) and 588 titles. There are no indicators showing that those certificates have had any impact on the capital formation or credit worthiness of individual farmers. No studies have been carried out on the impact of this subcomponent.

Component 5. Studies: *Unsatisfactory (US\$4.5 million)*

The component was designed to finance studies on: (a) canal regulation and management of canal irrigation and drainage systems in the Project Area; (b) layout of the irrigation and drainage systems in the Project Area; (c) preparation for future agricultural projects; and (d) agricultural policy issues.

The design and engineering studies of the irrigation systems took a very long time to complete. The terms of reference were over dimensioned and it took about three years to finalize the first draft of the study. Moreover, weather difficulties for the aerial photography, INDRHI’s continuous modifications of the content of the studies and the slow performance of the consulting firm caused a further three year delay in the construction of the subsequent works. The studies cost US\$2.5 million for the design of works whose cost would not exceed US\$10 million. However, one positive aspect of the study was that cadastral maps of the irrigated areas and the aerial photos of Nizao watershed are available.

Another consulting assignment was the supervision of construction works. Although strictly speaking this is not a study, the supervising engineer had to re-do several detailed designs of the design study mentioned above. These modifications as well as the slow implementation of infrastructure works brought the cost of the work supervision up to some 17% of the construction costs.

Three project evaluation studies were prepared, a watershed management study and a water tariff study were carried out in the last four months of the project. The quality and outcome of these studies are rather mixed. No future agricultural project was prepared.

Component 6. Monitoring and Evaluation: *Unsatisfactory (US\$1.19 million)*

The component included the design of: (a) a management information system of irrigation and drainage schemes in order to improve the management of such schemes under the control of INDRHI and the WUO in the Irrigated Area; and (b) an environmental monitoring system for INDRHI.

The irrigation and drainage management information system was not developed as planned. A Hydro – Agricultural Information System was established in INDRHI through another project and

provides information on the irrigation systems' structure, the irrigation users and the agricultural plots.

A consulting assignment to install monitoring and evaluation of the environmental aspects of the project was carried out, but the outcome of this assignment is negligible as the environmental monitoring and evaluation system was not implemented.

As regards regular project monitoring, the Monitoring and Evaluation Unit performed some occasional reporting activities on the basis of field information supplied by INDRHI staff (Agricultural Development or Infrastructure Unit) and ADESJO (Watershed Management component). However, the Unit did not conduct regular or independent management support activities, including analysis of implementation progress, and no monitoring and evaluation software was implemented although it was designed by a consulting firm. Almost no annual progress reports or annual project implementation plans were sent to the Bank.

The Mid-Term Reviews of 2000 and 2002 focused on the urgent needs to get the project onto a faster implementation path and could not deal with the strategic issues as much as was required.

The monitoring and evaluation component was crucial to measure the efficiency, effectiveness, impact and replicability of the methodologies that were supposed to be tested. Without a well functioning monitoring system, the second project objective could not be reached.

4.3 Net Present Value/Economic rate of return:

No economic return has been calculated as the works under the infrastructure component were not finished. Some economic considerations have been dealt with in Annex 3. In summary: if the works would be completed by the Government the infrastructure component might obtain some marginal return; the agricultural development and the watershed management components show positive returns.

4.4 Financial rate of return:

Same as above

4.5 Institutional development impact:

Modest

As explained under the evaluation of Component 4, the project has strengthened three WUO over a relative short period. The WUO increased their management capacity but remain very much dependent on INDRHI's assistance at all levels. As cost recovery has not made significant progress the sustainability of WUO institution building remains in doubt. The institution building within the 24 community councils provided by ADESJO has had positive impacts. Nevertheless, as the communities did not handle the project's financial resources, institution building in those communities remains somewhat limited. Impact of institution building within INDRHI has also been modest considering the continuous difficulties to handle project related matters in an expedient way.

5. Major Factors Affecting Implementation and Outcome

5.1 Factors outside the control of government or implementing agency:

The project area was affected by Hurricane George (1998). In response, the Bank agreed to modify the loan agreement to allow fast track procurement of heavy equipment and the implementation of community rehabilitation works. This gave an impulse to lagging implementation, but was not sustained.

During the latter years of the project, the country was plunged into a financial crisis that caused severe fiscal constraints, depreciation of the currency and high inflation. This also contributed to the scarcity of counterpart funds for infrastructure works.

Finally, effectiveness delays were mainly caused by loan approval delays in Congress. Such delays are very common in the Dominican Republic as political criteria determine the speed of loan approval rather than Government commitment. Nevertheless, this delay of almost two years was the longest effectiveness delay in the DR since 1991.

5.2 Factors generally subject to government control:

Even accounting for fiscal difficulties, supply of counterpart funds was frequently delayed. This problem, together with high inflation, caused contractors difficulties in financing the civil works and resulted in additional delays.

The strongly protective nature of the Dominican Republic's agricultural policy has contributed to the apparently positive impact of the project's agricultural development and WUO institutional strengthening components. But the desire to maintain protections has had a negative impact on water tariff levels and cost recovery, which was considered as not politically feasible.

5.3 Factors generally subject to implementing agency control:

INDRHI had difficulties managing this project under the requirements of the World Bank. Initial factors were the bureaucratic red tape, the complex decision-making process within the institution and the lack of administrative independence of the Project Implementation Unit (UEP). Long and cumbersome decision-making processes were major factors delaying implementation.

5.4 Costs and financing:

Not taking into account the PPF-refinancing approved in December 2004, the Borrower has only used 67 percent of the loan over a nine year period.

6. Sustainability

6.1 Rationale for sustainability rating:

Sustainability: *Unlikely*

The positive achievements under this project are at risk of being unsustainable, as they depend on the continuing support and resources of government and agencies facing other issues and priorities.

The benefits of works initiated under the infrastructure component were not fully realized, but could be sustainable if: (i) the works are completed in a timely fashion; and (ii) the Government introduces a serious and enforced mechanism of water charges and cost recovery.

The Government confirmed its intention to finish some works under an EXIM-Bank loan although a timetable and implementation plan for doing so has not been produced at the time this report was prepared. The likelihood that more aggressive cost recovery measures will be taken in the short term is also uncertain as the government has more important problems on hand (financial and energy crises). Nevertheless, in the medium term, if further fiscal constraints are necessary to stabilize the macroeconomic situation, INDRHI's expensive structure and large subsidies may come under pressure and adequate water charges and cost recovery systems may be put on the agricultural policy agenda.

The sustainability of the watershed management component is largely dependant at the moment on support from ADESJO. This is a solid institution that will probably make further contributions to the sustainability of the community councils and the subprojects that have been financed provided its financial situation and leadership remain. Its future is not, however, within the control of government. The profitable income subprojects are to a degree dependant on government's continuing protectionist agriculture policies, but are likely to be sustainable if this continues. However, the watershed management and environmental subprojects that provide long term returns (such land conservation or reforestation) will be sustainable only if a national watershed management policy rewarding environmental services is put in place or if the economic and social returns to such activities as tree planting are improved. The chances that such policies are put into place will depend on the outcome of dialogue that is about to begin with the World Bank which has been requested by the Government to finance a follow-up project to expand the ADESJO experience into other areas requiring more involvement of the municipalities and other actors in decisions regarding watershed management.

The productivity gains made so far under the agricultural development component are likely to be sustainable because of the high adoption rate observed and the simple nature of the technologies introduced. Nonetheless, further technological progress will only be possible if a high level of technical assistance continues to be provided either by INDRHI or by the WUO themselves out of their own resources (which means charging higher water tariffs).

The positive development outcome of the WUO strengthening subcomponent is on the path to sustainability as it is now institutionalized in legislation and supported with self interest. Long-term sustainability will depend on the WUO becoming more independent from INDRHI, which will depend on INDRHI's deliberate withdrawal from tasks that the WUO should perform. Such a withdrawal will require political will as well as time, but is likely if budget pressures and

dialogue reinforce the transfer.

6.2 Transition arrangement to regular operations:

not applicable

7. Bank and Borrower Performance

Bank

7.1 Lending:

Unsatisfactory

The Bank's performance during preparation had major shortcomings. As mentioned above (Quality at Entry), most components were designed to allow flexible project implementation although insufficient analysis prevented this from being planned properly ex ante. The design did not take enough into consideration INDRHI's weak implementation capacity (although the Bank had worked with INDRHI before). In this case, the lack of clear project blueprints for rehabilitation works opened the door for a long and overly ambitious study. The Bank also failed to detect the lack of ownership by INDRHI of the participatory methodologies to implement the infrastructure works and the research components (in which INDRHI had no experience). Although project preparation proposed levels of cost recovery through water use payments for irrigation operation and maintenance, preparation did not elaborate the processes to achieve cost recovery.

The Bank was also somewhat lax in exercising quality control of the lending process which later contributed to implementation and supervision difficulties. For example, there were discrepancies between the SAR and the loan agreement in objectives and components. Cost recovery was treated as being secondary objective in the SAR but in the loan agreement it is considered an important project objective. This led to confusion within the Bank and with the Borrower as to the importance of this objective during implementation. There were also large discrepancies between the project costs in the text and in the project cost annexes. Land titling became part of the project design without a clear justification and turned into a disbursement condition for the infrastructure works.

7.2 Supervision:

Unsatisfactory

The Bank dedicated most of the supervision effort on getting project inputs into place; including leading the project to effectiveness, ensuring timely procurement, resolving contractual issues, project restructuring and component redesign. There were, however, several Borrower complaints about the Bank's initial frequent changes in task managers and lack of responsiveness at a later stage.

There were an adequate number of supervision missions properly staffed. But because of slow implementation, the supervision effort did not approach the project with a strategic ("results") perspective. Supervision teams continued to consider a project of a planned eight-year duration as a "pilot" and did not focus on the project objectives in a comprehensive manner until 2002

when the loan agreement was amended and Project Development Objective Indicators were established. For example, Project Status Reports did not mention cost recovery in the development objectives until 2002, and did not record any discussion of the risks to sustainability.

To its credit, the Bank persisted in diagnosing and trying to remedy implementation problems. It helped to restructure the project's terms and implementation arrangements in such a way as to facilitate reaching the main technical outputs. On three occasions it declared project implementation unsatisfactory and encouraged the Government to take corrective actions. However, the Bank appears to have unrealistically accepted agreements on action plans or restructuring plans as solutions before the problems were effectively resolved or the actions were implemented. Considering that this project was rated "at risk" several times, and taking into account the Bank's previous experience with INDRHI and in other projects in the Dominican Republic, the Bank could have been less credulous. In face of the poor performance of the implementing agency (see below), the Bank did not hold it or the government accountable for repeated failings.

The Bank may also have shown poor strategic and technical judgment in approving the terms of reference for a long and costly study to identify and design irrigation works to be performed by consultant engineers, contrary to the expressed goal of the project to engage farmers and WUO in the design of works, linking this to cost recovery. The Bank, therefore, allowed the project to drift away from intended goals.

The Bank was effective with the reconstruction after Hurricane George and in assisting the Government to obtain technical advice from FAO/CP when it became clear that this was needed. It extended the project for one year to allow the project to reach its objectives. The Bank took hereby a calculated risk that the works could be finished by the end of 2004. At the moment of that decision (end 2003), however, the national financial and fiscal crises were very pronounced thereby casting doubt about the availability of fiscal space to implement the works, while 2004 was also an election year which was likely to create delays. The chances to finish the works before project closing were not promising.

Overall, therefore, the Bank allowed short term implementation issues to set the supervision agenda and did not motivate a results focus.

*7.3 Overall Bank performance:
Unsatisfactory*

Borrower
*7.4 Preparation:
Unsatisfactory*

The involvement of the government in project preparation was rather limited. The project was prepared by the Bank through FAO/CP funds from 1991 to 1993 and was appraised in 1995. Most interest was shown by INDIRHI which had a clear interest in receiving project support. However, levels of government with responsibilities for rural development and fiscal management did not participate actively. There was a two-year delay between Board approval and

effectiveness. Granted that most of the delay was caused by Congress, where loan approvals are often based on political considerations that have very little to do with the project itself, government does not appear to have made a strategic case for the project. This was the longest effectiveness delay of all Bank projects in the DR since 1991.

*7.5 Government implementation performance:
Unsatisfactory*

Once effective, the Government has supported the project during its implementation providing it with fiscal space within its control. It also provided latitude for implementation by INDIRHI, although this may have dampened INDIRHI's accountability for meeting strategic goals. It did not appear to have informed itself, or if informed, take action to reinforce respect of commitments made by INDIRHI to the Bank. On the other hand, the financial crises of 2002-2003 delayed the provision of counterpart funding and interrupted construction of the infrastructure works. At the macro-level, the policy of agricultural protection has helped create positive results of the agricultural and institutional development components. The same policy, however, has also been an impediment to introduce serious water tariff levels and cost recovery mechanisms and has restrained the transfer of water management responsibilities from INDRHI to WUO.

*7.6 Implementing Agency:
Unsatisfactory*

At the onset of the Project INDRHI was not ready for implementation. With the change of Government in 2000, a new project coordinator was appointed, the UEP gained some administrative decision authority and implementation moved ahead but at a different pace in each component. Nevertheless, at least initially, there were deficiencies in procurement and the Bank had to declare misprocurement in 2000 for almost US\$300,000. Internal weaknesses limited the monitoring and reporting in the project (very few progress reports are available).

INDRHI had a very positive response to Hurricane Georges and used good judgment to recruit good implementation agencies for the institutional and agricultural development and the watershed management components. As a result, the sub-contracted parts of the project worked well. However, when INDRHI was in charge (tender and supervision of studies, tender and payment of works) implementation was extremely slow and bureaucratic. It did not recruit the technical assistance that was provided for in the project and hence did not implement some components. It had difficulties in deciding on the alternatives for infrastructure works, and was slow in approving bidding documents, contracts (including price adjustments) and payments. It made repeated promises to the Bank that the implementation pace would pick up, but did not follow through. Finally, when it became obvious that not all funds would be spent, it refused to ask for cancellation of the outstanding loan amounts until after project closing.

*7.7 Overall Borrower performance:
Unsatisfactory*

8. Lessons Learned

The project experience has illustrated several lessons that have appeared in previous projects,

most strikingly, the importance of a significant analysis of risks of fulfilling developmental objectives, particularly when dealing with known agencies in borrowers facing difficult circumstances. Among specific lessons are:

- Projects that have as an objective testing methodologies for public intervention in the rural sector need to make sure that baseline studies are available and monitoring and evaluation systems are in place to evaluate these methodologies prior to beginning activities.
- The transfer of irrigation schemes from the public sector to WUO is a process that requires political will and adequate transfer policies and processes. When the Bank assists such transfers, it should make clear agreements with the Borrower before or during loan negotiations on those policies and processes and on the support needed to help these processes move forward.
- Private sector performance in project execution (ADESJO's watershed management program and the State University of Utah's agricultural institutional development program) has been much better than Government performance. Governments should be encouraged to involve the private sector more in implementation (to outsource rather than to reproduce expertise) when these organizations have a comparative advantage and a proven track record.
- More technical and financial participation of WUO in selecting, designing and implementing works would have created more ownership and possibly assured greater effectiveness in the use and maintenance of infrastructure as it has in other countries. In addition, it would have facilitated the implementation of works needing farmers' collaboration in arranging water flow cuts in canals.
- The participatory process of technology transfer requires both agronomic and agro-economic analyses. The monitoring system should carry out agronomic and agro-economic studies to ensure that the technologies and methodologies are profitable and sustainable.
- The costs per beneficiary of training, technical assistance, investment support and administration should be closely monitored and contained within limits that are acceptable from a replicability point of view.
- Supervision of civil works using national companies may bring about important savings.
- Design of infrastructure works should be followed promptly by implementation as design of works close to urban areas become quickly outdated resulting in design changes during implementation, additional delays and soaring construction costs.
- Bank management should ensure that the PAD, loan agreement (and logical or results framework) have the same project development objectives and consistent performance indicators.

9. Partner Comments

(a) Borrower/implementing agency:

The Borrower did not provide specific comments on the ICR but referred to its project final report, a summary of which is presented in Annex 8

(b) Cofinanciers:

n/a

(c) Other partners (NGOs/private sector):

No comments were received from ADESJO

10. Additional Information

n/a

Annex 1. Key Performance Indicators/Log Frame Matrix

The SAR did not include a Log Frame Matrix and there are no impact/outcome indicators presented in a systematic manner. There are however key performance indicators. The outcome indicators were established in 2002.

Outcome Indicators

INDICATORS	Units	At appraisal	Target (SAR)	Implementation December 2004
Increased productivity/incomes				
Agricultural development component in the irrigated areas	Number of farms		5,000	9000 or 12000 ¹
Nizao watershed management	Farm families		1,500	1,300
Increased water availability (supply/savings)	Million of cubic meters / incremental hectares of arable land		n.a. ³ /3,600 irrigation, 1,200 drainage ²	32million m ³ /1,300 ha irrigation, 0 ha drainage
Cost recovery (water charges per hectare)				
YSURA	US\$/Ha	14	60	21
NIZAO-VALDESIA	US\$/Ha	16	40	26
PRYN	US\$/Ha	24	41	12-24
Reduced government subsidies			n.a.	n.a.

¹The figure of 9,000 was provided by the UEP, estimated on the basis of 1500 farmers assisted directly by the project and 7,500 neighboring farmers benefiting indirectly (5:1 rate). The figure of 12,000 beneficiary farmers with at least 15% increase in productivity and income is derived from the end-of-project survey (see annex 3 with more details).

²Area estimated at appraisal that would benefit from irrigation/drainage improvements.

³n.a. = not available

Key Performance Indicators

(prepared on the basis of information provided by the Project Implementation Unit)

INDICATORS	Units (Quantity/%)	Target	Implementation December 2004
1. Irrigation infrastructure			
YSURA			
Surface drainage	Ha/km	1800/68	0
Wells ⁴	No.	0	9 (45%)
NIZAO VALDESIA			
Rehabilitation of canals ⁴	Km	55	55
Canals of inter-connection reservoirs-laterals	Km	6	6
Reservoirs ⁴	No.	2	0
PRYN			
Reservoirs ⁴	No.	2	1
Surface drainage	Ha/km	1200 / 42	0
Land leveling (original target was 7,259 ha)			
YSURA			
Area	Ha	1816	347
Final design	No.	-	312
Plots leveled	No.	-	230
PRYN y NIZAO-VALDESIA			
Area	Ha	1929 + 369	323
Final design	No.		196
Plots leveled	No.		167
Manual of operation and maintenance	No.	3	3
2. Watershed management			
Plant production in green houses	Million units	5.0	4.33
Re-forested area	Ha	873	437
Land conservation	Ha	1,923	1,046
Community irrigation systems	No.	42	35
Agro-forestry systems	Ha	1,762	1,235
Training to groups and ADESJO	No. events	246	385
Promotion of rural micro-enterprises	No. beneficiaries	938	976
Community Councils	No.	24	24
3. Agricultural Development ⁵			
Training technical staff SATTT ⁵	No. staff	60	34
Farmers directly assisted by SATTT ⁵	No. producers	1550	1550
Field activities with farmers			
Visits ⁵	No.	16,000	62,013
Field days	No.	600	380
Educational tours	No.	150	83
Demonstration plots	No.	600	541

INDICATORS	Units (Quantity/%)	Target	Implementation December 2004
4. Institutional Development ⁶			
Technical Training	Person-days	450	830
Training Water User Organizations (WUO)	Person-days	18,890	24,700
Strategic plans of the WUO	No.	3	2
Workshops	No.	2	5
Visits abroad	No.	6	0
Office equipment and computers WUO	Units	15	30
<i>Land Titling</i>			
Ownership certifications (“Cartas Constancia”)	No.		4,491
Propriety Titles	No.		588
5. Studies ⁷			
Design of infrastructure works	%		100
Cadastral maps	%		100
Review of legal documents	%		100
Other technical studies and studies required for the evaluation of the project	Unit	n.a.	6
6. Monitoring and Evaluation			
Manual of Operations of Project	Unit.	1	1
Mid-term Review	Unit.	1	1
Final Report	Unit.	1	-
Monitoring and Evaluation System	Unit.	1	-

⁴ Infrastructure	To date 45% of wells has been completed, including drilling, etc. Reservoirs replace other works planned originally. Construction works completed, missing small sluices and mechanical parts. Heavy equipment was acquired under the Emergency Plan for Hurricane Georges.
⁵ Agricultural Development	Technical staff trained by the “Servicio de Asistencia Técnica y Transferencia de Tecnología (SATTT)”. It is estimated that each extension worker SATTT assisted 50 farmers in a direct way. This component was revised during the mid-term review (1999), to include technical assistance through three methodologies: intensive technical assistance, demonstration plots and sporadic technical assistance.
⁶ Institutional Development	Training staff of INDRHI, WUO and ADESJO, courses, visits, etc. No detailed information was found regarding training of INDRHI’s staff.
⁷ Studies	The design of the infrastructure works was finalized with great delay that contributed to the general delay of project implementation.

Annex 2. Project Costs and Financing

Project Cost by Component (in US\$ million equivalent)

Project Cost By Component	Appraisal Estimate	Actual/Latest Estimate	Percentage of Appraisal
	US\$ million	US\$ million	
Irrigation Infrastructure	20.19	5.89	29%
Watershed Management	2.89	2.63	91%
Agricultural Development	5.00	5.29	110%
Institutional Development	4.00	5.60	140%
Studies	0.00	4.50	n.a.
Monitoring and evaluation	0.00	1.19	n.a.
Refinancing PPF	0.00	2.03	n.a.
TOTAL Baseline Costs	32.08		
Contingencies	11.12		
Total Project Costs	43.20	27.13	62%

Project Costs by Procurement Arrangements (Appraisal Estimate) (US\$ million equivalent)

Expenditure Category	Procurement Method ¹			N.B.F.	Total Cost
	ICB	NCB	Other ²		
1. Works	11.90	3.80	0.00	0.00	15.70
	(9.50)	(3.00)	(0.00)	(0.00)	(12.50)
2. Goods	2.50	0.40	0.20	0.00	3.10
	(1.90)	(0.40)	(0.10)	(0.00)	(2.40)
3. Technical Assistance/Studies/Training	0.00	0.00	7.10	0.00	7.10
	(0.00)	(0.00)	(6.20)	(0.00)	(6.20)
4. Agricultural Development Services	0.00	0.00	4.40	0.00	4.40
	(0.00)	(0.00)	(2.90)	0.00	(2.90)
5. Grants for watershed management	0.00	0.00	3.20	0.00	3.20
	(0.00)	(0.00)	(3.20)	(0.00)	(3.20)
6. Operating costs	0.00	0.00	0.00	9.70	9.70
	(0.00)	(0.00)	(0.00)	(0.80)	(0.80)
Total	14.4	4.2	14.9	9.7	43.2
	(11.4)	(3.4)	(12.4)	(0.8)	(28.0)

Project Costs by Procurement Arrangements (Actual/Latest Estimate) (US\$ million equivalent)

Expenditure Category	Procurement Method ¹			N.B.F.	Total Cost
	ICB	NCB	Other ²		
1. Works	0.00 (0.00)	5.10 (4.02)	0.79 (0.63)	0.00 (0.00)	5.89 (5.28)
2. Goods	0.00 (0.00)	2.05 (1.74)	0.27 (0.23)	0.00 (0.00)	2.32 (1.97)
3. Consulting Services	0.00 (0.00)	0.00 (0.00)	8.27 (8.27)	0.00 (0.00)	8.27 (8.27)
4. Agricultural development Services	0.00 (0.00)	0.00 (0.00)	1.30 (1.30)	0.00 (0.00)	1.30 (1.30)
5. Grants for Watershed Management	0.00 (0.00)	0.00 (0.00)	2.63 (2.63)	0.00 (0.00)	2.63 (2.63)
6. Operational Costs	0.00 (0.00)	0.00 (0.00)	1.00 (0.19)	3.69 (0.00)	4.69 (0.19)
7. Refinancing PPF			2.03 (2.03)		2.03 (2.03)
Total	0.00 (0.00)	7.15 (5.76)	16.29 (15.92)	3.69 (0.00)	27.13 (21.68)

1/ Figures in parenthesis are the amounts to be financed by the Bank Loan. All costs include contingencies.

2/ Includes civil works and goods to be procured through national shopping, consulting services, services of contracted staff of the project management office, training, technical assistance services, and incremental operating costs related to (i) managing the project, and (ii) re-lending project funds to local government units.

Project Financing by Component (in US\$ million equivalent)

Component	Appraisal Estimate			Actual/Latest Estimate			Percentage of Appraisal	
	Bank	Govt.	Other	Bank	Govt.	Other	Bank	Govt.
Infrastructure	12.30	5.40		5.28	0.61	n.a. ¹	43%	11%
Watershed Management	2.89	0.00		2.63	0.00		91%	
Agricultural Development Services	3.50	1.50		2.30	3.99		66%	266%
Institutional Development Studies	9.31	3.86	0.92	3.75	0.85	n.a.	40%	22%
Monitoring and Evaluation				4.50			~	~
Other		3.44		1.19			~	~
Refinancing of PPF					n.a.			
TOTAL	28.0	14.20	0.92	2.03	5.45	n.a.	79%	43%

¹ n.a. = not available

Annex 3. Economic Costs and Benefits

The Project's objective to improve farmers' income in the project area could not be assessed through a cost-benefit analysis because (i) none of the irrigation infrastructure rehabilitation works were fully completed; and (ii) the project did not collect comprehensive data on changes in productivity and income as a result of the agricultural development and institutional strengthening components.

During the last three months of the project the Government ordered studies trying to estimate the likely social and financial impact of some project components. A rather theoretical study was done on the possible impact of two works (Canal Marcos A. Cabral and the La Rapida Reservoir) and land leveling on water savings. A survey of 120 farmers of the three project areas was carried out to collect their perceptions on the changes in productivity and income as a result of the agricultural and institutional development components. A third study was done on the social and economic impact of the watershed management component.

There are indications that: (i) the rehabilitation works could save substantial amounts of water; (ii) the agricultural and institutional development components have had a very positive impact on productivity and income; and (iii) the watershed management component also showed gains in conservation management and income. The results of the three studies are analyzed below.

Irrigation infrastructure

Rehabilitation and water regulation improvements in the canal Marcos A. Cabral are reducing water losses and making additional water available to farmers in the extreme ends of the irrigation system that had irregular or no access to water in the past. However no measurements have been done. The construction of the La Rapida reservoir that hopefully will become operative soon, was conceived as a way to reduce less efficient night irrigation. The reservoir will be replenished during the night and released during daytime and is expected to result in reduced water losses and increased water efficiency at farm level. In addition to these two works, 670 hectares of land were leveled with an average cost double than estimated. Land leveling may also decrease water consumption. According to the infrastructure study, the above works could increase the annual availability of irrigation water by approximately 32 millions cubic meters Ing. Franklin Ramírez, Estudio de Evaluación de Impacto del Componente de Infraestructura del Proyecto PROMATREC, Diciembre de 2004. The figures are entirely based on data from feasibility studies.

, enough to irrigate an additional 1,300 hectares. The reservoir would account for the largest impact. If these estimates would prove to be close to reality, the investment cost of providing water to one additional ha would vary between US\$2,911/ha and US\$4,627/ha which is a reasonable cost compared to international standards for irrigation rehabilitation. See table 1.

Table 1**Estimated benefits to be derived from incremental water availability**

	Potential incremental water supply/savings per year (Cubic Meter)	Potential increase of irrigation area resulting from incremental water supply/savings (ha)	Investment cost per additional ha (US\$/ha)
Canal MAC, Nizao-Valdesia	9,870,000	387	3,659
Reservoir La Rapida, PRYN I	15,680,000	639	2,911
Land leveling YSURA/Nizao-Valdesia and PRYN I	6,627,065	276	4,627
TOTAL of nearly completed works	32,177,065	1,302	3,496

Assessing the cost of the infrastructure works in relation to the farmers' capacity to pay the investments over 30 years shows the following. Table 2 presents the cost recovery price of water if the investment costs are discounted over a period of 30 years at 12 percent discount rate, the average costs of operating and maintaining the irrigation systems and the actual water tariff. The annual cost per ha with full cost recovery and payment for operation and maintenance would be between US\$ 507/ha and US\$ 667/ha. This is way above the actual tariff of US\$12-26/ha (varying according to the irrigation system and the crop produced in the irrigated plot).

Table 2**Cost analysis of incremental water availability**

	Cost-recovery price discounted over a period of 30 years (US\$/Cubic Meter)	Prospective annual tariff assuming cost-recovery (US\$/ha) 2/	Average cost of management, operation and maintenance of current irrigation systems (US\$/ha - Cubic Meter) 1/	Actual water tariffs per ha/year (US\$)
Canal MAC, Nizao-Valdesia	0.025	637	125 - 0.007	12 – 26
Reservoir La Rapida, PRYN I	0.021	507	59 - 0.003	
Land leveling YSURA/Nizao-Valdesia and PRYN I	0.028	667	242 - 0.014	

1/ Pavletich, Recuperación de Costos en los Sistemas de Riego del PROMATREC, Diciembre del 2004.

2/ Discounted cost of investment, operation and maintenance over a 30 year period and 12% discount rate.

How do these figures compare to the actual marginal financial benefits obtained by the farmers

from improved irrigation infrastructure?

The evaluation of the Nizao Watershed Management component Carlos Luis Jiménez Briceño: Evaluación de impacto de las Acciones del Componente Manejo de Cuenca en las Áreas de Intervención y estudios de casos en Áreas Demostrativas del PROMATREC and the studies carried out to design the infrastructure works provide information in that regard. According to the post-project evaluation carried out in the Nizao watershed, the annual net income per hectare of the target group and the control group are on average respectively US\$ 1,300 and US\$ 800 Taking into account all sources of family income and an average plot size of 3 hectares.. These income differentials are to a great extent explained by the differences in the efficiency of the irrigation systems. Estimations on annual average net incomes per hectare under the hypothesis of combined improved irrigation methods in the project area Source Tahal Irrigation Design Study roughly confirm the validity of the net returns per hectare (US\$ 1,020-US\$ 1,255) Based on a production structure of vegetables, fruits, cassava and mousaceas, as it is in general the normal practice in the project area. .

Moreover, according to a recalculation of the Nizao-Valdesia farm model at appraisal, the incremental net income flow per hectare (i.e. income flow with project minus income flow without project) would be about US\$500 per ha.

The above figures suggest that increased irrigation efficiency could have a marginal financial return in the order of around US\$500 per ha, or in other words: a farmer would be willing to pay (in the margin) up to that amount per ha for irrigation. This is however slightly less than the discounted cost per ha of irrigation rehabilitation plus operation and maintenance of the concerned works (table 2). Which means that the discounted costs of rehabilitation plus operation and maintenance could be equal or exceed the marginal financial returns per ha. It also indicates that under an appropriate policy context and efficient water management the water tariffs could be significantly raised but probably not to the level required for full cost recovery.

The economic costs and returns are not very much different from the financial ones. Although the Dominican Republic has a high protection of domestic production, crops grown in the irrigation schemes under the project are not very much protected.

Summing up, even if the infrastructure works are completed within the next few months, and the water savings would be close to the ones estimated in the post-project infrastructure study, the financial and economic return of the infrastructure rehabilitation component could be rather marginal.

Agricultural Development

The agricultural development component mainly involved training and technical assistance to farmers. It comprised the following activities: short courses, visits, technical tours and demonstration plots (annex 1 provides detailed statistical information on each type of assistance). Apart from the demonstration plots, some farmers benefited also from intensive technical assistance whereas others only received sporadic assistance.

According to a survey of 120 randomly selected farmers, most have experienced an increase in productivity and incomes as result of the component. As shown in table 3, more than 80% of the farmers claim they have increased productivity by at least 15%. Farmers in Nizao and PRYN systems mention the highest increases whereas those in YSURA mention lower increases. These benefits are also linked to increased production costs. In spite of the increased production costs, 77% of all farmers say they have obtained income improvements greater than 15%.

Table 3

Impact of the Agricultural Development Component by Irrigation System

	NIZAO	YSURA	PRYN	TOTAL
	% of farmers in the irrigation system			% all systems
> 15% increase in productivity	85	68	80	80
> 15% increase in production costs	84	88	74	83
> 15% increase in income	82	85	60	77

These outcomes were achieved within the framework of an initial situation of low technology levels, poor water use efficiency and during a period of favorable agricultural prices caused by a strong currency depreciation and high inflation. Higher impact was obtained among farmers that received intensive technical assistance or managed demonstration plots: 83% and 63% of the farmers with demonstration plots declared increases in productivity higher than 15% and 20% respectively. However, sporadic technical assistance was quite successful and achieved 10-15% productivity increases.

Table 4

Adoption of technologies

	Baseline (percentage of farmers)	After the program (percentage of farmers)
Use of fertilizers	86	97
Certified seeds	50	68
Land levelling	20	46
Drainage	61	78
Weed control	100	n/a
Disease control	83	99
Below surface ploughing	19	43
Contour planting	91	n/a

The financial and economic returns on this component are quite high. Because of the component the farmers would have obtained additional net benefits between US\$81 and US\$260 per ha. Considering the initial cost of this component and taking into account the sustaining costs of accompanying the farmers over the next ten years internal rates of return are estimated to be close to 175 percent. Even if this figure would be overestimated because of the weak statistical material on which it is based, there is no doubt that the agricultural development component has been highly successful from the financial and economic perspective.

Some of the technologies introduced (such as land levelling or drainage) can be considered

intrinsically sustainable. The sustainability of other technology improvements, such as certified seeds, fertilizing or disease and pest control will depend on the farmers' access to financing.

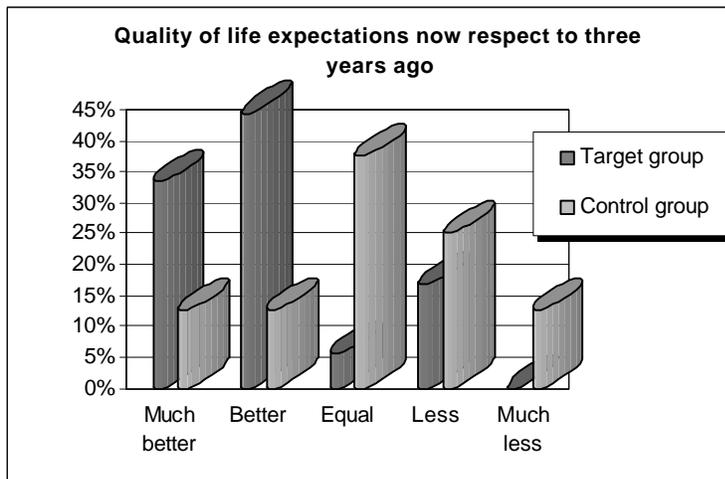
Nizao Watershed Management

An NGO (ADESJO) implemented this component with a view to develop and test a methodology to promote improved watershed management systems for nationwide replication. Strengthening community organizations and the adoption of new technologies (conservationist and economically efficient) are key elements of the methodology. The component was successful in organizing/reinforcing 24 Community Councils, establishing revolving funds for community organizations and made important progress in productive projects such as community irrigation, agro-forestry, reforestation, organic production and women participation.

The impact of the component was estimated through a field survey. The results are as follows: 75 percent of the farming households said they have now a better quality of life and 72% said that their income improved by 25%. This outcome contrasts with the 63% of the households in the control group that mentioned no increase in their income. On average the beneficiary households have an income of RD\$ 10,032 compared to RD\$ 6,145 in the control group.

The household expenditure structure provides an insight in the differences in the quality of life between the beneficiary households and the control group. Whereas the control group tends to concentrate its expenditure on food (59%) and maintain a minor allocation to education, health and leisure (20%) and none for savings, the beneficiary families spend less in food (44%) more on health, education and leisure (25%) and manage to save 9% of their income. This positive outcome would result from the higher income situation as well as from higher individual self-esteem and community interaction.

The chart below provides an illustration of the people's perception about the future. It refers to the expectations about their quality of life: 77 percent of the beneficiary households have higher expectations now than three years ago while only 25 percent of the control group do so.



Regarding environmental impact, although there are no indicators that can show differences in a irrefutable way, the field evaluators refer to a noticeable higher environment quality in the project areas and a more environmentally conscious attitude on the part of the beneficiary families.

There are however some challenges regarding the sustainability of the benefits that would require an additional time horizon and analysis. First, some participants never adopted the proposed technologies. The reasons for this are not clear, but lack of profitability of the technologies may be one of them. Moreover, the process of participatory validation and transfer of technology is slow and requires long-term commitment. Second, the project funds were not transferred to the Community Councils that remained highly dependent on ADESJO's financial management of their resources and therefore they have not yet been able to develop sufficient institutional skills to self-manage resources. Third, the relationships between the Community Councils and the other actors in the watershed (municipalities, water companies, down stream water user organizations) have not been developed. Fourth, the unit cost (about US\$ 1,000 of direct investments and US\$ 2,000 of total cost per beneficiary household) is relatively high and must be taken into consideration for the replication of the experience. The relatively high cost of accompanying the Community Councils and the communities themselves in this pilot may have been caused by some administrative problems during contract implementation. Nevertheless, watershed management through communities will need to be accompanied by efficient watershed management by the central and local Governments to become profitable and sustainable.

Annex 4. Bank Inputs

(a) Missions:

Stage of Project Cycle	No. of Persons and Specialty (e.g. 2 Economists, 1 FMS, etc.)		Performance Rating		
	Month/Year	Count	Specialty	Implementation Progress	Development Objective
Identification/Preparation Appraisal and Negotiation Staff Weeks		68.58			
Supervision					
06/95	4	I,I,A,E			
09/95	2	I,E	S		S
01/96	1	E	U		S
06/06	1	E	U		S
02/97	1	E	U		S
11/97	5	A,I,E,E,E	U		S
05/98	5	A,A,I,FM,L	S		S
12/98	2	A,I	S		S
7/99	2	A,I	S		S
01/00	5	A,A,I,P,M	U		S
09/00	1	A,I	S		S
03/01	1	A	S		S
09/01	2	A,I	S		S
02/02	2	A,I	S		S
10/02	5	A,P,FM,RA,I	U		S
06/03	5	A,P,FM,RA,I	U		S
09/03	2	A,I	S		S
01/04	1	I	S		S
03/04	4	A,I,E,FM	S		S
ICR					
09/04	4	E,I,AE	U		U
03/05	2	AE,AE	U		U

I= Irrigation Engineer; A= Agronomist, AE= Agricultural Economist; E= Economist; RA= Research Analyst; P=Procurement Specialist; FM= Financial Management Specialist

(b) Staff:

Stage of Project Cycle	Actual/Latest Estimate	
	No. Staff weeks	US\$ ('000)
Identification/Preparation	48.1*	190.3
Supervision	185.4	741.7
ICR	13.2	65.7
Total	246.7	997.7

*includes Appraisal/Negotiation (37.1 Staff weeks)

Annex 5. Ratings for Achievement of Objectives/Outputs of Components

(H=High, SU=Substantial, M=Modest, N=Negligible, NA=Not Applicable)

	<u>Rating</u>				
<input checked="" type="checkbox"/> <i>Macro policies</i>	<input type="radio"/> H	<input type="radio"/> SU	<input type="radio"/> M	<input type="radio"/> N	<input checked="" type="radio"/> NA
<input checked="" type="checkbox"/> <i>Sector Policies</i>	<input type="radio"/> H	<input type="radio"/> SU	<input checked="" type="radio"/> M	<input type="radio"/> N	<input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Physical</i>	<input type="radio"/> H	<input type="radio"/> SU	<input checked="" type="radio"/> M	<input type="radio"/> N	<input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Financial</i>	<input type="radio"/> H	<input type="radio"/> SU	<input type="radio"/> M	<input checked="" type="radio"/> N	<input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Institutional Development</i>	<input type="radio"/> H	<input type="radio"/> SU	<input checked="" type="radio"/> M	<input type="radio"/> N	<input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Environmental</i>	<input type="radio"/> H	<input type="radio"/> SU	<input type="radio"/> M	<input checked="" type="radio"/> N	<input type="radio"/> NA
<i>Social</i>					
<input checked="" type="checkbox"/> <i>Poverty Reduction</i>	<input type="radio"/> H	<input type="radio"/> SU	<input checked="" type="radio"/> M	<input type="radio"/> N	<input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Gender</i>	<input type="radio"/> H	<input type="radio"/> SU	<input type="radio"/> M	<input checked="" type="radio"/> N	<input type="radio"/> NA
<input type="checkbox"/> <i>Other (Please specify)</i>	<input type="radio"/> H	<input type="radio"/> SU	<input type="radio"/> M	<input type="radio"/> N	<input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Private sector development</i>	<input type="radio"/> H	<input type="radio"/> SU	<input type="radio"/> M	<input checked="" type="radio"/> N	<input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Public sector management</i>	<input type="radio"/> H	<input type="radio"/> SU	<input type="radio"/> M	<input checked="" type="radio"/> N	<input type="radio"/> NA
<input type="checkbox"/> <i>Other (Please specify)</i>	<input type="radio"/> H	<input type="radio"/> SU	<input type="radio"/> M	<input type="radio"/> N	<input checked="" type="radio"/> NA

Annex 6. Ratings of Bank and Borrower Performance

(HS=Highly Satisfactory, S=Satisfactory, U=Unsatisfactory, HU=Highly Unsatisfactory)

6.1 Bank performance

Rating

- | | | | | |
|---|-----------------------------|----------------------------|---------------------------------------|-----------------------------|
| <input checked="" type="checkbox"/> Lending | <input type="checkbox"/> HS | <input type="checkbox"/> S | <input checked="" type="checkbox"/> U | <input type="checkbox"/> HU |
| <input checked="" type="checkbox"/> Supervision | <input type="checkbox"/> HS | <input type="checkbox"/> S | <input checked="" type="checkbox"/> U | <input type="checkbox"/> HU |
| <input checked="" type="checkbox"/> Overall | <input type="checkbox"/> HS | <input type="checkbox"/> S | <input checked="" type="checkbox"/> U | <input type="checkbox"/> HU |

6.2 Borrower performance

Rating

- | | | | | |
|---|-----------------------------|----------------------------|---------------------------------------|-----------------------------|
| <input checked="" type="checkbox"/> Preparation | <input type="checkbox"/> HS | <input type="checkbox"/> S | <input checked="" type="checkbox"/> U | <input type="checkbox"/> HU |
| <input checked="" type="checkbox"/> Government implementation performance | <input type="checkbox"/> HS | <input type="checkbox"/> S | <input checked="" type="checkbox"/> U | <input type="checkbox"/> HU |
| <input checked="" type="checkbox"/> Implementation agency performance | <input type="checkbox"/> HS | <input type="checkbox"/> S | <input checked="" type="checkbox"/> U | <input type="checkbox"/> HU |
| <input checked="" type="checkbox"/> Overall | <input type="checkbox"/> HS | <input type="checkbox"/> S | <input checked="" type="checkbox"/> U | <input type="checkbox"/> HU |

Annex 7. List of Supporting Documents

Recuperación de Costos en los Sistemas de Riego del PROMATREC , Iván Pavletich, Diciembre del 2004

Evaluación de impacto de las Acciones del Componente Manejo de Cuenca en las Areas de Intervención y estudios de casos en Áreas Demostrativos del PROMATREC Carlos Luis Jiménez Briceño, Diciembre de 2004

Consultoría Evaluación ex post del Componente de Desarrollo Agrícola de las Juntas de Regantes Ysura, Nizao Valdesia y PRYN Pedro Pablo Peña Diciembre 2004

Consultoría sobre Conformación Organismos de Cuencas, Hernán Carmona Atencio , Diciembre de 2004

Supervisión de la Ejecución de los Trabajos de Rehabilitación, Complementación y Modernización de los Sistemas de Riego Yaque del Norte, Yaque del Sur y Nizao Valdesia Informe Final Louis Berger Group, INC, Diciembre de 2004

Estudio de Evaluación de Impacto del Componente de Infraestructura del Proyecto PROMATREC, Ing. Franklin Ramírez, Diciembre de 2004

PROMATREC, Resumen Descriptivo de las Obras Ejecutadas, Enero de 2005

Universidad Estatal de UTA, Informe Final Componente de Capacitación, Fortalecimiento Institucional y Desarrollo Agrícola,

Universidad Estatal de UTA, Estudio diagnóstico del nivel tecnológico de las Juntas de Regantes Nizao-Valdesia, YSURA y Ulises Francisco Espailat, 2002

Proyecto Manejo de Tierras Regadas y Cuenca, Informe de Cierre, PROMATREC, Abril 2005

Additional Annex 8. Borrower Contribution

The Borrower's evaluation diverges at many points from the Bank's evaluation. The following is a translated summary of the Borrower's report dated April 2005. The focus of this summary is on the assessment of the project by the Borrower. The Borrower's full report is available in Spanish in the project files. The paragraph numbering in the translation refers to the paragraph numbering in the Borrower's report.

Borrower Report Summary

2.1. Objectives and components: The overall objectives of the project are (a) to improve the livelihood of the three irrigation systems where the project intervenes and of the peasants in the watershed of Rio Nizao, and (b) develop and test methodologies at the national level in water resources management, operation and maintenance of irrigation systems and support services to the agricultural production under irrigation.

The specific objectives of the project are to: (a) increase the income of the farmers in the PRYN, YSURA and NIZAO-VALDESIA irrigation systems and the farmers located in the Rio Nizao Watershed; (b) rehabilitate and modernize the above three irrigation systems; (c) strengthen the water user organizations and producer organizations; (d) reduce the fiscal costs of public investment in irrigation through adequate cost recovery policies; (e) develop methodologies for sustainable watershed management; and (f) provide agricultural production support services to improve the management of the water user organizations and the operation and maintenance of the irrigation systems.

2.2. Revised objective: Overall, the initial project objectives have been maintained with some variations in the infrastructure and agricultural development components, and some reorientation of the project targets to implement the emergency rehabilitation plan in response to Hurricane George (1998). As far as specific objective (d) is concerned, this aspect was initially and during implementation not well accepted.

2.3 Original components: The project has six components: (i) institutional strengthening; (ii) agricultural development; (iii) irrigation and drainage infrastructure; (iv) technical studies; (v) development of the Rio Nizao Watershed; and (vi) monitoring and evaluation.

2.4 Modified Components: the infrastructure component was modified to include an emergency rehabilitation component after hurricane George (1998). The agricultural development component was modified from a subsidy scheme for private and public entities involved in agricultural development and research to a technical assistance and technology transfer program in support of INDRHI's decentralization policy.

2.5. Quality at Entry: The quality at entry is poor, for several reasons: (i) the project became effective 22 months after the planned date after which the project lingered on for 14 months without much progress for several reasons: changes in key staff in the Bank and INDRHI, poor implementation capacity of INDRHI in 1995 and the complexity of the project; (ii) hurricane

Georges (1998) delayed implementation even further; and (iii) the objective of reducing the fiscal cost of the irrigation systems through adequate cost recovery mechanisms was adopted in the margin of reality – the same can be said about reducing INDRHI assistance to water user organizations. On the contrary, INDRHI has focused on the transfer of irrigation systems to the water user organizations by increasing INDRHI's technical assistance. Hence this project objective was unrealistic.

3. Assessment per component.

3.1. Institutional Strengthening. The objective of the component was to improve significantly the level of understanding of the water user organizations to increase their efficiency in administration, staff management, democratic decision making, finance, accounting and marketing. The training component had as a principal objective to teach the producers a series of innovations that if adopted would increase productivity.

The results of this component include among others: (i) the legal establishment of three WUO and 30 associations that are part of the WOU, including statutes and regulations that promote more democratization, computers and accounting systems, and a digital map of the irrigation district; (ii) training was provided to the managers and staff of the WUO as well as 200 members of the directorates of the WUO and 3,000 members; (iii) farmer cooperatives were established; (iv) under a contract with INDRHI the WUO collected water fees; (v) the existence of an operation and maintenance mechanism to facilitate water distribution, water measuring and infrastructure maintenance; (vi) the existence of planning, organization and control mechanisms; and (vii) the existence of a long-term strategic development plan.

The impact of this component is evaluated as: *highly satisfactory* for the following reasons: (i) 65 percent of the water users participated in training; (ii) 80 percent of the farmers participated in meetings of their organization; (iii) 50 percent of the farmers participated in titling activities; (iv) land titles were obtained – request for provisional titles by more than 80 percent of the farmers; and (v) 66 percent of the farmers know the decisions of the WUO board of directors.

3.2 Agricultural Development. The general objectives of this component are: productivity increases, increase the capacity of the farmers through technical assistance and technology transfer, establish a technical assistance and technology transfer service in the three WUO, improve farmer incomes, and reduce the irrigation costs through the adoption of adequate cost recovery mechanisms.

The results of this component include among others: (i) an increase in the average weighted productivity of 30 percent in the three WUO; (ii) 80 percent of the farmers obtained productivity increases of more than 15 percent through their participation; (iii) plantain productivity increased five fold; (iv) 60 professional staff of INDRHI, the Ministry of Agriculture and the WUO were trained in technical assistance during two years by an international agro-engineering firm (Utah University); (v) about 50,000 farmer visits were made, 3,000 groups activities were organized, 1,500 farmers were followed-up in an intensive manner through field days and other events.

The impact of the component is evaluated as: *highly satisfactory* because of: (i) 80 percent of the water users increased their productivity by more than 15 percent; (ii) the use of the “subsolado” soil improvement technology increased from 19 percent to 43 percent of the farmers; (iii) the use of plot drainage increased from 61 percent to 78 percent of the water users; (iv) the use of fertilizers and pesticides increased from 86 percent to 99 percent of the water users; and (v) increases in average farmer income of RD\$13,822 per year in Ysura; RD\$ 10,907 in Nizao-Valdesia; and RD\$8,888 in PRYN. The average income increases were due to the adoption of technology implemented by the project in the three irrigation systems.

3.3. Irrigation Infrastructure. The general objectives of this component was the rehabilitation of 37 km of principal canals, 15 km of secondary canals, detailed engineering designs, the leveling of 4,114 ha of agricultural land, equipment for the three irrigation systems, and increases in the water availability through the construction of six water reservoirs and the drilling of 13 wells.

The results of this component are as follows: (i) the detailed design of the rehabilitation and modernization of the irrigation schemes; (ii) the construction of the El Llano and the Rapida I reservoirs; (iii) the rehabilitation of the canal Marco Cabral; (iv) the drilling of 13 wells to be completed with other financing; (v) about 347 ha have been leveled; and (vi) the works have been supervised by the Louis Berger Group, Inc.

The Borrower’s report does not evaluate the impact of the infrastructure component but states the following: (i) well drilling and testing achieved at 45 percent; (ii) reservoir designs completed; (iii) tender for the construction of a reservoir and complementary works; (iv) the infrastructure will be completed on time; (v) implementation of 16.3 percent of the land leveling; and (vi) heavy equipment purchased under the emergency subcomponent.

3.4. Study Component The general objectives of this component was to implement several studies to complete the documentation needed to support several investment the project was to implement. There were three fundamental studies: (i) the determination of the water costs, (ii) the determination of the cost of machinery for the conservation of the water distribution systems, and (iii) the evaluation of the cost recovery of the investment as well as policy studies for the Ministry of Agriculture

The results of this component are: (i) a study about watershed organizations; (ii) several policy studies about the modernization of agriculture; (iii) impact studies of the irrigation works; (iv) cost recovery study; and (v) study on the transfer of financial resources from the lower to the upper watershed levels.

The report rates the impact of the studies at several levels. The studies on training, institutional strengthening, works supervision, cadastre measurements, cost recovery, establishment of watershed organizations, transfer of resources from low to high levels in the watershed, the project impact studies are considered *highly satisfactory*. Other studies such as the rehabilitation and modernization of the irrigation systems study as well as the environmental studies are *satisfactory*.

3.5. Watershed Management Component

The principal objective of the component is to obtain sustainable use of the natural and water resources in the middle and upper watersheds. The project would realize: the organization and strengthening of 24 communities in 5 micro-watersheds; the training of the associations in self-management, the management of development programs and the sustainable use of natural resources; the provision of modern technologies to facilitate the sustainable use of soils and water and the establishment of a revolving fund for private investments in agro-forestry, irrigated agriculture and community investments on public lands. Another objective was to develop watershed management methodologies that can be replicated at the national level.

The results of this component, in terms of physical factors, are not yet available as there are no measurements. In visits and conversations with the farmers, one could clearly perceive achievements at the level of erosion control, improved land and water use, improvement in employment, productivity and income of the farmers.

The impact of this component is rated *highly satisfactory* and an impact table is presented in the report.

3.6. Monitoring and Evaluation Component. This component had to monitor all project activities through an integrated organizational system: (i) general management information; (ii) establishment of a monitoring and evaluation unit; (iii) environmental monitoring; and (iv) environmental impact.

The component is evaluated in general as *satisfactory* for the following reasons: (i) the joint monitoring between the Bank and the implementing agency; (ii) the works supervision by the Louis Berger Group; (iii) the annual reports; (iv) the supervision of the institutional and agricultural development components; (v) the supervision of the cadastral measurements; (vi) the establishment and operation of a hydro-agricultural information system. The monitoring system itself is considered *satisfactory*.

4. Overall assessment of the achievement of the project objectives

Development of methodologies for sustainable watershed management	Highly satisfactory
Efficient support services for agricultural production	Highly satisfactory
Improved water management	Highly satisfactory
Adequate operation and maintenance of the irrigation systems	Moderately satisfactory
Cost recovery	Unsatisfactory
Strategic studies	Highly satisfactory
Future project studies	Moderately satisfactory

5. Economic and Financial Evaluation

On the basis of a methodology using an economic water value of US\$0.08 per cubic meter the Borrower report presents the following benefit/cost ratios:

Infrastructure Work	Benefit / Cost ratio
Ysura 13 wells	1.28
Reservoir “El Llano”	3.45
Canal Marcos A. Cabral	4.06
Reservoir La Rapida	2.85
Land leveling Ysura – Nizao-Valdesia	8.51
Land leveling PRYN	8.33

6. Factors affecting project implementation and results

6.1. Factors not under the control of the Government or the Implementing Agency

- Delayed loan approval in Congress
- Unsatisfactory performance of the engineering design company in the contract to design the rehabilitation and improvement of the irrigation schemes
- Rigidity in the application of the procurement procedures by the Bank
- Late responses from the Bank to the initiatives of the implementing agency
- Successive changes in the management of INDRHI

6.2. Factors under the Government control

- Untimely provision of counterpart funds
- Excessive delays in the payment processes

6.3. Factors under the control of the Implementing Agency

- Slow decision making
- Slow tender procedures
- Low staff motivation because of low salaries
- Lack of support for the achievement of the project objectives

7. Sustainability

Only the sustainability of the watershed management component has been evaluated: sustainability is linked to the relationship INDRHI/NGO/Community, the profitable economic activities will be sustainable while the environmental activities will need additional follow-up and support by the Government.

8. Bank Performance

Bank performance is considered: *fair*

The rigidity in the Bank's procedures caused important delays and paralyzed the watershed management component; there were delays in the approval for tender documents because of minor issues. The decision-making process in the Bank is very slow: the task team leader (TTL) has to consult frequently with other areas in the Bank causing delays in the implementation of the initiatives, the TTLs have multiple commitments and are absent from the office to fulfill these commitments, hence they do not respond in a timely manner to communications.

9. Borrower Performance

The implementation unit was staffed with experienced people; the performance during the first two years was not satisfactory and mistakes were made which made it impossible to use the loan funds to spend on operating costs. There were also changes in the management.

10. Lessons Learned

- To establish a monitoring mechanism to the disbursement system to avoid implementation delays;
- Absence of a mechanism to recover the invested funds;
- To establish a steady technical support program for all stakeholders in fund management;

- It is evident that no infrastructure works should be started without formalizing the agreements with the beneficiaries;
 - To establish with more clarity the economic impact of the project, indicators have to be used to measure employment creation, migration and farmer income;
 - The inhabitants of the high watershed levels start complaining as those who live in the lower watershed benefit from their work and compensation mechanisms are being discussed;
 - Community members are not interested in practices that do not provide individual benefits; and
 - Work undertaken by PROMATREC in the demonstration farms has shown that the local conditions, the type of society, and the specific needs of the local population are as important as the production technologies.
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