PD-AAN-879
ISN 33506

INTRODUCING IRRIGATED PRODUCTION TO SMALL FARMERS:

A Comparative Evaluation of Three Small Farmer Irrigation Projects in the Bicol Region

(Project Nos. 492-0275, 492-0310 and 492-0289)

SEPTEMBER 1983

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EXECUTIVE SUMMARY

INTRODUCTION

During the past three decades, the U.S. Agency for International Development (USAID) has obligated more than $130 million towards helping the Government of the Republic of the Philippines (GRP) to increase the agricultural production and incomes of the rural poor, through the wide variety of programs. Since 1974, a major element in those programs has been support for the GRP's Integrated Area Development (IAD) program in the Bicol River Basin of Southern Luzon. This area is characterized by extensive rural poverty, high population growth, and vulnerability to natural disasters, but is also endowed with natural resources that provide the potential for economic growth and development.

Within the Bicol River Basin Development Program (BRBDP), one of the principal investments made by the GRP and USAID has been in irrigation systems serving small farmers. Three IAD projects based on irrigation have been identified, designed and developed through the Program Office of the BRBDP, which has received technical assistance, training and other support as part of the USAID assistance program. The three irrigation projects, which were initiated between 1975 and 1980, and are at various stages of implementation, are the subject of this evaluation:

- Libmanan-Cabusao Project (IAD I);
- Bula-Minalabac Land Consolidation Project (IAD II); and
- Rinconada/Buhi-Lalo Project (IAD III).

These projects represent a series of attempts over time to address the complex and inter-related technical and institutional problems of introducing irrigation systems and supporting activities to help farmers improve their livelihood, and in the process, increase national food production. The purpose of this joint GRP/USAID evaluation is to draw lessons and to make recommendations on how these and similar investments can yield sustainable benefits to small farmers.

SUMMARY OF FINDINGS

1. The focus of the projects on irrigation systems that benefit small farmers is suitable for the selected areas, and provides a basis for achieving the goals of increased agricultural production, employment, net incomes and quality of life of farmers in these areas.

2. The technical designs of the projects are essentially sound, in particular the assessments of the available water supply and the type of irrigation system required. Achieving and maintaining these design standards, however, will require additional time and investment.

3. Institutional development and its integration with the physical installation of the irrigation system appears to be the weakest aspect of the three projects. This is more apparent in the Libmanan-Cabusao and Rinconada Projects than the Bula-Minalabac Project.

4. In accordance with the criteria identified in the evaluation for generating sustainable benefits, the Bula-Minalabac Project, and to a slightly lesser extent, the Rinconada Project, appear to have the greatest chances for success. Technically and institutionally, there are serious problems in the Libmanan-Cabusao Project. If not addressed immediately, they will result in a loss of the investment that has been made. Currently, the irrigation system is operating at less than 50 percent efficiency.

5. A key determinant of high performance and sustainable benefits is the level of farmer involvement in decisionmaking, beginning with the conceptualization and identification of an irrigation project. This is most evident in the Bula-Minalabac Project, where there is a high rate of adoption of the technological package, high irrigation fees and payment rates, excellent participation of farmers in maintenance activities, and related investments to generate additional income. Although progress is being made in the Rinconada Project, an early priority on physical infrastructure development delayed institutional development. The Libmanan-Cabusao Project reflects the difficulties that can occur when farmer involvement in decisionmaking is bypassed. It also shows the negative effects on farmers of poor technical implementation and management.

6. The placement of management responsibility in each project with a lead agency appears to work satisfactorily, if bolstered by integration and coordination mechanisms such as the Composite Management Group (CMG), the Bicol River Basin Development Coordination Committee, and monitoring by the BRBDP Program Office. The projects reflect an increased capacity for management and coordination, as well as increased private sector involvement in local development.

7. In the project areas, the effects and impact of these development initiatives are reflected in increased tax revenues, higher land values, business and community infrastructure, "backyard farming", and increased rice production. However, the information activities of the projects are not designed in a way to capture these effects and impacts. Even though considerable amounts of data are being gathered, there is little analysis to allow effective evaluation and correction of project activities, either by the PMO or higher levels of government.

8. The process of establishing a mature water supply system requries time--a minimum of five years, and perhaps more, after the completion of the physical system. This period of testing and development should be built into each project; for the three projects in the Bicol Region, it requires plans and additional resources from the Government to bring these projects to maturity.

SPECIFIC FINDINGS AND RECOMMENDATIONS

1. Developing a Reliable Water Supply

Although there are problems in the Libmanan-Cabusao project, all three systems have the potential to deliver a reliable water supply to farmers. However, certain actions are required if the systems are to prove sustainable.

Recommendations

1a. The Libmanan-Cabusao Project needs serious attention from NIA if the system is to be brought up to original design standards. This may prove to be very costly. Therefore, it is recommended that an engineering study be done to determine a time-phased program with detailed costs, which can then be negotiated with farmers in the area to determine responsibilities and resource commitments.

1b. In accordance with current NIA and MAR policy, all three systems should be completed, tested and certified before any attempt is made to transfer responsibility for these systems to the farmer beneficiaries.

1c. Operations and maintenance plans should be prepared for each of the three projects to increase the efficiency, quality and reliability of service to water users.

1d. The technical management of all three systems requires specialized skills that farmers cannot be expected to acquire. Therefore, it is proposed that the lead agencies (NIA and MAR) establish technical management units for each system, with the longer-term expertise and training requriements identified.

1e. Better information on water availability, water supply, and drainage flows is needed for technical operations. This is especially important for the two pump projects, where effective management can reduce water losses and can increase efficiency, thereby reducing the costs of energy. In the Rinconada Project, in particular, there are questions about long-term water availability, which indicates the need for a monitoring system.

2. Turning the Systems Over to Farmers

There appear to be unrealistic expectations on the part of NIA and other agencies regarding the functions farmers can perform through their Irrigators Associations (IAs). Therefore, it is critical to define what functions the IAs can perform and what is needed to build their capacity to do so.

Recommendations

2a. Plans for the turnover of the systems in all three projects should be developed by the PMO and the Irrigators Associations; these should clearly and realistically define future responsibilities on a time-phased basis. The eventual aim should be to develop the capacity of Irrigators Associations to perform policy and supervisory roles, and to take care of lower level maintenance and financing of the system.

2b. The block units and divisions within the Irrigators Associations should be aligned with the physical layout of the systems so that a commonality of problems and interests emerge; this requires restructuring the IAs in all three projects.

2c. Activities which concern and directly benefit farmers should be carried out through a consolidated organization. At the policy level, there is a need to adopt a policy and approach for integrating farmer organizations. In the case of Irrigators Associations, such a policy would increase cooperation and may lead to other ventures that increase revenues for the IAs.

2d. Training is weak in all three projects, due to limited farmer involvement in decisionmaking, untimely sequencing of training activities, lack of follow-up, and a failure to monitor the behavior changes anticipated and achieved through specific programs. Therefore, it is recommended that each project reassess its training strategy and program, with a cross-project review conducted by the BRBDPO.

2e. Building on NIA's recent initiatives in the Rinconada Project, there is a need for a model through which the IA gradually assumes responsibility for supervising and financing the technical management support unit necessary for effective system operation, maintenance and betterment. One model for accomplishing this is for the IA to contract with a government agency such as NIA for these services. Later it may be possible to obtain the same services from private sector sources.

3. <u>Covering the Costs of the Systems</u>

The eventual aim of the projects is to have the Irrigators Associations cover the costs of operating and maintaining the systems as well as to pay for all or part of their amortization. Only the Bula-Minalabac Project is coming close to achieving this. Because rice yields and farmers' incomes are lower than expected, this aim may not be accomplished in any of the projects, particularly the two with pumps that require electrical power. Data for determining these costs and what farmers can pay are not currently available.

Recommendations

3a. Energy costs have been increasing at 25 percent a year and this trend will most likely continue. As this factor represents over 40 percent of O&M costs in the two pump projects, there is a need to address the issue of rising rates. Although initial local negotiations have resulted in marginal decreases and there is the potential for Irrigators Associations to help with maintenance, this issue should be addressed by NIA with the NPC, taking account of all projects in the country that require power. One option would be direct payment by the project to NPC for power plus payment of a user or wheeling fee to the cooperatives.

3b. There is a need for each project to provide five-year and twenty-year budget estimates for review by BROOPO and other appropriate agencies. This will allow a reasonable determination of the costs of operations and maintenance as well as partial amortization. With these budgets, the financial reporting systems should be modified for monitoring and correction purposes. Such a framework would facilitate negotiations with the Irrigators Associations regarding fees.

3c. In addition to calculating the overall costs of the system, there is a need to determine how much farmers can pay. This can be accomplished, at relatively little cost, by introducing a farm records system, gathering hard data on low, high and average producers. Part of the unprogrammed funds from the Rinconada Project could be used for the technical assistance needed to establish and refine this system.

4. Improving the Productivity of the Systems

It is apparent, with the possible exception of Bula-Minalabac, that estimated mean rice yields are lower than anticipated in the project designs. There is a potential for these deficiencies to be covered if steps are taken to test and introduce improved water management and related crop technologies, and to release constraints in access to credit. The full extent of the improvements requires the support and integration of agricultural services.

Recommendation

4a. Ongoing research and adaptive testing of new practices should be incorporated into each project, to address the problems of irrigation water use and the related technologies of crop-water-fertilizer-labor interaction. In particular, the current effort of IRRI in the Libmanan-Cabusao Project should be expanded to collect and analyze farm budget information as innovations are developed.

4b. A major bottleneck to improving the productivity of the systems is the availability of credit, due to farmer failures to repay loans received prior to the initiation of the projects. An arrangement should be made to restructure these loans, possibly with a repayment scheme organized on a small group basis.

4c. Many observers have noted an increase in illegal land transfers. At the policy level, there is a need to define what types of transfers would benefit individual farmers and could therefore be legalized. Also, the further strengthening of agricultural services may reduce this problem.

4d. For the systems to realize their full potential, strong management and coordination are essential. Over time, the BRBDPO has developed a workable model encompassing Composite Management Groups, the BRBDCC, and the Project Monitor system. This should be continued after project completion and certification.

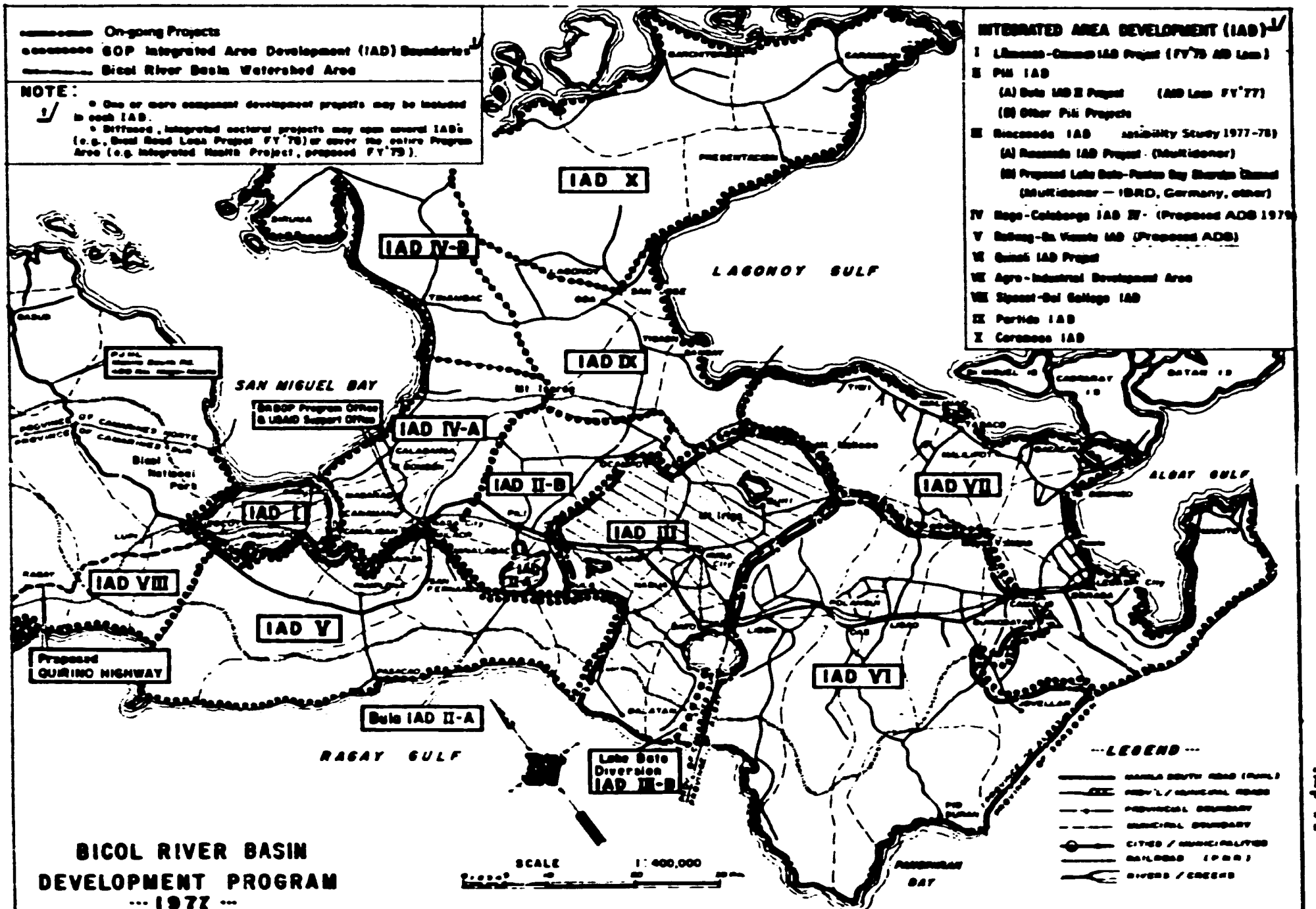
4e. The environmental effects, real or perceived, raise uncertainties about the sustainability of these irrigation systems. In the Rinconada Project, there are questions about the long-term conservation of water and land resources, as well as the system's effects on plant and animal life. Similar effects have been noted in the other two projects. Therefore, it is recommended that part of the unprogrammed funds from the Rinconada Project be used to develop and test a monitoring system on environmental effects that can be adapted to other irrigation projects.

4f. As mentioned above, there is no system for analyzing the data collected under the three projects that can be used to evaluate effects and impact. Therefore, there is a need, most likely with technical assistance, to revise the reporting requirements of the three projects in a way as to provide better information for analysis and decision-making.

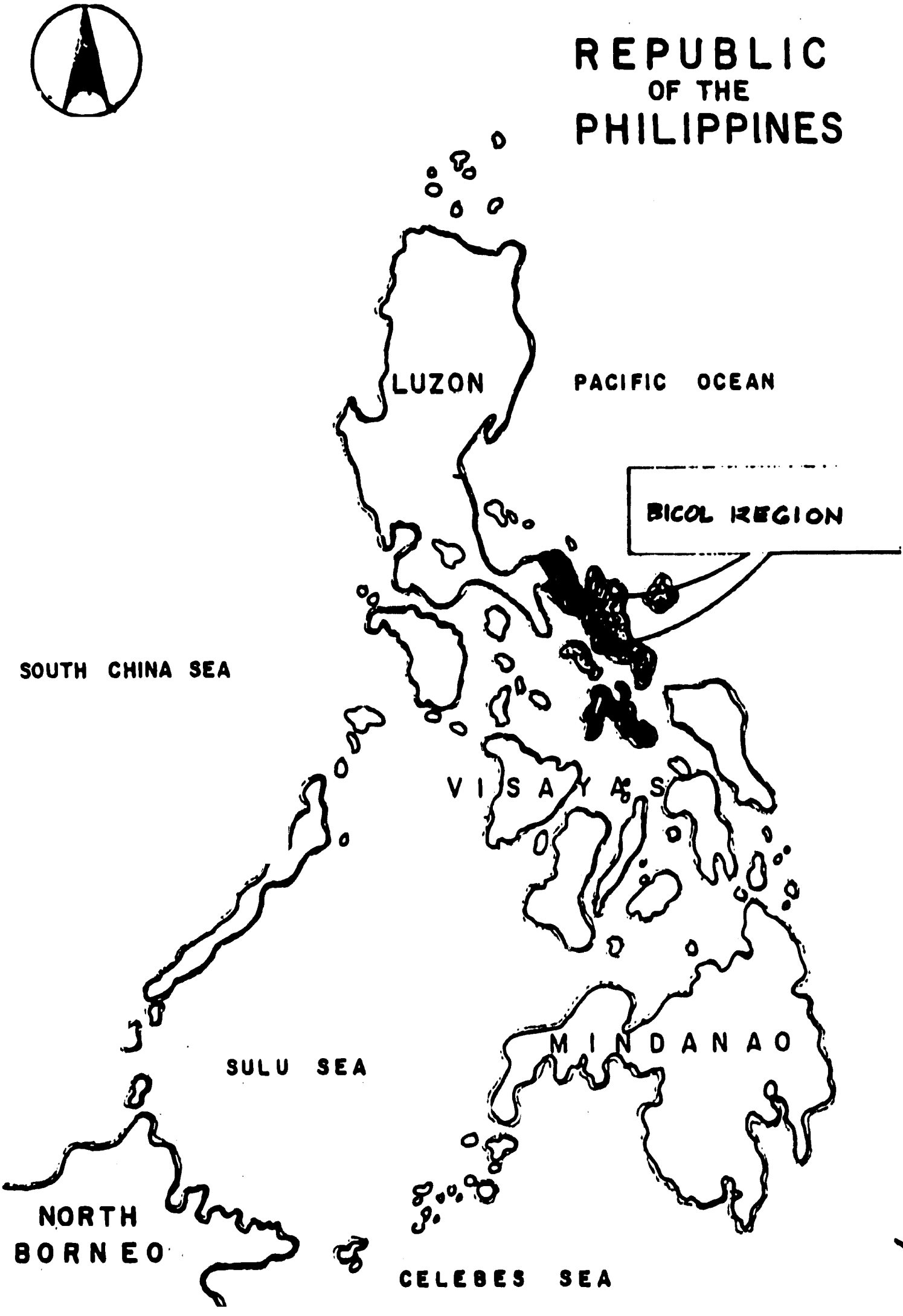
STATISTICAL SUMMARY

Project	Libmanan-Cabusao	Bula-Minalabac	Rinconada
Type of System:	Pump	Pump	Gravity
Hectares to be Irrigated	3873	2181	3100
Hectares Harvested, 1982 Wet Season (Percent)	1968 (501)	458 (21)	1025 (33)
Hectares Harvested, 1983 Dry Season (Percent)	1672 (43)	374 (17)	956 (31)
Number of Planned Farmer Beneficiaries	2310	1230	2450
Farmer Beneficiaries Currently Receiving Water (Percent)	1843 (80)	211 (17)	1418 (58)
Average Size of Holding	1.68 ha.	1.77 ha.	1.27 ha.
Project Costs on Signing Agreement	₱47.29M	₱41.76M	₱89.98M
Revised Project Costs as of June 30, 1983	₱87.47M	₱69.02M	₱90.61M
Cost Per Hectare	₱22,585	₱31,646	₱29,229
Cost Per Farmer Beneficiary	₱37,866	₱56,114	₱36,984
Mean Rice Yield Per Hectare (m.t.), 1983 Dry Season (vs. Project Design Estimate)	2.99 (4.75)	4.25 (4.8)	3.12 (4.1)
Mean Rice Yield Per Hectare (m.t.), 1982 Wet Season (vs. Project Design Estimate)	2.5 (3.75)	4 (4.2)	3.12 (4.1)

Project	Libamanan-Cabusao	Bula-Minalabac	Rinconada
Water Supply Per Hectare 1983 Dry Season	17,479 M^3	12,654 M^3	14,910 M^3
Water Supply Per Hectare 1982 Wet Season	7,080M^3	5,709M^3	10,530M^3
O&M Cost Per Hectare for Past Two Cropping Seasons	₱594	₱248	₱239
Total O&M System Cost for Past Two Cropping Seasons	₱993,472	₱113,718	₱245,000
Level of Irrigation Fee	12 Cavans/yr	24 Cavans/yr	5 Cavans/yr
Collection Rate	30%	94%	45%
Membership in Irrigators Associations	1,200	206	285
Percent of Farmer Beneficiaries Currently Receiving Water in Irrigators Associations	65%	98%	20%


On-going Projects
GOP Integrated Area Development (IAD) Boundaries 1/
Bicol River Basin Watershed Area
NOTE:
1/
• One or more component development projects may be included in each IAD.
• Diffused, integrated sectoral projects may span several IADs (e.g., Bicol Road Links Project FY'78) or cover the entire Program Area (e.g. Integrated Health Project, proposed FY'79).
INTEGRATED AREA DEVELOPMENT (IAD) 1/
I Libmanan-Camaro IAD Project (FY'75 ADB Loan)
II Pili IAD
(A) Bula IAD II Project (ADB Loan FY'77)
(B) Other Pili Projects
III Bincanada IAD (Feasibility Study 1977-78)
(A) Bincanada IAD Project (Multidonor)
(B) Proposed Lake Bato-Panlao Bay Diversion Channel (Multidonor — IBRD, Germany, other)
IV Naga-Calabanga IAD IV- (Proposed ADB 1979)
V Balinag-Sn Vicente IAD (Proposed ADB)
VI Buhi IAD Project
VII Agro-Industrial Development Area
VIII Sipocot-Gui Gallego IAD
IX Partido IAD
X Caramoan IAD
IAD X
IAD IV-B
LAGONOY GULF
IAD IX
SAN MIGUEL BAY
BicOP Program Office & USAID Support Office
IAD IV-A
IAD II-B
IAD I
IAD III
IAD VII
ALBAY GULF
IAD VIII
IAD V
Proposed QUIRINO HIGHWAY
IAD VI
Bula IAD II-A
RAGAY GULF
Lake Bato Diversion IAD III-B
PANGANAN BAY
LEGEND
SCALE 1:400,000
BICOL RIVER BASIN DEVELOPMENT PROGRAM
--- 1977 ---

Map #1


REPUBLIC
OF THE
PHILIPPINES
LUZON
PACIFIC OCEAN
BICOL REGION
SOUTH CHINA SEA
VISAYAS
MINDANAO
SULU SEA
NORTH
BORNEO
CELEBES SEA

CHAPTER ONE: INTRODUCTION

Overview

The Bicol River Basin Development Program (BRBDP), with the assistance of the United States Agency for International Development (USAID), has sponsored three Integrated Area Development (IAD) Projects with irrigation systems designed to benefit small farmers. These projects are located in Camarines Sur, one of the six provinces in Bicol Region--an economically depressed area in the Philippines that has the human and natural resources necessary for growth and development. The projects are located in the following areas:

- Libmanan-Cabusao (IAD I);
- Bula-Minalabac (IAD II); and
- Rinconada/Buhi-Lalo (IAD III).

These projects represent a series of attempts over time to address the complex and inter-related technical and institutional problems of introducing irrigation systems and supporting activities to help farmers improve their livelihood, and in the process, increase national food production and availability.

The focus of this comparative evaluation is on how these and similar investments can yield sustainable benefits, drawing lessons and making recommendations useful for decision making. Therefore, the objectives of this evaluation are twofold:

- First, to do a comparative analysis of the three projects which highlights issues and alternatives for internal project decision making and for future policy, program and project formulation; and
- Second, to assess the progress of each project and to make recommendations, specific and general, on what actions are needed to increase the likelihood that the benefits generated by these investments will continue after as external assistance is withdrawn.

The projects were launched during the period of 1975 to 1980 and are therefore at various stages of development. Such differences do not allow a rigorous comparative analysis, but rather accent a process of learning and adjustment. Experience has shown in other situations that this process will have to continue over several years before such projects mature and become viable. This evaluation is viewed as one step in furthering this process.

Irrigation Systems and Small Farmers

The main aim of investments in irrigation systems is to develop sustainable production systems, particularly in areas where there are serious

natural resource constrainsts affecting agricultural production. This innovation assumes special significance in areas where there is a high population growth rate, with resulting pressures on land and water resources and the need for increased food supplies. A recent paper, "The Philippines: Why Continue Irrigation Development?" shows how the country has moved from importing milled rice to the position of an exporter; however, it points out further that if the population continues to grow at its current rate, the Philippines will once again have to import rice, because demand will outstrip supply.1/ This population growth also threatens the productivity and conservation of natural resources that are vulnerable to severe changes in climatic conditions. The establishment of well-designed irrigation systems will help protect these resources, increase agricultural production, and speed industrialization and other income-generating activities.

Irrigation systems that involve and benefit small farmers address the question of a more equitable distribution of wealth. This is a major policy objective of the Philippine government, as evidenced in the priority placed on agrarian reform. However, initiating an irrigation system for small farmers is a complex process, since major behavioral changes are required when a farmer shifts from rainfed to irrigated production. Encouraging behavioral changes involves the introduction of technical and institutional improvements in a timely and integrated manner. The management and organizational requirements for doing this are severe, making this type of development initiative difficult, although the potential benefits to small farmers and the country are high.

The Bicol River Basin

Such considerations led the Government and USAID to invest in the three irrigation projects and other development activities in the Bicol River Basin. The Basin area covers 9,961 square kilometers and has a population of about 3.5 million people (1980). Its estimated rate of population growth is 3.3 percent, increasing pressures on its land and water resources which are vulnerable to periodic typhoons, floods, salinization, and soil erosion and silting. The area has low per capita production and incomes, a low rate of savings and investment, and a lack of employment opportunities outside agriculture. Moreover, there are a inequities in the distribution of land and wealth.

The Bicol River Basin Development Program was established in 1973 to attack the constraints and problems of the Basin in a coordinated manner. There are three main elements in its approach:

1/ Position paper prepared by the National Irrigation authority, transmitted by the Administrator to Prime Minister in letter dated 28 March 1983.

- First, development initiatives in the rural sector should be focused on defined areas of high growth potential and socio-economic need;

- Second, development planning for these areas should be cross-sectoral and integrated; and

- Third, project planning and management should be decentralized to greatest extent possible, with the full involvement of the beneficiaries.

The BRBDP Office identified specific areas of concentration, called IDAs (Integrated Development Areas), and commenced major planning efforts for those with the highest priority, given the above criteria.

One major potential in the region is irrigated rice production which exploits and protects its rich (though vulnerable) natural resources. As a pilot effort, the Libmanan-Cabusao Project was initiated in 1975, with the Bula-Minalabac Project following in 1978 and the Rinconada Project in 1979. All three projects focused on small farmers as a response to the equity concerns of the Government and USAID.

Purposes of the Evaluation

The three IAD projects are either completed or nearing completion, and thus are rich sources of information, especially since they evolved over a five-year period and since different approaches and problem solving techniques were used. This comparative evaluation is intended to highlight the major lessons learned which can be further tested in similar projects. Also, there is a potential for cross-fertilization among projects which as yet has not been fully realized. Further, the evaluation provides specific recommendations for the management of each individual project. More broadly the evaluation raises the question of how the benefits generated from these investments can become self-sustaining.

Focus of the Evaluation

The main concern in this evaluation is how to bring about sustainable benefits. Frequently, projects receive infusions of government and donor resources that result in a period of intense activity, followed by a decline when these resources are withdrawn. It is a premise of this report that the investments made during the traditionally defined project development and implementation cycle are only the beginning; additional time and human and financial resources are needed to bring a system to maturation. This perspective is critical, starting with the conceptualization and design, and throughout the project. A fully operational and gradually improving system may require several years after the physical structures needed for irrigation have been installed.

From the field investigation, discussions with project and BRBDPO staff, and experience in other countries, 12 ingredients were identified for an

irrigation system that delivers sustainable benefits:

1. Reliable and adequate water supply for the agricultural system being employed in the area of coverage.

2. Physical infrastructure (both irrigation and drainage) complete and operable down to the farm level.

3. An operations plan that insures the effective and efficient delivery of water to all parcels.

4. A plan for the regular maintenance and periodic upgrading of the system.

5. Adequate technical and management competence for solving problems and improving the system.

6. A financial plan and system for covering the costs of operations and maintenance, system improvement, and (if feasible) amortization.

7. A technological package acceptable to farmers that is sufficiently productive to meet farmer requirements and the above costs.

8. Supporting agricultural services that effectively serve farmer interests.

9. An Irrigators Association organized in a way that ensures that water users interests and responsibilities are met.

10. An information system for monitoring and evaluation and for increasing the accountability of service providers to beneficiaries.

11. Sufficient market demand for the major crops produced.

12. Macro-economic policies favorable to the producer.

The projects were examined in light of these criteria, and the findings and recommendations follow.

Organization of the Report

Following this introduction, Chapter II traces the development of the three projects by presenting comparable descriptive data. Chapter III identifies and discusses the major issues that arose in project design and implementation. Although the projects are at different stages of development, Chapter IV looks at their initial effects and impact, pointing out data shortcomings and offering hypotheses to be tested further. In Chapter V, the broader and long-term question of sustainability is addressed, leading to the major conclusions of this evaluation.

The first three annexes (A-C) provide brief descriptions of each project, an assessment of its current status, and specific recommendations for consideration. Annex D offers suggestions for future assessment and evaluation of the Bicol River Basin Development Program. A full review of the program and the results of USAID's investment over the past 10 years has been provisionally scheduled for 1984; several options for undertaking a comprehensive review are discussed in the annex. Finally, Annex E presents the schedule and methodology employed in this evaluation.

CHAPTER TWO: SUMMARY PROJECT PROFILES

The three projects share the common goal of increasing the agricultural production, productive employment, net incomes and quality of life of small farmers in the project areas. Although activities vary in each project, their main purpose is to introduce irrigated agriculture to small farmers.

Table 1: Planned Project Coverage in Hectares and by Number of Farmer Beneficiaries

	Libmanan-Cabusao	Bula-Minalabac	Rinconada
Number of Hectares to be Irrigated	3873	2181	3100
Number of Farmer Beneficiaries	2310	1230	2450
Average Size of Holding	1.68 ha.	1.77 ha.	1.27 ha

The Libmanan-Cabusao Project was the first to be planned and initiated. It was considered to be a pilot scheme to test and develop management and organizational arrangements and other interventions for involving farmers in the development of a specific area. It was designed to bring 3,873 hectares under irrigation, using a pump system in two municipalities adjoining the Libmanan River and San Miguel Bay. In addition to the construction of the irrigation and drainage system and service roads, the project was designed to provide related agricultural services, including the establishment of compact farms, the introduction of applied research and improved extension, and the development of an Irrigators Association capable of managing the system. Another major emphasis of the project has been land tenure, with the objective of ensuring a more equitable distribution of wealth. The lead agency for implementing the project is the National Irrigation Authority (NIA).

Bula-Minalabac, the second to be undertaken, has similar infrastructure and agricultural development activities; it also employs a pump system and is designed to supply water to 2181 hectares. However, this project also included a land consolidation component that involves redistributing land to tenants and squatters in accordance with the layout of the irrigation system and issuing Certificates of Land Transfer (CLTs). This also involved the relocation of homesites and establishment and development of community centers for the seven affected barangays. For developing these centers and farmer organizational capabilities, a wide variety of development activities was built into the project--the provision of water, multipurpose centers, health, family planning, and support for other income generating enterprises. The lead agency for this project is the Ministry of Agrarian Reform (MAR).

The last to be initiated was the Rinconada/Buhi-Lalo Project, which includes two separate components managed by different lead agencies. The larger of the two, an irrigation component designed to serve 3100 hectares, was included in this evaluation. NIA is the lead agency for this component, which involves the rehabilitation of existing irrigation infrastructure along the Lalo River and the development of Lake Buhi as a water source for the project area as a whole. With the eventual exploitation of this water source, the total area served by irrigation will exeed 11,000 hectares.

The second component of the Rinconada Project, not studied in detail during this evaluation, is an upland component for agro-forestry and watershed development around Lake Buhi. The Bureau of Forestry Development (BFD) is the lead agency for the upland component.

Table 2: Summary of Main Project Components

Components	Libmanan-Cabusao	Bula-Minalabac	Rinconada
Irrigation and Drainage System Installation	XX	XX	XX
Rural Service Roads	XX	XX	XX
Institutional and Agricultural Development	XX	XX	XX
Land Tenure Reform	XX	XX	XX
Land Consolidation		XX	
Water Source Development			XX
Agro-Forestation/Watershed Development			XX
Community Development		XX	

Current Status of Projects

Timing

As indicated above, the projects were initiated sequentially over a period of four years.

Table 3: Project Initiation, Planned and Estimated Completion Dates

	Libmanan-Cabusao	Bula-Minalabac	Rinconada
Date of Initiation	7-29-75	1-13-78	8-1-79
Original Project Completion Date:	1-31-81	12-31-82	6-30-85
Actual Completion Date or Current Estimate	12-31-81	12-31-83	6-30-85

The Libmanan-Cabusao Project has officially been completed; however, further work remains before the irrigation system is fully operational as designed, and much remains to be done to establish a viable farmer organizational structure. Delays in completion were due mainly to the extra work required because of typhoon damage and the lack of a coherent institutional development strategy at the outset.

The Bula-Minalabac Project is significantly behind in its physical construction schedule, due to delays in funding releases and some difficulties with contractor performance. Although the current estimated completion date indicates a 12-month delay, it is likely that additional time will be required, particularly if recently requested funds are not released soon. Results in the institutional development component of the project have fulfilled earlier projections, with significant involvement and investments by the farmers in the area.

The Rinconada/Buhi-Lalo Project is slightly ahead of schedule for the physical development components of the project. In its earlier stages, this priority delayed concentration by the Project Management Office (PMO) on the institutional aspects of the project, but the two are now receiving equal attention and emphasis.

Project Funding

The following table shows the amount of funds[1/] originally programmed for each project, and the estimated cost as of 30 June 1983.

1/ For purposes of standardization, the exchange rate between dollars and pesos has been adjusted for devaluations between 1975 and 1983. This was done because of the periodic releases of funds over this period.

Table 4: Estimated and Actual Costs (in Pesos)

Estimates in Project Agreement	Libmanan-Cabusao	Bula-Minalabac	Rinconada
- GOP Contribution	₱19.15 M	₱17.64 M	₱49.78 M
- USAID Contribution	₱28.14 M	₱24.12 M	₱40.2 M
TOTAL	₱47.29 M	₱41.76 M	₱89.98 M
Revised Total Cost as of June 30, 1983			
- GOP Contribution	₱59.56 M	₱46.52 M	₱50.41
- USAID Contribution	₱29.91 M	₱22.5 M	₱40.2 M
TOTAL	₱87.47	₱69.02	₱90.61
Percentage Difference in Total Cost	+ 84.97%	+ 65.28%	+ 0.15%

Both the Libmanan-Cabusao and Bula-Minalabac Projects have suffered significant cost overruns, while the Rinconada Project appears to be adhering closely to its original budget. A partial explanation for the difference is the improved planning ability that has been developed over the years. In the first two projects, there were problems with environmental damage, contractor performance, and management supervision; in the case of Bula-Minalabac, funding delays also played a role. The Rinconada Project has benefited from realistic planning by the PMO, prompt funding releases from NIA, and the willingness of management to actively support the contractors through such actions as securing equipment and supplies.

Particularly noteworthy has been the willingness of the Government of the Republic of the Philippines (GRP) to cover the added costs of the projects--about ₱42 million for Libmanan-Cabusao and ₱29 million for Bula-Minalabac. Due to deficiencies in construction, additional funds will be required for the Libmanan-Cabusao Project if it is to reach the original design standards; a portion of these funds has already been released by the GRP.

The Bula-Minalabac Project has been affected most severely by funding delays, mainly from the Ministry of Budget to MAR. These delays were compounded by the FAR (Fixed Amount Reimbursement) system employed by USAID, which requires the completion of certain phases before loan funds are released to reimburse the GRP. The GRP has already released 139 percent of its original estimated contribution requirement (as of June 1983) while USAID has only released 19 percent; in the Rinconada Project, USAID has released about four percent of its contribution and the GRP 64 percent.

As might be expected, the costs per hectare and per farmer beneficiary are highest in the Bula-Minalabac Project, which addresses a comprehensive set of village development activities.

Table 5: Project Costs Per Hectare and Per Farmer Beneficiary

	Libmanan-Cabusao	Bula-Minalabac	Rinconada
Cost Per Hectare	₱22,585	₱31,646	₱29,229
Cost Per Farmer Beneficiary	₱37,866	₱56,114	₱36,984

The costs for Libmanan will continue to rise until the system is fully operational. The estimated cost for Rinconada includes the investment in the development of the Lake Buhi water supply source, which will may eventually irrigate a much larger area (over 11,000 hectares); when this full area is developed, the costs of the infrastructure per unit of land and per beneficiary will drop.

Project Accomplishments

Based on the official progress reports of the PMOs, Table 6 shows the degree to which planned activities have been completed.

Table 6: Percent Completion of Activities

	Libmanan-Cabusao	Bula-Minalabac	Rinconada
Physical	100	82.25	58.37
Institutional	89.9	92.43	52.58
Operational	88.4	22.33	33.06

These figures need to be placed in perspective. The Libmanan-Cabusao Project was officially completed in 1981, and NIA submitted a Completion Report to USAID as required under the Project Agreement. However, there are ongoing activities for both the physical infrastructure and institutional components of the project, under NIA's direction. The divergence between physical/institutional and operational status at Bula-Minalabac is largely explained by delays in procurement of the pumps needed to make the system functional.

Perhaps a better indication of project accomplishments is effective delivery of water to parcels throughout the system, as shown by the area under irrigation that was harvested during the past two cropping seasons.

Table 7: Number of Hectares Harvested and Percent of Target for 1983 Dry Season and 1982 Wet Season

	Libmanan-Cabusao	Bula-Minalabac	Rinconada
1983 Dry Season			
- Number of Hectares	1672	374	956
- Percent of Target	43	17	31
1982 Wet Season			
- Number of Hectares	1968	458	1,025
- Percent of Target	51	21	33

Table 7 shows that only about half of the area served by the irrigation system is actually producing rice in the Libmanan-Cabusao Project; this is mainly due to technical deficiencies limiting water delivery, as outlined in Annex A. The technical investigation under this evaluation showed a high likelihood that the other two projects will achieve their objectives, though there are questions about the availability of the necessary technical and management skills for ongoing system operation and maintenance (See Chapters III and V).

Although irrigated rice yields are significantly higher than under rainfed agriculture, and in most cases, farmers are now able to produce two crops each year, the average yields achieved in the most recent seasons are considerably lower than those anticipated in the project designs.

Table 8: Wet and Dry Season Rice Yields and Project Paper (PP) Estimates (Metric Tons per hectare)

	Wet Season		Dry Season	
	1982	PP	1983	PP
Libmanan-Cabusao	2.5	3.75	2.99	4.75
Bula-Minalabac	4.0	4.2	4.25	4.8
Rinconada	2.9	3.9	3.12	4.1

Sources: The data for Libmanan-Cabusao came from IRRI which has a 119 farmer sample; Rinconada from data on about 50 farmers in progress reports and for Bula-Minalabac from field estimates.

The shortfall in mean yields achieved under irrigated conditions raises questions about the projected economic and financial returns of the projects (See Chapter IV).

Operations and Maintenance

Variations in the supply of water have occurred, in large part due to management factors in the three project systems.

Table 9: Water Supply Per Hectare Harvested for 1983 Dry Season and 1982 Wet Season (Cubic Meters)

	Libmanan-Cabusao	Bula-Minalabac	Rinconada
Dry Season	17,479 M^3	12,654 M^3	14,910 M^3
Wet Season	7,080 M^3	5,709 M^3	10,530 M^3

These variations have affected the operations and maintenance costs of the projects' irrigation systems. It appears that Libmanan-Cabusao costs are running significantly higher because of technical deficiencies in the system and because of poor management which has resulted in water losses. One surprising indication is that the operations and maintenance costs of the gravity system in Rinconada and the pump system in Bula-Minalabac are similar, though this may change when the additional pumps become operation in the Bula system and if energy costs continue to rise.

Table 10: Operations and Maintenance Costs Per Hectare and for System as a Whole, July 1, 1982-June 30, 1983

	Libmanan-Cabusao	Bula-Minalabac	Rinconada
O & M Cost Per Hectare	₱594	₱248	₱239
O & M Cost for System	₱993,472	₱113,718	₱245,000

Irrigation Fees and Collection Rates

The size of irrigation fees and collection rates differ substantially, as shown by the following table.

Table 11: Irrigation Fees and Collection Rates

	Libmanan-Cabusao	Bula-Minalabac	Rinconada
Irrigation Fee per Hectare per year[1/]	12 cavans	24 cavans	5 cavans
Percentage of farmers Receiving Water Fully Paid Up	30%	94%	45%

The fees are only collected from those farmers receiving water through the irrigation system. The fee in the Bula-Minalabac Project includes six cavans per year for land amortization and two cavans for membership dues in the Samahang Nayon. In addition to having the highest fee, this project also has the highest collection rate, which may be attributed to the level of farmer involvement in decision making.

None of the projects have data readily available indicating whether irrigation fees charged to farmers cover the operations and maintenance costs of the irrigation systems at their current stage of development, especially since all have ongoing management activities under the PMO. Of the three, the Bula-Minalabac Project shows the highest potential for covering costs, with both a high fee and an impressive payment rate, voluntary labor for system maintenance, and income from other sources to help fund the farmer organizations. The costs for operations and maintenance for the Rinconada Project involve periodic repairs, but the use of a gravity system insulates the project from rapid inflation in energy costs. With a combination of higher fees and payment rates, this could become a financially viable system. As currently structured, however, and with current fee and payment rates, significant support must continue to be provided by NIA. In all three systems, there is an obvious need for continued technical support.

Institutional Development

A major focus of all three projects has been the organization and development of the capacities of the Irrigators Associations (IAs). Participation has varied, as reflected in the following table which shows farmer-beneficiaries' access to irrigation water and participation in the respective IAs.

1/ Fees are stated in cavans of rice (1 cavan = 50 kg.) but are paid in cash. At the current price of ₱1.70/kg., one cavan is equivalent to ₱85.

Table 12: Beneficiaries Currently Receiving Water and Participation in the Irrigators Association

	Libmanan Cabusao	Bula-Minalabac	Rinconada
Current Beneficiaries	1,843	211	1,418
Membership	1,200	206	285
Percent Participation	65	98	20

The participation percentage is notably high in Bula-Minalabac, where local organizations are carrying out several other profit-making activities such as cooperative stores, processing facilities, and improved transport. To a large extent, this is traceable to the emphasis placed on farmer involvement from the outset, and a successful effort to build on the strengths of existing institutions. Rinconada appears to have the potential for higher participation, but this is restricted by the by-laws of the Irrigators Association which specify that membership cannot be offered to those farmers who have mortgaged their land. The effect of this is to exclude large numbers of farmers from the IA. Serious problems occurred in the Libmanan-Cabusao Project, in part because institutional development activities were ignored in the early stages and were later contracted to private institutions outside the NIA structure. Moreover, there have been no elections or means for accountability built into IA since the early days of the organization. The lack of this has led to entrenchment of the leadership and poor responsiveness to farmer interests. An attempt is being made to modify this situation by the Community Organizers now serving under NIA.

Training has received priority in all three projects but there have been problems with content, timeliness and follow-up (see Chapter III). The result is that little progress has been made in developing farmer capabilities to the point where (according to NIA policy and project plans), water users themselves would run the systems. Indeed, there appears to be a need for ongoing management and technical support from outside the IAs.

Supporting Institutions

In the early years of the BRBDP, conflicts tended to arise regarding the distribution of responsibilities and resources among public and private agencies involved in the IAD projects. Since then, cooperation has improved significantly. One important step was the creation of a Composite Management Group (CMG) for each project, under the chairmanship of the regional director of the lead agency concerned. Difficulties which the CMG cannot resolve are referred to the Bicol River Basin Development Program Coordinating Committee (BRBDPCC) which includes senior elected government officials as well as the Director of the BRBDPO. The BRBDPCC has assumed a strong policy role and has tackled operational issues when needed, in an effort to improve integration. Project coordinators working under the BRBDPO also serve a useful purpose in

identifying problems and facilitating action to resolve them. At the project level, the creation of Project Promotion Committees embracing private groups and local organizations (in addition to the IA) has also proven effective. Taken as a whole, major strides have been made in the past eight years toward improved coordination and integration.

The role of supporting institutions has become clearer, in part because different approaches have been used. One interesting finding comes from cases where private sector contractors, rather than government agencies, have been hired to implement institutional development initiatives. The results have been less than anticipated in two ways: the first is the problem of coordinating these efforts with the installation of physical facilities; and the second is a lack of capacity for such institutions to respond to farmer interests and project requirements.

These problems were evident when a private voluntary organization (the Economic Development Foundation) was contracted to carry out organizational development for the Libmanan-Cabusao IA (the task has since been assigned to Community Organizers who work directly for NIA). A research program is currently in progress at Libmanan-Cabusao through a contract with the International Rice Research Institute (IRRI). No results will be available until 1984, but the research design does not isolate all of the factors in farmers' decision making or in the project irrigation system itself. In contrast, the performance of contractors in physical infrastructure development has been generally adequate, perhaps because supervision and monitoring of construction progress and quality by the PMOs have been less difficult than in the case of institutional development.

In all three projects, the agricultural research and extension services remain quite weak in terms of their ability to influence farmers' production levels. It appears that rice yields vary considerably among farmers within the same project area, and also between different projects, but there is almost no hard data on the factors that account for these differences. The first step in strengthening agricultural support services is to establish priorities for adaptive research and extension methodologies; these priorities will depend, in turn, on improved data collection and analysis capacity in each project

The project designs did not include interventions in the supply and distribution of inputs or the marketing system that operates in the Basin. Because of pre-project debts that many farmers had accumulated, access to credit for purchasing inputs remains a serious problem. (The project designs all assumed that farmers shifting to irrigated production would be able to obtain credit for fertilizers, herbicides, insecticides and hired labor). In terms of marketing, private sector traders and millers have proven capable of buying and processing rice and other crops. The market share of the National Food Authority (NFA) has been somewhat smaller than anticipated. Private marketing agents offer lower prices but more timely payment than NFA

Farmer Involvement

Whether for public or private sector services, the one determinant that stands out in encouraging behavioral changes by farmers is the level of their involvement in decision making. The projects are rated in Table 13 on a scale of 4 (high involvement) to one (minimal or no interaction) at various stages of project development.

Table 13: Farmer Involvement in Project Development

	Libmanan-Cabusao	Bula-Minalabac	Rinconada
Conceptualization of the Project	1	3	1
Modification in Land Tenure Arrangements	1	4	2
Farmer Organization Arrangements	2	4	2
Farmer Training Requirements	1	2	2
Size of Irrigation Fees	1	3	3
Flow of Water Supply	2	4	3
Method of Collecting Irrigation Fees	1	4	2

Particularly because of the land consolidation scheme and its requirements for an agreed upon jointly-run system, there was heavy involvement by Bula-Minalabac farmers in decision making, beginning with the conceptualization of the project design. The decisions included farmer organizational arrangements and the size and method of collecting fees. As a consequence, this project stands out as the most noteworthy in terms of farmer commitments as measured in payment rates, quality of maintenance and additional agriculturally related investment.

CHAPTER THREE: LESSONS LEARNED FROM IAD PROJECTS IN THE BICOL REGION

INTRODUCTION

This chapter provides a comparative analysis of critical issues that were identified by the evaluation team, and that are generally applicable to IAD projects based on small farmer irrigation systems. The main thrust of the chapter is to draw general lessons and conclusions from the experience of project development and implementation in the Bicol Region. In some instances, there are clear lessons that can be used to guide future policy and planning for similar projects; in other instances, only provisional conclusions can be drawn at this point, but the issues are presented so that project managers, the BRBDPO and other agencies will give them further attention. The sections in this chapter refer frequently to the experience of individual projects when illustrating points or analyzing differences between the projects. Project-specific material may be found in the annexes to this report.

The sections that follow deal with critical issues, grouped under four headings, that cut across the three projects. The list of these issues was established through a process of intensive discussion among members of the evaluation team, using the overall framework of sustainability as a guide. The issues are examined in the following sequence.:

- Project planning and financing: project development strategies; sequencing and timing of activities; and funding arrangements;
- Technical considerations: irrigation system design, construction and operations; technology packages for increased production; and problem solving in the irrigation system;
- Institutional issues: farmer organizations; supporting institutions; and land tenure and reform; and
- Project management: organizational arrangements and linkages; and information systems for monitoring and evaluation.

PROJECT PLANNING AND FINANCING

Project Development Strategies

Different strategies were employed in the planning and design of the three projects, with varying results. A key factor appears to be the level of farmer involvement in decisionmaking at all stages of project development. In the Bula-Minalabac Project, farmers were involved from the start, and this has resulted in high payment rates of irrigation fees, excellent maintenance, and

the initiation of other social and commercial investments. In the other two projects, a "consultation model" was employed in the early stages: farmers were informed about planned activities, and had a chance to voice their opinions, but this took place after critical design decisions had already been made. Thus consultation was intended to gain farmers' acceptance of the new irrigation project, rather than to involve them directly in the planning process. Some of the difficulties that arose later can be traced to this strategy, though at Rinconada the PMO has consciously adjusted its approach during implementation, in order to compensate for shortcomings in the way the design was developed.

Should a project be multi-purpose or narrowed as much as possible to a single development initiative?

The Bula-Minalabac Project was designed to improve most aspects of farmers' lives, ranging from housing to the introduction of irrigated crop production practices and processing. In contrast, the other two projects were more narrowly focused on irrigation and related production activities. During implementation, additional agricultural support funds and activities were incorporated into the Libmanan-Cabusao Project. There is a generally accepted guideline that project activities should be limited to those most critical for improving production through irrigation. Bula-Minalabac suggests this is not always essential, though it may be a unique case because of the requirements of land consolidation and the prior existence of unusually strong local organizations. It indicates how much momentum and investment can be generated if a project has the flexibility and resources to respond to farmers' interests.

One possible strategy is to concentrate initially on the irrigation system, but build in the resources for other income-generating activities as the project evolves. Such a strategy would facilitate the development of Irrigators Associations, and it would help build organizational and financial capabilities early on in a project.

What is the value of pilot schemes and other information gathering activities?

Both Libmanan-Cabusao and Bula-Minalabac started with pilot schemes in the respective project areas. Neither pilot scheme had much influence on the project design, due to the pressures of the government and donor for rapidly initiating a larger-scale investment. Several of the problems in Libmanan could have been discovered and remedied if the pilot scheme had had sufficient time to operate.

Significant amounts of data were collected and analyzed during the project design processes. In large part, this information (except for the engineering data) was used to secure project approval; an alternative would be to redefine data requirements in a way that would be more directly useful to the implementors. Of particular significance would be carrying on a dialogue process with farmers to gain a consensus on what the project will do, as well as to gain a better understanding of local conditions.

This implies a process approach to project development, where knowledge about an area is gained through the development and testing of ideas with farmers. This is especially important for those activities that require behavioral changes by farmers. A more participatory approach has now been incorporated in all three projects. However, except for the Bula-Minalabac Project, the designs are fairly rigid and resources are not readily available for new activities. The acceptance of a more gradualistic and participatory approach to project development requires flexibility, particularly in funding for making changes as implementation proceeds.

Sequencing and timing

In all three projects, performance and results have been affected by the sequencing and timing of activities. The provision of human and financial resources on a timely basis, in response to sound and realistic implementation plans, has been essential. Even though financial and physical targets for the three projects have been set and monitored, there has been insufficient attention to step-by-step sequencing of activities and responsibilities, so that physical and institutional inputs are integrated to achieve desired project goals.

What are the significant stages for coordinating physical construction and institutional development?

As mentioned above, conceptualization and planning for an irrigation system need to be done jointly by the potential beneficiaries and technical specialists. This can best be accomplished through direct discussion and through the use of influential organizations (like the parish leaders, the church and youth groups who became involved in Bula-Minalabac). It is not necessary to begin formal organizational development in the pre-design phase, due to the long period of time usually required to secure project funding.

In the construction phase, it is important that farmers are fully advised about the work program and its progress. Farmers' knowledge about natural waterways, land levels and drainage can contribute to field modifications, as was shown in Bula-Minalabac and Rinconada. In addition, the layout and eventual use and maintenance of farm ditches benefit from farmer involvement. NIA's use of community organizers, working with farmers and engineers, appears to be a workable model.

Rinconada and Bula-Minalabac instituted systems for involving farmers in the construction of farm ditches. Groups of farmers working under contract such as in Rinconada provide the basis for building an effective Irrigators Association. The training process needs to be directly tied to the evolution of the physical infrastructure; skill training should be done within a thirty day period prior to the start of an activity, with field follow-up to ensure that desired behavioral changes have taken place.

For sustainable benefits, how much time and what elements should be built into project design?

On completion of an irrigation project, there is a need for at least a five-year period for solving technical problems and further development of the capabilities of the Irrigators Associations. Technical support and backstopping for the system must be established; Irrigators Associations made up entirely of farmers should not be expected to perform the full range of technical and management functions for the system. Finally, funding and a means for upgrading the system after completion need to be provided, which may require ten to twenty years. Taken together, these factors indicate that the conventional model for small farmer irrigation projects, in which investment and external technical support terminate after three to five years, is both unrealistic and unworkable. A significantly longer time horizon is required in planning such projects.

Funding Arrangements

All three projects have been financed by a combination of Philippine Government (GRP) and donor (USAID) resources. Each system has its own specific procedures and requirements for the release of funds. The vast majority of USAID financial support has been provided on a loan basis, with funds disbursed to reimburse the GRP for expenses incurred in project implementation. GRP funding support is provided by means of allocations and releases under the annual budgetary cycle for the agencies concerned.

As noted elsewhere in this report, the pace of implementation has been slower than planned in all three of these IAD projects. Given inflationary pressures in the Philippines and world economies, it is not surprising that time delays have given rise to significant cost escalation. It should be noted that in spite of the problems encountered in securing funds on a timely basis, the aggregate amount of GRP financial support for the projects has greatly exceeded the estimates prescribed in the respective Project Papers. USAID funding has not been increased above the levels authorized in the PPs.

How do the requirements of GRP and donor funding decision makers affect project development?

In the Bula-Minalabac project, considerable construction time was lost in the process of meeting GRP requirements for obtaining fund releases. This contributed to stagnation of construction activities, loss of interest among contractors, and increased project costs. Because of the size of the investment and the high per capita and per hectare costs, the GOP's Office of Budget and Management (OBM) had a legitimate interest in cost control and efficiency, but the end result was to slow down the rate of progress in physical construction, thereby reducing efficiency and raising costs.

Difficulties with the terms of the Fixed Amount Reimbursement (FAR) system used by USAID can be traced to design definitions about what constitutes a "completed" (and therefore reimbursable) activity. In some specific instances at Bula-Minalabac, reimbursement would not be made under the FAR system for a project component that was already operational, if it was only 95 percent complete according to design criteria.

Since the physical construction of all three projects has been carried out with funds advanced by the GRP, delayed FAR payments have not directly caused implementation delays. But the delays have indirectly weakened the cash flow of GRP agencies performing project functions, during a period of budgetary difficulties.

What are the reasons for and results of the delays in the release of funds?

Among the three projects only Bula-Minalabac suffered delays in the release of funds. This may be partly attributed to the fact that MAR is not an infrastructure agency. As an infrastructure agency, NIA has built up experience and capability essential for budget programming and timely project implementation.

The Bula-Minalabac Project at the outset had a poor construction performance due to problems of weather, inefficient contractors, design problems and late arrival of funds. Since the original PACD of December 31, 1982 could not be met, MAR requested USAID to grant a one-year extension. For USAID to approve a time extension, the PMO was required to design a detailed implementation plan for the turnover of the irrigation system. These events took place when the 1983 budget cycle was in process. When the PMO submitted its budget request, OBM required it to submit, in addition to the regular requirements, an AID-approved time extension of the PACD. Time constraints prevented the inclusion of the budget request in the General Appropriations Act which was approved in September 1982. As a result, the budget request was included in the Foreign Assisted Project Support (FAPS) fund which was approved in February 1983. Meanwhile, all construction activities ceased. It deprived the PMO of the opportunity to maximize construction work during the dry season of 1983. At the end of August, MAR finally obtained the requested funds.

Each year OBM provides an infrastructure project with a Cash Disbursement Ceiling (CDC) that authorizes disbursement of funds for the a 12-month period. A grace period of one quarter (through March 31) is provided to allow completion of activities in progress at the end of the year. Undisbursed funds either revert to the central Treasury, or they may be revalidated as of April 1. In the case of Bula, however, the CDC for 1982 had not been fully used by the end of the grace period (March 31, 1983). MAR's efforts to obtain revalidation had not succeeded as of late August; valuable time was lost in the dry season, which offers the best opportunity to complete physical construction activities.

What is the effectiveness of donor funding arrangements such as the various FAR systems used by USAID?

Since the evaluation team had no information on funding arrangements of various foreign donors, the analysis is confined to the FAR method. It is reported that on ADB projects, NIA deposits a certain percentage of authorized project funds in a bank account, from which operating capital may be drawn for ADB-assisted projects when government funds are delayed. As a result of evaluations in 1981 and 1982, the AID FARA terms for Bula-Minalabac were amended to break down components by sub-activities in order to facilitate reimbursements for completed sub-activities. A similar system is now used for reimbursement at Rinconada.

Is the release of funds to a lead agency an impediment to inter-agency cooperation and integration?

The release of funds to a lead agency has presented no impediment with respect to inter-agency cooperation and integration. However, in the beginning of 1983, the GRP's budget retrenchment policy limited the lead agencies' ability to extend honoraria to personnel of cooperating agencies. Salaries are paid by their mother agencies, but financial incentives linked to projects managed by other agencies have been reduced.

TECHNOLOGICAL CONSIDERATIONS

Irrigation System Design, Construction and Operation

Technical design criteria for the three Bicol irrigation projects, and in the Philippines generally, are fairly well standardized and agree with those in other areas of the world where irrigation is practiced. The criterion for crop requirement of 1.5 liters per second per hectare (lps/ha) is used in determining the diversion capacity, and the sizing of canals is adjusted upwards or downwards depending upon soil conditions controlling seepage and whether or not conveyance channels are lined. The resulting technical designs for the three projects were found to be basically sound. However, during implementation some shortcomings surfaced, some of which were corrected in the later projects, and can be avoided in the future. This section discusses several key questions, based on a comparative analysis.

What are the most important considerations in the conceptualization of a small farmer irrigation system, including content and process?

The consensus among project leaders and others contacted was that the project design must include the people. This does not mean that the technical design will be changed, but eventually the people are the ones who will make it work. The relative acceptance and success at Bula substantiate this consensus. The involvement of local leaders and farmers early in the design phase is extremely important, to get them thinking about the new resource which will be available to them, about how it will change their farming practices and potential income, and about what their responsibilities and roles will be.

The involvement of farmers and landowners during the field location of canals and farm ditches is even more important. They usually know their land, how the water moves and where their delivery point should be. Minor adjustments of the "paper location" of structures in the field to match the topography with the farmers' wishes will be an aid in eliminating illegal tapping and other problems when operations begin.

What design criteria should be used to insure reliable systems in different environments?

Although the technical criteria are well established, the criteria for the operation and maintenance of the systems were found to be vague or non-existent. An operations manual tieing the operations to the design is seen to be a pressing need in two of the projects (Libmanan-Cabusao and Bula-Minalabac). The manual should include a model of the operational plan assumed by the designers, instructions for operating the pumps and putting the system in operation, and the water delivery method that should be followed. Additionally, the manual should include a listing of operations and maintenance personnel, the duties they perform (job descriptions), and the qualifications required. The training of personnel both for operating and maintaining the system and for training farmers in managing and using water in combination with other inputs, should also be developed as an integral part of the manual. Estimates of recurring costs for O & M could also be made if this is included as a design function.

Removal of excess water is usually considered to be an integral part of an irrigation system. However, drainage criteria and the possible reuse of water appear to deserve more emphasis. Major drainage problems in one of the areas have been aggravated rather than mitigated by the project. Canal and roadway embankments often force the water to take a more circuitous route to natural drainage outlets, substantially increasing the draindown time. This can be a serious problem and deserves more attention.

What should the design incorporate to form the basis for a workable system?

As indicated above, the design should incorporate the development of an operations manual specifically for the project. Certain assumptions are made by the designers in formulating the project. These assumptions may place limitations on how the system can function, and further justify the need for a specific guide to the operations. Additionally, the designers should acquaint themselves with the field conditions and the people who will eventually use the system, and should be identified with the project during the construction phase. The general belief is that farmers' acceptance of a project is enhanced if top project personnel are more permanent and frequent changes of personnel are avoided.

What types of modifications are needed in the construction phase and how can these decisions be most effectively accomplished?

The modifications required during the construction phase in the three projects are those brought about by construction difficulties, such as the cut and cover requirements at Libmanan; or those required to match the system to

the topography, requiring minor shifts in the alignment of the canals, or the inclusion of relift pumps to serve lands found to be too high. These changes have been found to be relatively straightforward and not a major problem.

What major activities should be incorporated into project design for effective operations and maintenance and system betterment?

In addition to an operations manual, a major concern for the pump projects is the escalating cost of power. This emphasizes the need for an annual review of project operations with the aim of identifying water losses and inefficient operations that increase energy consumption. From these reviews and operating experience, problems will be quickly identified and solved, and a "system betterment" program is certain to evolve. "Betterment" includes more efficient water distribution plans and schedules for preventive maintenance, as well as replacement of worn out structures and facilities with improved designs, location or materials. This results in a continual and planned upgrading of the system over the years. The need for forward planning toward system betterment was evident in all three projects.

Technology Packages

There are many constraints to farming in a strictly rainfed system, including crop varieties, planting dates, fertilizer practices, diseases, pests and markets. The assured availability of water through irrigation, relaxes some of these constraints, allowing a series of technological inputs that can be packaged to bring about improvement of farmer production and net incomes. Some aspects of the technological package for irrigated rice production were assessed in this evaluation.

With respect to water management, what problems do farmers experience in shifting from rainfed agriculture to an irrigated system?

Experience within the three projects and elsewhere in the Philippines indicates that the individual farmers are quick to shift to irrigation from rainfed farming. In fact, their eagerness to obtain water leads to problems such as "illegal tapping" and unwillingness to submit to delivery schedules and water control. Water management at the farm level is therefore a major problem, especially at Libmanan. There is a strong tendency for the farmers at the "head end" to take more than their fair share, leaving little or no water for the "tail enders". This also induces other problems, such as leaching of fertilizers where over-irrigation is practiced, and drainage problems resulting from the uncontrolled runoff related to excessive irrigation. Nevertheless, the shift from rainfed farming to irrigation is coincident with the availability of irrigation water. The farmer knows that he has flexibility in planting time, because the water is there. Timely planting results, since it is not necessary to wait for rain. He has the assurance that he can plant and fertilize for high yields without fear of adverse effects due to drought. He will adopt improved farming practices more quickly because the drought hazard is eliminated. The potential for increased production was voiced by all farmers interviewed (two crops instead of one, with the yield from each crop as much as double the yield under rainfed conditions).

Are rice production innovations available and acceptable?

Technologies that are capable of raising rice yields under irrigated conditions were available at the time the systems were designed. These technologies are subject to continuing modification and improvement as a result of ongoing research programs being conducted by IRRI and other organizations. In terms of adoption rates by farmers in the project areas, however, available data show wide variation in the use of recommended fertilizers, and to a lesser extent, herbicide and insecticide applications. These variations appear to reflect differences in access to the elements in the technology package--specifically, problems in obtaining credit needed to finance purchase of inputs, whose prices have increased drastically due to recent devaluations of the peso.

In terms of the water management practices recommended as part of the technology package, none of the systems has established the type of operations plan needed to ensure timely and equitable delivery of water to all parcels. In the absence of such a plan, on-farm water management practices appear to vary widely within each system, with some farmers using water in fairly close conformity with recommendations, and others either applying excessive amounts or failing to obtain enough.

In overall terms, while a technology package exists, there are serious institutional and organizational constraints that must be removed before the package can be used effectively by farmers throughout each of the systems.

Problem Solving in the System

The technical design of the project with the standardized design criteria, although difficult, is rather straightforward as compared to difficulties of construction and operation. Important technical issues arise in providing for water distribution and system maintenance.

What methods are successful in obtaining equitable water distribution?

The equitable distribution of water is the major unsolved problem on all three projects. The evaluation team believes that this is because operational plans are not complete or fully implemented. The designs contemplated that rotation delivery would be employed within rotation areas and that continuous delivery averaging 1.5 lps/ha would be maintained to the area. Rotation plans have not yet been developed, although progress is being made. At Rinconada and Bula-Minalabac, water is only available to a small part of the total project (the Upper Lalo area in Rinconada and Phase I at Bula). These areas could serve as pilot areas for developing and testing rotation delivery plans acceptable to the farmers. The relative strength of the IA will be an important factor in obtaining compliance with water scheduling and rotation plans when they are put in operation.

At Libmanan-Cabusao, the problem is more complex. The system has been certified as physically complete.1/ However, technically it is not yet fully operational and it was put in service without a water distribution plan. Head-end farmers diverted all of the water to their farms, either by blocking the system or by illegal tapping, resulting in no water for the tail-enders. A block or zone system of rotation is employed to correct the situation and force head-end users to let water pass to the zones designated to receive water on given days. Tail-end farmers now get some water, but there is still maldistribution within the zones. The evaluation team concluded that the present method of distribution is not compatible with the system as it was designed and constructed. Canals and laterals are too small in the tail-end zones to accommodate all of the flow to those zones. This makes it necessary to adopt a delivery plan more compatible with what was envisioned by the designers. Developing a compatible plan will be fairly simple, but getting farmers to shift from the present pattern and comply with the plan will take some time.

At Bula-Minalabac, the synchronization of all 16 pumps with the crop water requirements, delivery schedules and cropping calendar presents a complex operational plan that has not yet fully evolved. An operational model is seen to be the first step towards the solution of this problem. The development of a sound water delivery schedule and an operations manual will certainly help. At Rinconada, an operations manual in the Bicol dialect has been completed and is being used in the training of farmers and project operations personnel.

Who should be responsible for system maintenance?

System maintenance on all three projects is and will be a continuing problem. The problem is most severe at Libmanan-Cabusao because the system is considered by NIA to be fully operational. Except for the main canal and pumping plant, the system has been turned over to the IA for maintenance, but the farmers are not yet fully prepared or organized for this responsibility. Additionally, a considerable part of the system was not fully operational to design specifications when the pumps were first turned on (see Annex A). These limitations must be corrected before the full area can be served efficiently.

There is no consensus as to who should be responsible for system maintenance. All projects have a "turnover" schedule indicating that the farmers (IA) should assume full responsibility by a given date. However, the major issue is whether or not the IA will have the technical and managerial competence to do so. Technical backstopping and specialized manpower from outside the IA will certainly be necessary.

1/ Completion Report, Libmanan/Cabusao Integrated Area Development Project, NIA, March 1982.

INSTITUTIONAL DEVELOPMENT

Farmer Organizations

The organizational efforts in Bula-Minalabac stand out as an example of how much can be accomplished if institutional considerations are given the same priority as the development of physical infrastructure. Farmers in that project have a high payment rate of irrigation fees, have contributed to the construction and maintenance of the system, have modified their cultivation practices and have undertaken broader initiatives to serve their requirements. In contrast, in Libmanan-Cabusao, cohesive community groupings with willingness and capacity to resolve conflicts have not emerged. The organizational efforts in Rinconada are relatively new, but there appear to be several problems that have implications for the promotion of farmer organizations.

What is the relationship between the physical design of an irrigation system and the process of development for a farmers' organization?

The first significant consideration is the need to begin organizational efforts at the time when an irrigation system is being conceptualized and planned. In the Bula-Minalabac Project, influential local leaders and farmers were involved immediately, with promotional activities done through existing organizations such as the Samahang Nayon, church and youth groups. The objectives of the project were jointly determined, with a definition of each group's responsibilities over time. The absence of joint decision-making in Libmanan-Cabusao led to unfulfilled expectations, conflicts among farmers over water rights, and an unwillingness to commit their time and other resources to the success of the project. Initially in the Rinconada Project, there was little involvement of farmers in the planning of the rehabilitation effort; however, for the new construction under the project, this weakness has been corrected.

Another factor of importance is the coverage of the farmer organization and its fit with the layout of the irrigation system. The potential for developing a cohesive and effective organization is enhanced if it is structured to include water users with not only a common source of supply, but also common diversion and drainage facilities. If the lower levels of an organization are not matched with the layout of the system, competing interests and concerns arise which do not allow the leadership of a grouping to fully represent concerns. At Bula-Minalabac, and to a lesser extent, Rinconada, the organizational structure is consistent with system layout, which encourages farmers to act on shared problems. Although modifications towards this aim are being made at Libmanan-Cabusao, there are still inconsistencies that may prolong the project's past history of farmer conflicts.

Is it better to create a set of single-purpose organizations or to try and develop a comprehensive, multi-purpose organizations?

Another consideration in the development of a farmer organization is whether its role is confined to the functioning of the irrigation system, or is expanded to include other activities. The organizational strategy in the Libmanan-Cabusao and Rinconada Projects emphasizes the evolution of a single-purpose IA, while the Bula-Minalabac Project has encouraged several functions, ranging from the financing and maintenance of the irrigation system to broader community development activities. The Bula-Minalabac PMO has attempted to consolidate leadership and direction of all local organizations (e.g. Irrigators Association, Samahang Nayon, Agrarian Reform Beneficiaries Association) while there is a proliferation of separate organizations in the other two project areas. The centralized approach of the Bula-Minalabac Project has included efforts to increase the financial viability of the organization through investments in transport, processing, and other farmer concerns.

This comparison suggests that the strength of an Irrigators Association will be increased as it addresses immediate concerns of its membership, and further as the organizational arrangements in a project area are consolidated to serve farmer needs. The implications for organizational development are to first concentrate on specific, farmer-defined needs and to gradually extend activities as organizational capabilities expand, in particular, to those activities which increase financial resources. Although there may be requirements for separate organizations to gain access to outside resources and services (such as loans), the success of all efforts will depend on the integration and effectiveness of local leadership for these organizations.

What incentives are needed to ensure active farmer participation in an organization under strong local leadership?

The question of how many functions an organization should perform highlights the issue of incentives for belonging to an Irrigators Association. Except in the case of the Bula-Minalabac Project, farmers appear to see the IA only as a mechanism for collecting fees and for organizing maintenance of the system. Given the past history of non-enforcement of loan repayments, the farmers tend to expect all assistance to be without obligation and are therefore reluctant to make the necessary financial commitments. A well-managed water supply system will go a long way toward securing their support, but until this is available (and the requirements are enforced), cooperation will be difficult to achieve. This suggests further that the organizational effort should be evolutionary, and planned to maximize the incentives for participation (i.e. meeting particular needs) in light of the timetable for establishing the irrigation system.

For organizational development, one key is the quality and commitment of leadership. The organizational effort in the Bula-Minalabac Project has excelled due to the presence of a leadership committed to the objectives of

the project, and more broadly to the economic development of the area. This is a unique circumstance which is hard to replicate. However, there are ways to secure the same type of commitment and accountability. One is to have periodic elections. For example, the original leadership of the IA in the Libmanan-Cabusao Project has not faced the test of re-election over the past eight years, which has resulted in inactivity, entrenchment, and charges of favoritism.

Another way is to identify methods for increasing the involvement of farmer leadership in the decision making process; this has begun to work in Bula-Minalabac Project through the interest and responsiveness of project management, in Libmanan-Cabusao through the joint management committee, and in Rinconada through the contractual arrangements made between NIA and the Irrigators Association. A third way is through the enforcement of the provisions in the by-laws of IA, but, this will only occur if there is full participation of members in deciding what the regulations should be.

What has been learned from the projects regarding the type, duration and timing of training to build the capabilities of farmer organizations?

One broad lesson, reflected in the contrasting performance of the three projects, is that the training process must be closely coordinated with the phasing of design and implementation. Thus training courses must be geared to emphasize the skills and attitudinal changes that the leadership of the IA, and the membership at large, will need in the planning, construction and operational phases of an irrigation project. A common problem, when training activities are not timed appropriately, is that newly acquired knowledge and skills are not applied, because the situation does not call for them: training tends to occur either too early or too late to have maximum impact.

One element that has been missing in the training activities of these project is verification of impact through follow-up evaluations after the training itself has been completed. As noted elsewhere, project monitoring and progress reports have been concerned more with meeting targets (e.g., the number of courses held, or the number of people attending) rather than with determining whether new skills are adopted and applied, or whether significant attitudinal changes are reflected in farmers' individual and collective actions.

Another factor that weakened the institutional development effort, and the commitment to farmer training, was the unequal importance given to the institutional and agricultural staff in the Libmanan-Cabusao PMO structure. This was compounded by decision to delegate the organization of the IA to an outside organization (EDFP), as well as personality conflicts among NIA and line agency personnel which weakened the inter-agency effort. These problems have since been resolved, but they caused serious delays and misunderstandings in the project's training program.

Supporting Institutions

The objectives of all three projects include increased production of rice and higher incomes for the farmers served by the irrigation systems in the project areas. Achievement of these objectives depends not only on the delivery of water, and improved crop production techniques, but also on the farmers' capacity to avail themselves of services for input supply, agricultural extension, credit and marketing. The integrated nature of the IAD projects shows that the need for these services was well understood when the projects were first identified. This section examines the degree to which institutions in the Bicol Region have been able to deliver such services on a timely basis, in order to meet farmers' needs and serve project objectives.

The accompanying table reveals a mixed record. Some of the difficulties already noted in the Libmanan-Cabusao Project, regarding farmers' participation in the project and progress with organizational development, are reflected in the ratings. While there are encouraging results in the other two projects, in terms of input supply and post-harvest facilities, credit problems remain important and hard to resolve.

How essential are agricultural extension services for promoting irrigated rice production technologies in IAD projects?

There is a serious shortage of reliable data on production practices at the farm level, so it is impossible to compare the productivity of farmers who regularly receive MA extension advice and those who do not. MA field staff have carried out formal farmer training, field days, demonstration plots and trials, under the auspices of each PMO. The fact that yield levels in all three project areas are generally observed to be lower than projected in the feasibility studies suggests that improved husbandry practices and uses of recommended inputs have not yet taken hold on a broad scale. Within the Bula project, however, there is evidence of high adoption rates among farmers, even though formal extension programs have not yet become fully operational. This suggests that informal mechanisms of knowledge transfer may operate quite effectively in a situation where broad-based support for a project intervention has been established among farmers.

To state the conclusion somewhat differently, there is no evidence to confirm popular generalizations that small farmers are strongly resistant to change, and will only alter their production systems if they receive a high degree of attention from agricultural extension agents. The process of innovation may, on the contrary, acquire a momentum of its own when the physical and organizational preconditions for technological change are in place.

What does the introduction of irrigated rice production imply in terms of the need for agricultural credit, and the terms on which farmers obtain it?

All three projects anticipated an expansion of demand for production credit among farmers who gained access to the new irrigation systems. Financial and economic projections assumed that farmers shifting into

Table 14

Degree of Change in Agricultural Services

	Libmanan/ Cabusao	Bula Minalabac	Rinconada
Adoption of rice production innovations	+1	+2	+2
Availability of inputs on a timely basis	+1	+2	+2
Availability of credit on a timely basis	+1	+1	+1
Farmers' repayment of production credit	-2	+1	+2
Farmers' repayment of land amortization costs	-2	+2	+1
Availability of storage facilities	-1	+2	+2
Availability of processing facilities	+2	+2	+2
Improvement in marketing arrangements	+1	+2	+1

Key
+2 Significantly positive
+1 Marginally positive
-1 Marginally negative
-2 Significantly negative

irrigated rice farming would intensify production by applying recommended inputs (seed, fertilizer, herbicides and insecticides) and also by increasing (hired) labor inputs. Given the marginal income position of most small farmers in the project areas, their ability to follow an intensification regime is closely linked with access to credit. From the lender's point of view, however, there are high costs and risks associated with small farmer credit; the experience with Masagana 99 (for which repayment rates have fallen from 90 percent in the mid-70's to about 50 percent today) is one reason for caution. (For example, the Rural Bank of Libmanan is owed ₱1.9 million in delinquent loans.) Many farmers are denied access to additional credit because they have defaulted or are in arrears on old loans. MA guidelines state that a loan of ₱1,300/ha is adequate for cash expenditures in irrigated rice production during one season; yet due to large increases in the price of imported inputs, many farmers cannot borrow enough to meet their real costs. At the same time, the amount being loaned and the interest it yields are so small that banks cannot afford to monitor the utilization and repayment of the loan closely. Thus they have no real incentive to serve small farmers.

It makes sense to change loan requirement guidelines for individual borrowers (perhaps to ₱2000-2500 per ha.), but only if rural credit services themselves can be made financially viable. To do so means that lenders must keep their administrative (overhead) costs down, while at the same time improving repayment rates. This poses a real dilemma for the banks. Current budgetary pressures on the national government make it highly unlikely that the rural banking industry will be subsidized with government funds, allowing the banks to set artificially low interest rates or to be reimbursed for losses on bad loans. Because of its commitment to rural development and the need to ensure that the investment in irrigation systems pays off, the GRP has a natural interest in seeing that rural banks serve larger numbers of farmers while maintaining their financial viability.

Among the low-cost measures that the banks might explore is the use of mobile units (such as PNB's "bank on wheels") on a seasonal basis, to reach larger numbers of potential borrowers and to strengthen collection procedures. As the numbers increase, it will become important to use some form of organizational grouping--perhaps the Irrigators Association, or the Samahang Nayon, or a subdivision of either one--as the borrowing entity, with collective responsibility for loan repayment. This mechanism would help to reduce transaction costs and provides a form of peer pressure to repay loans so that members of the group stay eligible for loans in the future.

There are no simple solutions to these credit issues, but they deserve serious attention. Without timely access to credit for rice production, aggregate yields in the IAD project areas will not reach a level that justifies the investment in irrigation.

Should facilities for storage, processing and marketing be the responsibility of the project, other public institutions, or the private sector?

Because of marginal incomes, farmers do not have the option of storing their rice and waiting for better prices. The great majority sell undried palay to middlemen at a discount rather than selling it to NFA. The NFA is mandated to absorb about 10 percent of the region's rice output for supply/price stabilization purposes, but its storage facilities effectively limit capacity to 6-8 percent. The NFA is generally shunned by farmers, because of slow payment and its requirement that palay should have at least 14 percent moisture content and that a farmer's outstanding loan obligations must be deducted from the proceeds of a sale.

Thus processing and marketing services are largely provided by middlemen - rice traders and millers. Because farmers organizations are still weak--i.e., inactive membership and a lack of seed capital due to low capital build-up - they cannot yet be utilized to fulfill their intended roles for processing and marketing to improve the incomes of individual farmers. So long as private traders and millers continue to dominate the local market, there are strong incentives for farmers to broaden their organizational base in order to compete more effectively and secure better prices for rice and other crops.

In anticipation of increased rice production in the project areas, especially in Libmanan and Rinconada, representation should be made with the NFA not to delay further the construction of warehouses projected for these areas. Additional NFA buying stations should also be established.

For the long term, the MA through the Agricultural Support Project should accelerate the re-vitalization and identification of viable Samahang Nayons which could be encouraged to establish warehouses and engage in palay processing and trading, to improve farmers' incomes and capital formation.

Land Tenure Issues

Land reform has been implemented as planned in the three projects, with a transfer of ownership of lands actually tilled by small farmers. The purpose was to abolish tenancy in these areas; as a result, thousands of share tenants have become either amortizing owners or leasehold farmers. The number of benefiting farmers varies among the three project areas, with a contrast between Bula-Minalabac (3.6% leaseholders, 95.3% amortizing owners, and 1.1% owner operators) and Libmanan-Cabusao (29.2% leaseholders; 61.3% amortizing owners and 9.7% owner operators).

By law, land reform beneficiaries are not allowed to sell or fragment the land they acquired through this program. Land can only be transferred to the government or to one of the heirs. Non-payment of lease or amortization/ obligations for at least two successive crop years is likewise a violation, and punishable by law. If a farmer does not follow these provisions, the Samahang Nayon is entitled to cultivate his lands until the time that the arrears are paid. All farmer beneficiaries are aware of this rule.

To what extent and how do various types of land tenure problems affect the development of a small farmer irrigation system?

The abolition of tenancy has helped the development of a small irrigation system as compared to the past, when the farmer's tenural status was not certain. However, there are still problems that hamper efforts by project management to attain sustainable operations: for example fragmented holdings situated far apart, causing illegal tapping of irrigation water; parcels too small in size to produce enough for family subsistence; or farmers residing too far from their respective farms, consuming a high percentage of daily man-hours in travel (in some cases only about 3 to 5 hours are spent on the farm).

In Libmanan-Cabusao and the Buhi/Lalo area, illegal transfers of land are reported to be a significant problem. In Libmanan it has been estimated that as many as 20 percent of the farmer-beneficiaries have illegally transferred land rights, and in Buhi-Lalo, about 10 to 15% are believed to have done so. In most cases farmers with holdings of less than one hectare are the ones selling land rights, usually because the produce from farming is not enough to support the family needs, or they cannot obtain the required package of inputs and services. If this drift is not controlled, the lands transferred via land reform to small farmers will eventually be in the hands of a new set of owners.

What conclusions can be reached regarding the replicability of approaches to solving land tenure problems?

The approach employed in the Bula-Minalabac project to solve tenure problems would improve other systems and future projects. This included establishment of compact community sites within the project area, which improved farmers' participation. Consolidation and restructuring of land holdings into farm unit, (ideally rectangular in shape) in a radius of 3 km to 4 km from farmers' residences, has avoided illegal tapping of irrigation water. Production has increased, and collection of irrigation fees and land amortization payments has worked smoothly to date.

To what extent and how do modifications in the land tenure system affect the success of small farmer irrigation projects?

The modifications of land tenure adopted at Bula proved successful in:

- Increasing yields, leading to a stronger capability to pay fees and amortization costs;
- Strengthening institutions with better participation of members in the operation and maintenance of the system; and
- Simplifying acquisition of right-of-ways and other land for public use.

PROJECT MANAGEMENT

Organizational Arrangements

The implementation of the three projects required effective institutional and technical development, in an integrated framework. Various approaches have been used and modified over time, and certain lessons may be drawn from this body of experience.

At what level, and to what degree, should decision making for project development and implementation be centralized? Does the lead agency concept provide for effective decision making?

The problem of integration has plagued all three projects from the outset. In the initial stages of the Bula-Minalabac Project, there was a difficulty in terms of technical inputs with MAR designated as the lead agency and NIA providing key technical services and supervision. In the Libmanan-Cabusao and Rinconada Projects, NIA has been the lead agency, with the result that institutional considerations assumed secondary importance to the physical development program, although NIA has begun to shift towards a more participatory approach. These circumstances raise questions about the appropriateness of the lead agency concept.

The lead agency approach places accountability in a single agency, and if the lead agency is the NIA, the flow of funding and other resources is facilitated. On the other hand, it is also readily apparent that the institutional aspects of a project tend to be neglected if the lead agency is construction-oriented. Likewise, when an agency such as MAR heads a project, it is just as apparent that the necessary technical support for full system development and improvement cannot be provided from within the agency itself. To a large extent, this problem appears to be one of internal project structuring and coordination; it argues for positioning the management of the technical and institutional components of a project on the same level. One model might be to have a general manager/planner as project director, and specialists representing the two components of the project as assistant directors.

Institutional development generally depends on inputs from several agencies, such as the Ministries of Agrarian Reform and Agriculture. Rather than having an agency-specific institutional development specialist as assistant manager, another option would be to give authority and resources to the BRBDPO for carrying out this responsibility. Such a move might facilitate the use of existing manpower resources from the cooperating agencies, place the necessary priority on institutional development, and spare NIA from having to recruit a duplicative staff (i.e. the community organizers). Moreover, it could achieve the same level of direction that the Bula-Minalabac Project has obtained.

What can be done to improve inter-agency coordination?

Beyond the internal structuring of a project, a key factor appears to be the coordination mechanisms used to secure support from other "non-lead" agencies. Although there were problems in the Libmanan-Cabusao Project at the outset, an effective system has evolved over the past eight years which facilitates cooperation and integration. The mechanism includes the participation of concerned agencies in a Composite Management Group, chaired by the Regional Director of the lead agency. Policy and program difficulties are then referred to the Bicol River Basin Coordination Committee.

How important is the participation of private sector entities and how can they be effectively integrated into an IAD project?

The BRBDPO and individual projects have formed committees or councils of representatives of the private sector. These mechanisms have been quite effective, especially in the stage of project formulation and in identifying problems after implementation. Operationally, an example is the use of church and youth groups to help involve families in the conceptualization and design of Bula-Minalabac. When a system is completed, such as in Libmanan-Cabusao, the Promotion Committee helps to call attention to technical and organizational deficiencies.

What is the most appropriate role for private contractors?

It appears that private contractors, with assistance from the Project Management Offices, are an effective means for accomplishing the necessary construction. Problems have arisen in all three projects when private contractors have been asked to intervene and assist with institutional development and socio-economic analyses for decision-making. This mechanism has proven unproductive, mainly due to outsiders' unfamiliarity with the project area or a preoccupation with methodology rather than problem solving.

The experience in the three projects suggests that with the exception of physical infrastructure development, where outside contractors fill an obvious need and enjoy a comparative advantage, other functions in project implementation should be managed and executed by agency personnel.

Monitoring and Evaluation Systems

The project design documents of the three irrigation projects provided for monitoring and evaluation (M & E) systems, and included logframes which attempt to put some order and logic into M & E for each project. Unfortunately, these systems were not fully implemented. Reporting and data collection activities during the course of implementation took on a different orientation, reflecting informal management practices and communication methods.

Does the monitoring system flag and successfully encourage the solving of problems?

Project managers seem to view monitoring and reporting as necessary compliance with the requirements of the donor and their agencies, rather than as a management decision-making tool. Therefore, reporting has generally been more informative than action-oriented. It consists primarily of progress reporting, comparing accomplishment versus the targets for the month or quarter, and often fails to bring out implementation constraints which require management attention and action. This form of monitoring is also biased towards infrastructure development, with less emphasis on institutional and agricultural development. Yet experience has shown that the latter tend to pose the more critical problems, from both an operational and a policy standpoint.

In the Rinconada Project, for example, some environmental problems were noted by local officials, but these were not documented in progress reports, and no study of how these would directly affect the livelihood of the project's beneficiaries took place until local officials elevated this to the BRBDPO and the inter-agency Composite Management Group.

It was demonstrated in the Rinconada Project that systematic data collection can be undertaken on aspects of agricultural and institutional development in the project area. As required by USAID, a survey on the beneficiaries is done by NIA-PMO for each cropping season. A report is then prepared for each season and submitted to the Central Office of NIA, USAID and BRBDPO. While the project is able to generate a good data base, analysis of the data is lacking. Moreover, these activities are scheduled to be discontinued at the termination of the loan (i.e. when construction is complete).

Due to the limitations in their formal reporting systems, both the PMOs and the BRBDPO rely more on informal methods for problem identification, and to a certain extent, problem solving. The PMO staff and the BRBDP Project Coordinators interact directly with project beneficiaries, staff and local officials, and in the process some problems are brought to their attention. Project managers have direct access to their agencies' Regional Directors, and through them to the central offices. Issues which need their intervention are communicated on a person-to-person basis.

Does the project information system promote or discourage the dialogue between levels for increasing the likelihood of project success?

At the project level, the formal reporting system exists independent of informal consultations between project management and farmer beneficiaries. The latter are not regular, although management feels that interaction between the engineering and institutional development staff of the PMO and the farmers is sufficient to bring a consensus on the appropriate methods of project implementation.

The BRBDPO, as secretariat of the BRBCC, finds limited value in the PMO reports for identifying issues which are the BRBCC's concern. It relies heavily, therefore, on the reports and investigations of its own Project Coordinators to do this.

Have expenditures on research and evaluation resulted in changes in project development and implementation?

Presently, there are several research and evaluation studies being conducted in the three project areas. At the end of each cropping season, the PMO at Libmanan-Cabusao conducted a survey on the socio-economic status of its target beneficiaries and the extent of agricultural development in the project area, until the closure of the loan in 1981. For the Rinconada area, similar surveys are ongoing and are expected to continue until the completion of the physical structures. For both areas, baseline data were established at the start of implementation. The MAR-Central Office likewise has surveys in the Bula-Minalabac project.

As part of its impact evaluation program, the BRBDPO conducts a similar survey (including a baseline survey) on the three areas, although not as frequently as the PMOs, and covering a different sample. The BRBDPO has also sponsored the Bicol Multi-Purpose Survey in 1978 and 1983, which covered three provinces in the region.

In addition to the above are studies conducted by non-governmental research institutions such as EDF, IRRI, Ateneo de Naga (Documentation Research on BIAD III) and UP, some of which are USAID-supported. USAID also undertakes a mid-project evaluations, usually on a joint basis with GRP agencies.

Considerable information thus exists on these projects. Unfortunately, the primary user agencies such as NIA, MAR, BRBDPO and USAID have not placed enough emphasis on data analysis and dissemination of results. Some surveys, such as the Libmanan-Cabusao agricultural surveys and the documentation research for BIAD III, were discontinued at a critical stage of project development. Due to funding and manpower constraints and methodological problems, the BRBDPO surveys have not been processed and analyzed, thus the timeliness of the information is lost. There is little concrete evidence that the information generated in the BMS has influenced project development and implementation.

Thus far, eight formal USAID/GRP evaluations have been undertaken among the three projects. The reports provide a wealth of detail on the implementation process in each project. However, there is no formal system of follow-up to determine if the recommendations have been implemented in the manner desired, or if there have been deviations. The reports are likewise not always explicit as to which agency is responsible for carrying out each recommendation. The implicit assumption is that the PMO will take the lead, but subsequent actions are not regularly monitored and reported.

There is obviously a need for more regular evaluation of the three projects. As the coordinating office of the project and secretariat of the BRBCC, the BRBDPO should initiate it and involve the appropriate line agencies. In addition to assessing project performance, these evaluation exercises should be addressed to the investigation of specific issues. Regularity will create a demand for improving and maintaining a good information base, facilitate decision making and likewise ensure continuity and follow-up on issues which require continuing attention by management. Based on such reviews, the BRBDPO can embrace its coordination role.

The timing of such evaluation studies could follow the budgeting cycle (annual), or be based on the phasing of project implementation. The first would be the most logical, since it would allow review of performance for the past year and use the results of such review to plan for the succeeding two years. The financing agency could then send their representatives as consultants to the BRBDPO-led evaluation.

What is required in the projects is a coordinated program for research and impact evaluation. The NIA and other implementing institutions have shown the capacity for data collection. The BRBDPO can complement this in the design, data processing, analysis and dissemination. Through such coordination, the surveys can better serve the information needs of the various agencies while making possible a more efficient use of resources.

CHAPTER IV: PROJECT PERFORMANCE, IMPACT AND EFFECTS

Introduction

The BRBDP is now entering its second decade. It is generally regarded as a mature program whose results should provide useful guidance for the design and implementation of other regional programs based on integrated area development. The design documents for all three projects covered in this evaluation anticipated that by 1983, significant changes would have occurred in the project areas, and that evidence of impact could be collected, verified and analyzed. For the lifetime of each project, physical and numerical targets were established, and projections were made for "before" and "after" levels of productivity, output and income at the farm (household) level. The "after" level, it was assumed, would be reached when each project was complete.

This chapter is concerned with three elements of change that are attributable to the IAD projects. The first element, designated as "project performance", concerns progress towards objectives stated for each project, as laid out in project documents: these include the area of land brought under irrigation, the number of farmers served and their membership in Irrigators Associations, the efficiency of water management under the new system, and so forth. Data for these indicators are either directly accessible in progress reports and other documents (that is, they are already routinely collected and reported), or they were obtained in the course of the evaluation.

Data for the second and third elements of change present some serious problems. The second element, "impact on beneficiaries", concerns changes in the productivity, production and income of households in the areas where the projects have been undertaken. The third element, "developmental effects", concerns changes in the economy, society and environment; these effects may be either positive or negative in terms of original project goals.

Dificulties in treating the second and third elements ("impact" and "effects") arise for two principal reasons. The first reason is the pace of project implementation: in terms of schedules and targets, the projects have moved more slowly than the designers anticipated. Many of the intended benefits and changes have not yet appeared, making it premature to formulate definite conclusions regarding impact. It can be argued that this problem will be resolved as soon as scheduled activities are brought to completion: in other words, by 1985, when the Rinconada Project, which was the last to begin, reaches the completion stage.

The second reason, however, is cause for greater concern: it is the absence of a reliable and efficient system for analyzing data so as to measure the projects' impact and effects. The emphasis here on data analysis is especially important. Vast amounts of data are collected by project staff, by the BRBDPO, and by outside researchers (as in the Bicol Multipurpose Surveys

of 1978 and 1983). Statistics on many of the data categories appear in the progress reports prepared for USAID and central GRP agencies, but the reports contain very little analysis of what the data mean - particularly in terms of project objectives. There is no clear explanation of what indicators are being used, and how to measure changes in various conditions that are affected by the project. Indeed, the evaluation team did not find evidence that an analytical framework for measuring impact and effects has been developed and used for any of the projects - let alone for the program as a whole, to allow inter-project comparisons.

As a consequence, many of the questions that arose in this evaluation could not be answered, and it is unlikely that the information system currently in use will be capable of providing answers, even when the projects have been brought to completion. The same problem, unfortunately, applies to the BMS, in spite of the fact that the surveys were designed to allow comparison at two points in time, five years apart. Analysis of the BMS data cannot be done without a model that specifies indicators and hypotheses about how the indicators are related. A model should have been constructed before data collection was undertaken; because it was not, the list of data "requirements" appears to have grown indiscriminately. Surprisingly, the 1983 survey was not significantly streamlined, despite the fact that the tasks of cleaning, processing and analyzing the 1978 results had proven formidable, and were still unfinished when preparations for the second round began..

This chapter, therefore, does not present definitive conclusions on the magnitude of impact and effects. It does offer some hypotheses for further investigation and testing, based on the team's observation and review of existing data sources. These hypotheses are meant to respond to near-term and long-term decision making needs for the projects, and for the BRBDP as a whole.

Project Performance

The three major factors considered in rating project performance were the completion of physical infrastructure; progress made in building the institutions needed for successful operation of the irrigation system; and the degree of integration between institutional and physical infrastructure components in each project.

Technical Performance

The data summarized in Chapter II and in Annexes A-C provide a basis for assessing project performance. The evaluation team noted, and wishes to emphasize, a critical distinction between two indicators of technical performance that can be used to measure "completion". One of these is the termination of civil works as specified in the project design; by this criterion, which is NIA's standard of measurement, the infrastructure at Libmanan-Cabusao is 100 percent complete. Yet the quantity of water that can be pumped through the system, under present conditions, and the area of land that has been brought under irrigation, both fall far short of the original targets - indeed, they are below 50 percent of the design specifications.

For the purposes of this evaluation, with its focus on long-term sustainability, the best test of technical performance is whether a project is delivering water to farmers across the entire area served by the system. By this standard, the Libmanan-Cabusao Project must either be judged incomplete or unsuccessful. Since potential remedies exist (they were identified in an evaluation in 1981, but not implemented by the PMO), it seems advisable to apply them, rendering the system "complete" in a meaningful sense, rather than condemning it as a failure and a poor investment.

The data on areas harvested for the other two projects are inconclusive: for Bula-Minalabac, a crucial test of technical performance will be water delivery and the irrigated area covered once the full set of pumps is turned on (within the next few months), since the civil works are almost fully constructed; an assessment of Rinconada must await further progress on the construction timetable, which has almost two years to run. On balance, the prospects for high technical performance in both projects appear good, since neither system confronts the limitations found at Libmanan-Cabusao.

Institutional Performance

Institutional performance in projects of this kind is by definition more difficult to assess, since both qualitative and quantitative measures must be used. One clear lesson emerging from the experience of these three irrigation projects is that the tasks of institutional development - in particular, capacity building for newly formed Irrigators Associations - are more demanding and time-consuming than project planners and lead agency technicians had anticipated. Nor are there any obvious milestones to indicate that the job is "done", to the extent that the IA is fully equipped to play its designated role in operating, maintaining and managing the new irrigation system.

This evaluation has challenged the assumption that the complete turnover of a system to an IA is feasible, given the technical and managerial requirements of sustaining the system. This does not rule out allotting a major role for the IA, as a representative farmers' organization, in supporting the system financially and in ensuring that water resources are used efficiently and productively. It suggests, however, that each project's institutional performance should be evaluated in terms of building capacity for joint system management between farmers and trained specialists who are accountable to the IA.

No single indicator will adequately reflect this process of capacity building. Two critical dimensions that stood out in this evaluation were the membership percentage and vitality of the newly constituted IAs, and evidence of resource commitment by farmers in these organizations.

Data on IA membership showed a sharp contrast between Bula-Minalabac (where participation in the IA exceeded 90 percent of those receiving water) and Libmanan-Cabusao (65 percent) and Rinconada (20 percent). In the first

case, the IA's membership has become actively involved in a range of income-generating activities, building on a basis for cooperation (a strong Samahang Nayon and other groups) that predated the project. In each of the other two projects, the IA is one among many organizations which farmers are expected to join, and its utility and legitimacy have not yet been demonstrated.

The second dimension of institutional development draws on evidence of resource commitments that farmers make to the development process. Specifically, the rate of payment of irrigation fees provides an indicator of the IA's capacity to tap farmer's resources. The fee structure differs among the three projects, and considerable uncertainty remains as to the appropriate (and affordable) level of annual fees, measured in cavans of rice. The collection rate achieved at Bula-Minalabac (94 percent) is all the more impressive, because fees there are double those levied at Libmanan-Cabusao and more than four times the fees at Rinconada (which does not have to allow for the cost of pumps and power). There is reason to believe that fees at the latter two projects will have to be increased if they are to cover all system costs (O & M, amortization and a sinking fund). Given performance to date, and the relative weakness of their IAs, collection rates would probably decline further if fees were increased without a renewed effort to strengthen the IAs.

Integration

The third factor considered under project performance is the degree of integration between the physical infrastructure and institutional development components. The realization that successful small irrigation projects must be institutionally sound - as well as meeting engineering standards - has only recently made its mark. There are no widely accepted formulas on how to combine the two, but these projects provide some useful insights.

Libmanan-Cabusao offers compelling evidence of the costs incurred when fulfillment of a technical agenda overrides the institutional dimension of a project. Serious efforts to strengthen the IA began only after the design was set, construction was well underway, and evidence was accumulating that the system would not work to capacity. Ironically, certain technical deficiencies were "locked in" at Libmanan-Cabusao because farmers had been excluded from the process of site selection and layout.

The experience at Bula-Minalabac suggests that the two components of an irrigation project can be effectively integrated, if planning and design activities for both begin concurrently. The engineering specifications and layout of the system benefited from farmers' inputs; and in the process, farmers appear to have gained enough familiarity with the system's complexity and costs to appreciate the need for a relatively high fee for water use.

Rinconada provides an intermediate case. Although farmer participation was not an important factor in the early planning of the project, the PMO has

made an effort during implementation to coordinate construction and institutional activities. (At one point, the construction program in Upper Lalo was rescheduled so as to take advantage of farmers' preferences on the siting of farm ditches and their availability to help dig them.) These adjustments during implementation reflect NIA's awareness of the problems encountered at Libmanan-Cabusao.

To summarize, successful performance in this type of irrigation project is directly related to the degree of integration achieved between the technical and institutional components. The longer efforts at integration are delayed, the more difficult the process, particularly when an expensive and complex infrastructure program is being carried out, making mid-course changes very difficult.

Impact on Beneficiaties

In July, 1981, a team sponsored by USAID carried out an impact evaluation of the overall program of integrated area development in the Bicol Region. That team encounted many of the same difficulties noted in this chapter, and the report includes an annex 1/ dealing with the methodological problems and data gaps affecting measurement of impact. The annex correctly focuses on the farm level, and on changes in rice yields and in the income received from rice farming, as the "bottom line" for measuring benefits to farmers. It points out that other indicators of success in the BRBDP matter less, in the long run, than whether farmers receive sufficient benefits so that they have the ability and incentive to produce more rice.

This issue involves detailed microeconomic analysis on a continuing basis over time, since the technological and economic factors influencing production are subject to change. Assumptions made during the project design process included a significant increase in rice yields per hectare; a shift from one crop per year under rainfed conditions to two crops a year due to a year-round supply of water under irrigation; adoption of improved production practices; and continued price incentives to grow rice in preference to other crops.

While the data collected to date generally confirm that these assumptions are valid for some farmers, they do not allow detailed analysis at the level of the individual farm, and in particular, analysis of differences among farmers in different localities socio-economic groupings.

1/ Philippines: Bicol Integrated Area Development, AID Impact Evaluation No. 28, Appendix D, "Benefits and Beneficiaries." (January 1982).

These differences are significant, in terms of the yields that farmers have achieved after obtaining access to irrigation water. Mean yields as shown in Table 8, Chapter II, are below project design estimates, and the gap between high-yielding and low-yielding farms appears to be quite large. In the IRRI study at Libmanan-Cabusao, a sample of 119 farms was stratified according to yields (low, medium and high). Within those strata, mean yields per ha for the 1981 wet season and 1982 dry season were as follows: 0.82 mt/1.42 mt (low), 2.67/2.82 (medium), and 4.83/4.4 (high). Data from this sample show low-yielders producing less rice than the pre-project estimates of 1.4 mt/ha (wet season) and 2.25 mt/ha (dry season).

Unfortunately, there is not a standardized system of data collection and analysis that permits detailed comparison of farmers within one project area or between projects. The IRRI data cited above are from a study designed to analyze yield responses to a package of inputs (fertilizer, herbicide and pesticide); the results of this research will be released in 1984. Because data on labor costs and other expenses are not presented in the IRRI tables, it is not possible to examine the profitability of each household's rice production enterprise. Thus the net incomes of low yielders and high yielders cannot be compared. One interesting hypothesis (which cannot be tested for this sample) is that low yielders may have experienced a decline in their net incomes, because they are now required to pay irrigation fees, but have not raised their output per hectare over pre-project levels. (Whatever the cause of low yields, data on water users' fee payments in the project indicate that farmers have not universally accepted the obligation to pay for irrigation water.)

Although the farm budget data being collected at Rinconada include labor costs and estimates of net income, progress reports from the project do not explain how the sample of households was constructed, and all data are presented in terms of averages. Much more could be done with these data to examine the questions being raised here about impact, particularly in analyzing yield and income variations among farmers being served by the system.

In overall terms, we need to know the distribution of farmers in each project area along the continuum from low to high yields. Secondly, we need to analyze the implications of yield variations for farmers' incomes. The data collection and analysis system needed for this purpose does not have to be elaborate, nor does it require a very large sample: with careful attention to sampling methods, about 50-100 farms in each project area would be adequate.

Those farmers attaining yields equal to project design estimates, or even higher, appear to be deriving substantial income benefits. Although inflation has affected input prices (and to a lesser degree, wage labor costs), these higher variable costs have been largely offset by an increase in the price of palay from ₱1.0 to ₱1.70 per kilogram. The farm budgets from Rinconada, despite their limitations due to averaging, substantiate this point. If PMO estimates of mean yields at Bula-Minalabac (8.25/ha/year) are accurate, then above-average farmers in that project are probably doing very well in financial terms; but we can only speculate on this point.

Two further points should be made here. First, "impact" in projects of this kind needs to be measured on a continuing basis, in order to capture the changes and uncertainties that affect small farmer agriculture. Only then will a clear picture begin to emerge, with evidence of important trends, providing answers to questions such as the following:

- Is a more or less stable proportion of farmers regularly attaining desired yields, and if so, does rice farming remain profitable to them?

- Do the output performance and profitability of low-yielding farmers improve over time, so that in the aggregate, the project moves toward its equity objectives?

- What factors explain the differences between beneficiary groups, in terms of performance and profitability, and what interventions or adjustments in the project are needed to help close the gap?

The BMS, despite its sizeable data base, is not an appropriate instrument for addressing these questions. Its weaknesses include a reliance on recall data from farmers in a single interview - as opposed to the type of farm records, with visit's and observations over a full cropping season, that are employed at Rinconada and are recommended in this report - and the fact that it allows comparison only between two points in time (1978 and 1983).

A second point concerns the need to estimate trends in real incomes. NEDA's price index for the Bicol Region shows a level of 236 in mid-1983, with 1975 as the base year (100). By comparison, palay prices have risen only 70 percent (from ₱1.00 to ₱1.70 per kilogram). Under these conditions, a farmer would have to market almost 40 percent more rice than he did in 1975, merely to keep pace with inflation. This finding has far-reaching implications. Among other things, it suggests that farmers not benefiting from new irrigation facilities are likely to have declining real incomes; it also suggests that benefit levels within the project areas vary substantially. Merely being "inside the system" in a physical sense is no guarantee that a farmer's income has increased.

To summarize, impact analysis presents major obstacles, given the existing data base, and this discussion raises more questions than it can answer. Filling gaps in the data base and strengthening data analysis capacity should be a major priority for the BRBDPO and each PMO.

Developmental Effects

The development program launched in 1973 has brought sizeable investments to the Bicol Region, particularly to the three areas served by the irrigation projects. The effects of these projects will not be fully discernible until the irrigation systems are operational, but they are almost certain to include some effects (both positive and negative) that were not anticipated in the

project designs. A major analytical problem will be to distinguish changes that can be attributed to the projects from those caused by other factors. At the present time, given available data and an absence of such analysis, most discussions on this issue are highly subjective and speculative.

Although the Bicol Multipurpose Surveys are not well suited to analyzing farm budgets and agricultural production, for reasons noted earlier, they provide one basis for comparing households and barangays in different parts of the Bicol Region, and specifically, in project and non-project areas. The sample is large, and the range of data collected in the interviews is extremely broad. Data cleaning and processing will require a major effort, in part because the survey design was inclusive (covering almost all aspects of household activity). An analytical framework must then be developed for comparative purposes. Since no framework seems to exist at present, the remainder of this section offers some hypotheses that can be tested with indicators based on variables in the BMS. Given the limitations of survey research, however, not all of these hypotheses can be tested rigorously through the BMS, and additional data collection and analysis will be needed. It should be emphasized that some of the most interesting and critical questions regarding project effects can be investigated through "quick and dirty" studies focused on specific problems, and do not require another massive survey.

Economic Effects

In general terms, there are numerous signs that the project areas are enjoying greater economic prosperity than they did 10 years ago, whereas other parts of the Bicol Region have stagnated or declined. This impression was formed as a result of interviews with farmers, officials and field technicians, as well as direct observations by the evaluation team during site visits to the projects. Indicators of economic progress that might be tested for the BMS sample as a whole include the following:

- The tax collection rates for the municipalities affected by the projects have increased, for both real property and business taxes. The records show that these increases coincided with the introduction of the irrigation systems.

- Housing improvements were readily apparent in the areas. In addition, there was evidence of increased "backyard farming", mainly in livestock production, including a high proliferation of ducks.

- Land values have appeared to increase, with an estimated pre-project value in Libmanan-Cabusao of ₱3,500 per ha. and a current value of ₱12,000.

- Business and employment opportunities have increased, both in terms of farm employment and supporting services, with small private enterprises being established.

- In the stores and in homes, there appears to be a greater variety and amounts of consumer durables and capital equipment.

- The transport structure has been strengthened (which is mainly attributable to the roads project), with more vehicles and a much reduced transport cost.

Environmental Effects

Irrigation systems are designed to be permanent, and to ensure that the agricultural production systems used within them are sustainable over time. The installation of an irrigation system brings with it a range of environmental changes - the most obvious is modification of the dry season environment so as to permit crops to be grown. The wet season environment is also affected, since the supply of water for sustaining crops can be assured during intermittent dry periods.

Beyond these broad system-wide effects, other changes may also be attributed to irrigation projects, even if causality cannot be proven:

- Positive impacts, all of which were noted by people within the project areas, and/or observed by the evaluation team, were greater availability of water (and much improved access to water) for household use (bathing, drinking, etc.) and for watering livestock.

- Negative effects perceived as being due to the projects include reduced fish supplies (in Lake Bato) flooding and drainage problems, soil erosion and salinization.

Both types of changes tend to be attributed to irrigation projects without thorough consideration of other potential causes. The tradeoffs between these effects and other developmental changes can be extremely difficult to measure, and since the negative changes listed above were not adequately foreseen in the project design, there is no plan of action for addressing them.

These observations underscore the team's recommendation for a pilot environmental monitoring program in the Rinconada Project, where several of the more serious issues exist and where USAID funding appears to be available to support such a program. As suggested above, the analysis of BMS data should be helpful in identifying both positive and negative changes visible at the household level. Comparisons between project and non-project areas will help to further refine hypotheses about environmental effects. But it is clear that a more highly targeted monitoring system is needed to measure environmental changes over time, and to isolate the main causes. Development and testing of a pilot system at Rinconada could be of considerable value to NIA (and other agencies) for irrigation projects elsewhere in the region and the country.

Social Effects

The establishment of an irrigation system requires increased community cooperation, which in turn brings opportunities for greater participation in other development activities besides agriculture. This potential is best seen at Bula-Minalabac, where there has been an ongoing series of community projects and investments. On the other hand, where the organizational foundation is weak, the need for cooperation to operate the irrigation system may have the opposite effect. In Libmanan-Cabusao, farmer conflicts were intensified in the years after the project was begun. In one incident a person was killed, and the leaders of the IA have been frequently accused of favoritism. In terms of land water management, the project appears to have increased competition for resources instead of eliciting the desired form of broad-based community management.

Two potential effects that deserve further investigation are changes in farm labor patterns (as a result of intensifying agricultural production) and changes in the land tenure status of households in the project area (as a result of reportedly sharp increases in land values). Analysis of the BMS data may shed light on these questions, but follow-up investigations will also be required in the field.

In the first case, if households require additional labor to grow rice under irrigated conditions, it may be supplied from among family members, or from individuals hired by the day or by the task. There are reports that landless families are moving into the irrigated areas (and are apparently even being welcomed) in response to increased an increased demand for hired labor.

In the second case, some farmers with small holdings classified as "sub-marginal" are being actively encouraged by MAR and other agencies to sell their land; others are reported to have transferred their some or all of their holdings, either temporarily or permanently, without legal authorization. Either way, it appears that significant numbers of families are moving (or being squeezed) off the land. Yet there is almost no information on what happens to them - specifically, whether they are absorbed in other sectors of the regional economy, or leave the Bicol Region altogether.

These comments serve as a reminder that the introduction of irrigation - like any planned development project - sets in motion a complex process of change. General impressions and popular wisdom about the effects of a program such as the BRBDP and its component projects do not do justice to this complexity. For the success of future development initiatives in the region, as well as in other parts of the Philippines, a more thorough investigation is needed; as the questions raised here are answered, new questions of equal importance to long-term development will emerge.

CHAPTER FIVE: GENERATING SUSTAINABLE BENEFITS

Introduction

The ultimate test of whether irrigation projects or other development initiatives succeed is the degree to which they generate sustainable benefits. There are numerous examples of projects where external resources, from the government and donors, have spurred a period of activity which collapses when these resources are reduced or withdrawn. Chapter I introduced 12 criteria for a successful irrigation project that benefits small farmers on a sustainable basis. This chapter ranks the three projects in accordance with these criteria, and then discusses the major issues which should be addressed. The rankings are scaled to indicate: (3) a project is moving ahead without any major apparent constraints; (2) changes are required due to moderate constraints; or (1) serious constraints exist which are not being addressed.

Rankings by Criteria for Sustainability

Overall, the rankings show that the chances for sustainable benefits are highest in the Bula-Minalabac Project, followed closely by the Rinconada Project; the Libmanan-Cabusao Project is significantly behind, indicating the need for immediate attention. Outlined below are the criteria and rankings which suggest guidelines for future decision making.

1. Reliable and adequate water supply for the agricultural system being employed in the area of coverage.

Libmanan-Cabusao	Bula-Minalabac	Rinconada
3	3	3

Basic water supplies and their sources were evaluated for all three projects, and considered to be adequate. However, hydrological records are not sufficiently complete to guarantee that no deficiencies will surface with the accumulation of operating experience. Already, there is concern in the Bula-Minalabac and Libmanan-Cabusao Projects that the water supply may not be sufficient for the pumps. This concern arises because the rivers are wide and channeling the minimum flows for a full supply to the pumps may present problems.

2. Physical infrastructure (both irrigation and drainage) complete and operable down to the farm level.

Libmanan-Cabusao	Bula-Minalabac	Rinconada
2-	3-	3

Comparing only the completed phases of the three projects, Libmanan-Cabusao has the larger difficulties. Its capacity to deliver water is impaired by numerous constraints that are discussed in Annex A, rendering it less than 50 percent effective; in addition, drainage is a problem. If these problems are not solved, the project can never reach its anticipated service area. As it stands now, it is doubtful that an area of more than 2000 hectares will be secure (out of the more 3800 planned). At Rinconada and to a slightly lesser extent, Bula, the physical systems and their operability for the areas served are more secure.

3. An operations plan that ensures the effective and efficient delivery of water to all parcels.

Libmanan-Cabusao	Bula-Minalabac	Rinconada
1	1	2

Detailed operations plans and programs are definitely lacking, with the possible exception of Rinconada. In both the Bula-Minalabac and Libmanan-Cabusao Projects, the systems appear to be operating more or less on a trial and error basis, without fully developed operational plans. The small size of the system currently completed in the former makes it possible to detect required changes sooner and obtain a quicker response, with a higher efficiency in the use of water. For example, the Libmanan-Cabusao Project pumped 38 percent more water per harvested hectare than the Bula-Minalabac Project during the 1983 dry season (with a resulting difference in cost). The Rinconada Project has an operations manual, but water delivery schedules to ensure equity between the water users are not being used on any of the three projects.

4. A plan for the regular maintenance and periodic upgrading of the system.

Libmanan/Cabusao	Bula Phase I	Rinconada Upper Lalo
1+	2	2

As with operations, system maintenance also seems to be carried out on an "as needed" basis, rather than as a planned program. Thus preventive maintenance is neglected and any betterment or "built in" maintenance considerations in the design are overlooked. There is a need for improvement in all three cases.

5. Adequate technical and management competence for solving problems and improving the system.

Libmanan-Cabusao	Bula-Minalabac	Rinconada
2	2	2

The technical issues involved in project management seem to be given a low priority on all three projects. The training programs and turnover plans imply that the farmers can eventually be trained to operate the systems. However, many of the requirements are technical, beyond the farmer. The management of the water includes both hydraulic problems (requiring a hydraulic engineer) and matching of water deliveries to crop requirements (the task of an irrigation scientist), calculated to take full advantage of natural precipitation. This technical expertise can easily pay for itself in water saved and the corresponding reduction in power costs to produce the water. Other jobs require managerial ability, special skills or training, which suggests that the operation of the systems be staffed accordingly, even though the techical staff would be under the control of the IAs.

6. <u>A financial plan and system for covering the costs of operations and maintenance, system improvement, and (if feasible) amortization</u>.

Libmanan-Cabusao	Bula-Minalabac	Rinconada
1	2+	2

Financial planning to cover all costs of the irrigation systems has not received much attention. The Bula-Minalabac Project is ranked high since it has an effective system for collecting irrigation fees (as well as the land amortization costs, which the other two projects lack). None of the projects has estimated overall costs nor the level of irrigation fees needed to recover these costs. The problem is compounded further in the Libmanan-Cabusao Project because NIA's policy of amortization is not clear.

7. <u>A technological package acceptable to farmers that is sufficiently productive to meet farmer requirements and the above costs</u>.

Libmanan-Cabusao	Bula-Minalabac	Rinconada
2-	3-	2

Progress in the introduction of improved rice production technologies has been made, particularly through the innovations under the Masagana 99 program. A complete technology package involving the interactions of water, high-yielding varieties, planting dates, fertilizers, pest control and farmer inputs (labor) is still in the formative stages and will continue to evolve as new technologies come on stream. The water technology variable is rather quickly accepted by the farmer in an environment with distinct wet and dry periods. If nothing more, it gives him the possibility of two crops where even one was not without the risk of drought before. However, the interaction of water with the other variables is even more profound, making possible double or triple yields and the possibility of taking advantage of markets not available before.

8. Supporting agricultural services that effectively serve farmer interests.

Libmanan-Cabusao	Bula-Minalabac	Rinconada
2-	3	2

The quality of supporting services in the three project areas has improved but problems still remain with the effectiveness of the agricultural extension program. Coverage is generally weak, but particularly in the Libmanan-Cabusao Project, which now has an agricultural development support component. Another problem that needs to be addressed is the availability of credit. Due to a history of poor repayment (prior to the projects), credit availability is limited, particularly in the Libmanan municipality where farmers owe ₱1.9 million; a similar situation exists in Rinconada. Another problem in Libmanan is the lack of warehouse space.

Most of the rice produced in the project areas is sold to private retailers rather than NFA. Although private agents offer lower prices than NFA, farmers are reluctant to sell to NFA because of quality controls, delays in payment, and the agency's mandate to collect loan repayments through its purchases. Coverage for other services by the private sector appears adequate, with a demonstrated capacity to expand as farming becomes more intensive through irrigation; indeed, private sector involvement has proven to be a responsive mechanism for serving farmers.

9. An Irrigators Association organized in a way that ensures that user interests and responsibilities are met.

Libmanan/Cabusao	Bula Phase I	Rinconada Upper Lalo
1	3	2

The farmer organizational component in the Bula-Minalabac Project is more advanced than in the other two projects, mainly because of the conscious effort of the PMO to involve farmers at all stages. Rinconada is now making excellent progress. However, the restriction in the by-laws preventing membership for those who have mortgaged or leased their land is a problem. The Libmanan-Cabusao effort got off to a poor start when NIA contracted out organizational work to a private foundation. Although efforts are being made to remedy this situation, essentially the same organizational structure and leadership remain in the IA from this initial effort, and they do not appear to have much credibility with the farmers.

The relative immaturity of the IAs is evidenced by the high degree of self interest in the water resource, as opposed to the mutual sharing and protection of the resource and the related costs and obligations. The latter will come with the realization that the benefits, if received, will depend upon the combined efforts of all. The protection and sharing of physical

works, the sharing of expenses and costs, and a mutual concern for all who use water from a common source. No one individual can maintain or operate the system alone. Unified group action is required. The maturity is more evident in the San Ramon IA (at Bula), but even here it will be sometime before the IA is seen to be unified and powerful.

10. An information system for monitoring and evaluation and for increasing the accountability of service providers to beneficiaries.

Libmanan-Cabusao	Bula-Minalabac	Rinconada
1	2	2-

As is shown in this evaluation, the information needed for evaluation is not readily available. This stems from the failure to design an analytical framework prior to the collection of data. As a consequence, resources have been wasted in data collection, and little analysis has been done. Of the three projects, Rinconada excels in the collection and presentation of agricultural data; with modifications in this system, there is the potential to collect and analyze the information on changes brought about by the project.

The Bula-Minalabac Project is ranked highest. Although it does not have a functional formal information system, it has a very strong communication linkage with farmers, allowing feedback that affects project development and farmer behavioral changes and resource commitments. Such a system is evolving in the Rinconada Project and with the senior farmer leadership in the Libmanan-Cabusao Project; both need to be strengthened further.

The technical information required to manage the irrigation systems efficiently is lacking in all three projects. Data on water delivery rates to each area or parcel aid in detecting avoidable water losses, and are also needed in order to program the operations to avoid critical water shortages and drainage problems. The projects should also obtain meteorological data for use in irrigation equations and crop-water scheduling. Data on areas with drainage problems will aid in their solution. Crop and yields data are equally important in isolating problems. Cost data and records are necessary in the budgeting process as well as for isolating areas with excessive O & M costs.

11. Sufficient market demand for the major crops produced.

Libmanan/Cabusao	Bula Phase I	Rinconada Upper Lalo
3	3	3

There is a strong demand for rice for national and home consumption, so the premise on which the projects were planned remains valid. One problem is that little experimentation has been done on crops for diversification during

off-seasons that would increase the net incomes and the overall viability of the irrigation systems. As noted below, however, the price incentive structure in which rice producers operates is not favorable.

12. Macro-economic policies favorable to the producer.

Litmanan-Cabusao	Bula-Minalabac	Rinconada
1	1	1

The trend in economic policies that affect the three projects provides little incentive for the producers; indeed, there appears to be a favoring of the urban consumer while adding costs to the producer. Prices have been held artificially low while the costs of inputs are no longer subsidized. Under current policies, farmers are expected to pay the costs of the operation and maintenance of the systems with our preferential status in securing the necessary energy resources. Moreover, it is assumed that farmers will be able to pay the amortization costs of the system. Such a strategy appears inconsistent with national food priorities, and does not recognize the considerable economic and related gains from this type of investment.

Issues and Recommendations

The above criteria are aimed at developing irrigation systems that benefit small farmers in a way that is sustainable. The integration of these elements is a key to evolving a viable system that increases productivity as it matures. This involves not just the completion of the physical system and its related institutional requirements, but also the initiation of a process for continuing to improve the system and supporting services.

One main finding of this evaluation is that the process of establishing a mature water supply system requires time--a minimum of five years beyond a system's physical completion and perhaps up to ten years or more, depending on the degree to which small farmers are expected to assume responsibility for these systems. This highlights an initial shortcoming in the planning of these projects and indeed, most irrigation projects assisted by foreign donor agencies. Sufficient resources after the physical completion of projects have not been planned for the testing, modification and maturation of water supply systems.

Recommendations

- The Government should work out plans and program the resources for bringing the three systems to maturity.

- In planning similar projects for the future, build the necessary resources for at least five years after completion, to allow for further system development.

For the three projects included in this evaluation, several issues should be considered if the benefits of these irrigation systems are to become self-sustaining. These may be categorized as follows:

- Developing a Reliable Water Supply System;
- Turning the System Over to Small Farmers;
- Covering the Costs of the System; and
- Increasing the Productivity of the System.

Outlined below is a summary of these concerns with specific recommendations for each one.

1. Developing a Reliable Water Supply System

Irrigation projects depend on a firm and reliable supply of water. The water supply for the three projects is considered to be reliable, though the amounts available change with seasons and with longer-term wet and dry cycles. It is therefore important to constantly monitor the hydrologic systems for all three projects, building data bases to be used for both for system management and ongoing resource evaluation. Project requirements can then be anticipated and future needs forecast, allowing the possibility for technical management of the water resources and facilities.

In this regard, it is equally important to maintain records of water delivery for each project. Such records will allow the technical functionality of the systems to be determined, pinpointing areas of high water loss or excessive water use. This is especially critical for the Libmanan-Cabusao and Bula-Minalabac Projects, where good water management translates into reduced pumping and therefore , into substantial savings in energy costs. Included further in the record system should be the necessary data for measuring drainage flows. The drainage from an area is a further indicator of a system's technical functionality from the standpoint of water losses as well as from the problems of removing excess precipitation.

Recommendation:

- As an integral part of technical operations, establish measurements and records on water supply availability, water diverted or pumped, water deliveries, and drainage flows.

The technical design criteria in all three projects are considered to be sound, and therefore provide standards for measuring sustainability. A failure to meet design standards almost always requires adjustments elsewhere in the system, since a chain reaction takes place. For example, the inability of the conveyance system in the Libmanan-Cabusao Project to deliver water in accordance with design specifications results in reduced pumping capacity (two pumps instead of the four planned), lowering water supply, with a resulting reduction in the area of coverage; target outputs are not achieved and the capital costs per unit area increase. Achieving and maintaining the

capability of systems as designed, as well as correcting deficiencies, provides a basis for improvement; otherwise, retrogression occurs and failure or major adjustments result. Moreover, farmer confidence and willingness to support the system are eroded.

Although a completion report has been done for the Libmanan-Cabusao Project, all three projects are still in progress. In line with NIA's policy, each of these systems should be tested and certified before a transfer to local farmers takes place. Due to the problems of meeting the design standards in the Libmanan-Cabusao Project, there is a need for an assessment of what can be accomplished and at what cost; with such a determination, the next steps should be worked out with the farmers in the area so there is a consensus on what is to be done before turnover, and on the specific obligations of the participating parties.

Recommendations:

- NIA should carry out an engineering study for the Libmanan-Cabusao Project to determine a time-phased program with costs for bringing the system up to design standards. Feasibility and responsibilities for doing this should be discussed and negotiated with local farmers.

- Construction and maintenance plans for future system development in all three projects should be geared to meeting, maintaining and upgrading the design standards.

- Systems should be tested, corrected and certified as meeting design standards before they are turned over to local farmers.

As indicated above, irrigation projects are highly technical, with their design requiring a high level of engineering skills and technical inputs. Interpreting these designs and formulating operational plans within the capability of these designs requires similar technical expertise. The analysis of hydrologic and meteorological data for determining crop water requirements and scheduling water deliveries accordingly is now a developed irrigation science. Where water costs are high, as in the two pump projects, the application of this available technology in the management of these systems is imperative. It is probably of no less importance in all irrigation projects, whether gravity or pumped, to protect the water resource base, minimize water delivery costs, and prevent such related problems as drainage.

The lack of detailed water delivery plans in each of the three projects and the existence of an operations manual in only one project suggests that the needed technical expertise is either not being fully employed or may not be available. There is a need for providing such expertise and further, the incentives necessary for attracting this expertise for longer-term system support. NIA is working on upgrading this position and introducing incentives such as bonuses based on irrigation fee collection rates; these are certainly positive steps.

Recommendations:

- Longer-term management of the systems be planned and structured so as to incorporate the technical/management skills requirement.

- Personnel and their training requirements be identified (and provided for) for the technical management of the systems over the next five years.

2. Turning the System Over to Small Farmers

Although small farmers through the Irrigators Association can perform many functions, it is unrealistic, as pointed out above, to expect that these associations will ever be able to assume the technical management responsibilities for the systems. In planning the turnover of a system to the IAs, therefore, it is necessary to first define a reasonable division of responsibilities between the associations and a technical management unit. Such a division may take this form:

- Responsibilities of Irrigator's Associations:

- policy formulation and supervision;

- establishment of irrigation fees and collection of these fees

- maintenance of farm ditches and laterals; and

- on-farm water management and feedback to management on requirements.

Responsibilities of Technical Management Unit:

- operations and maintenance planning and implementation

- programming of water supply to various parts of the system

- maintenance of the main canal and pumping stations; and

- planning for system betterment.

These responsibilities should be fully defined with the Irrigators Associations, along with a timetable and arrangements for turnover.

Recommendation:

- Develop plans for turnover in all three projects with the Irrigators Associations that clearly and realistically define future responsibilities on a time-phased basis.

A main consideration in this planning is how to develop strong and viable Irrigators Associations, especially in the Libmanan-Cabusao and Rinconada

Projects where progress has been slow. One problem (except in the Bula-Minalabac Project) is that the internal structure of Irrigators Associations does not fit the physical layout of the systems. Organizing along laterals with a common source of supply helps to build a cohesiveness around similar farming and other interests. Another problem is the number of farmer organizations within one locality; it is important to consolidate these organizations into one multi-purpose organization that responds and is accountable to the farmers in the locality.

Recommendations:

- Realign and strengthen the Irrigators Associations to address shared concerns.

- Adopt a policy and approach for consolidating the activities of farmer organizations into one structure.

Another aspect of building the capabilities of the Irrigators Associations is training. While all three projects have placed priority on training, there are some serious deficiencies. One is that farmers are rarely involved in deciding what type of training is needed and when it is needed; training modules are frequently designed based on what the technicians feel farmers need. The second problem is tieing the training to the installation of the physical system: there is a need for training to take place within about a thirty day period before a farmer will use it. A further problem is the lack of follow-up, seeing whether the desired behavioral changes have occurred and if not, why not. Reporting on training should be expanded to show effectiveness in terms of behavioral changes.

Recommendation:

- Each project should reassess its training strategy and program and a cross-project review should be done by the BRBDPO.

Eventually, an objective is to have the Irrigators Association fully responsible for overseeing and financing at least the operations and maintenance costs of the systems. One model would be for the Associations to contract for the necessary technical management support and another is to develop a unit within its cooperative structure to carry out these functions. Such an arrangement would increase accountability to the water users. An interim step could follow the model that NIA has developed in the Rinconada Project, where the Irrigators Association contracts for services, paying an increasing amount of system costs.

Recommendation:

Establish a model where Irrigators' Associations gradually assume responsibility for the supervision and financing of the technical management support unit necessary for system operation, maintenance and betterment.

Until systems are operational and until the capabilities of the Irrigators Associations are developed, there will be a need for the government to allocate sufficient resources for assisting the Associations to perform this role.

3. Covering the Costs of the System

There are significant variations in the operations and maintenance costs of the three systems, in terms of actual expenditures in the past two cropping seasons per harvested hectare. The Libmanan-Cabusao costs are high with 38 percent more water pumped per hectare, which adds significantly to energy costs. The cost could be reduced through completion of the system as designed, a solving of the drainage problems, and more efficient management as discussed above. The Bula-Minalabac Project area under irrigation is smaller, more efficiently run, and has a high level of farmer contributions to maintenance; but costs are likely to go up as more pumps are added and the irrigated area expanded.

A main factor in the O & M costs for the Libmanan-Cabusao and Bula-Minalabac Projects is rising of energy costs. The cost per kilowatt hour has increased steadily averaging 25 percent per year, and the rural electrical cooperatives project that this trend will continue. Energy costs constitute over 40 percent of the Libmanan O&M budget and almost 80 percent of the Bula-Minalabac O&M budget. Further increases will jeopardize the longer-term financial viability of both projects. Attempts have been made to reduce rates through negotiations with the cooperatives. but these have not brought about larger reductions. The rates might be reduced more if the Irrigators Associations help the cooperatives with the maintenance of the power system. However, additional action is needed. One option would be for NIA to negotiate directly with the NPC to establish a policy for all systems in the country that require power, perhaps including a direct cost rate plus a wheeling or line use fee for the cooperatives.

Recommendation

- NIA and NPC should negotiate a policy covering power costs for all irrigation systems with significant energy requirements.

Ideally, the returns from an irrigation system should be sufficient to make it financially viable, covering operations and maintenance costs plus the amortization of the system. One problem found across all three projects is poor financial planning; projections have not been made on the amount required for each system to become viable. Without such projections, difficulties will be encountered in determining amortization rates, negotiations on energy costs, and working out feasible options with the Irrigators Associations.

Recommendations:

- Each project should be required to provide five and twenty-year budget estimates for review by the BRBDPO and implementing lead government agencies.

- Project financial reporting should be redesigned to indicate what adjustments in the estimated budgets are needed to establish viable systems.

The importance of sound financial planning cannot be overemphasized, especially in terms of developing credibility with Irrigators Associations. When costs are clearly delineated, then the question becomes how much farmers can pay. The information for determining the level of irrigation fees is not available. During the evaluation, an attempt was made to develop farm budgets from a number of sources such as IRRI, the Ministry of Agriculture, and the Bicol Multi-purpose Survey. Inconsistencies were such that no definite conclusions could be reached about income levels, though the data suggested that many farmers would be unable to pay fees high enough to recapture the full costs of the systems. This is mainly due to lower mean yields than were anticipated in the planning stages, except possibly for the Bula-Minalabac Project, where yield estimates are most tentative. This indicates that high priority should be placed on developing a system farm records for a selected number of farmers in the project areas.

Recommendation:

- Each project, with technical assistance, develop a farm records system to monitor production and incomes (for low, medium and high producers). The BRBDPO should be responsible for analyzing these data on an ongoing basis to advise PMOs and IAs on how to determine the level of irrigation fees.

The above analyses may show that farmers can only pay a minor portion of the amortization costs. However, this situation should be viewed in the context of the investments already made and the related economic and other returns discussed in Chapter Four.

4. Increasing the Productivity of the Systems

The long-term viability of the three projects will depend on increasing the productivity of each system through better water management, combined with adaptive testing of improved technological packages. Although increases in production have occurred, they are lower than anticipated, and remain far below what the systems can produce. In part, this is due to the changes required as farmers shift from rainfed to irrigated agricultural production. This transition requires a process of ongoing testing of alternatives and improvement of production practices, as well as the introduction of new off-season crops that will increase the net incomes of farmers.

Recommendation:

- Provision needs to be made for an ongoing research and adaptive testing program in each project, to address the problems of irrigation water use and the related technologies of

Achieving potential yields also depends in large part on the effectiveness of supporting agricultural services. In particular, there is a need for these projects to improve extension operations, the availability of credit, and the return to the farmers from marketing and processing operations. Since the initiation of the projects, management and organizational arrangements to coordinate and integrate these inputs have evolved through the establishment of the Composite Management Groups to handle operational problems, supported by the BRBDCC for policy and resource decisions. Also, the current system of project monitors allows the identification and solving of specific problems. Even after a project is certified as completed, there is a need for this continued coordination and support so that the potential of the systems is realized.

Recommendations

- The approach of using the CMG and BRBDCC should be continued, perhaps with the expanded participation of public and private agencies that provide supporting services.

- The BRBDPO should define an ongoing role the project monitors for the period after the projects are physically completed, with an emphasis on problem-solving functions.

The environmental effects of these irrigation systems--the conservation of land and water resources, the maintenance of their fertility, the preservation of fish and other plant life, the level of Lake Buhi, salinization, erosion through flooding, and the availability of water--need to be monitored with much greater precision. Some effects, such as the decline of the fishing industry in certain areas, are perceived and attributed perhaps unjustly to the projects. For longer-term planning and project modifications, there is a need to monitor and analyze these environmental effects, not only in the three projects but generally for all irrigation projects.

Recommendation

- Use part of the unprogrammed funds under the Rinconada Project to develop a monitoring system on environmental effects that can be replicated by NIA and other agency-supported irrigation projects.

There are serious deficiencies in the overall information systems of the three projects. Much effort has gone into data collection but these efforts have not yielded the information needed for planning and decision making by either the PMOs or higher level government agencies. To a large extent, data are being collected without reference to an analytical framework. With only a marginal increase in cost, current reporting systems could be modified to give more concrete information that would allow an early identification of problems and more realistic expectations of what is required to develop viable systems. In particular, there is a need for structured information on long-term financial requirements, farm budgets, and farmer behavioral responses to training and other interventions.

Recommendation:

- The BRBDPO should revise, with technical assistance, if required, the reporting requirements of the three projects in a way as to provide better information for analysis and decisionmaking.

Conclusion

The three projects offer an evolving knowledge base of what is required to develop irrigation system that benefit small farmers. It is clear from the evaluation that this is a difficult process which requires considerable time and the complex integration of physical and institutional development initiatives. While farmer involvement in decision making appears to be essential if the desired changes are to occur, there is a need to specify what form this involvement takes at each stage of project development and implementation before a workable model is developed. The evaluation also demonstrates that there are serious technical and management considerations, beyond the capabilities of farmers to handle, which must be satisfied if systems are to be technically and financially viable. Preliminary indications of project effects and impact illustrate the potential returns from such systems--both to the farmer and to the country. Measuring these results and gaining further knowledge for system betterment require effective information systems. Overall, the study emphasizes that the work in the three projects is just beginning if sustainable benefits are to be achieved.

ANNEX A

LIBMANAN - CABUSAO (IAD I)

PROJECT-SPECIFIC ANALYSIS AND RECOMMENDATIONS

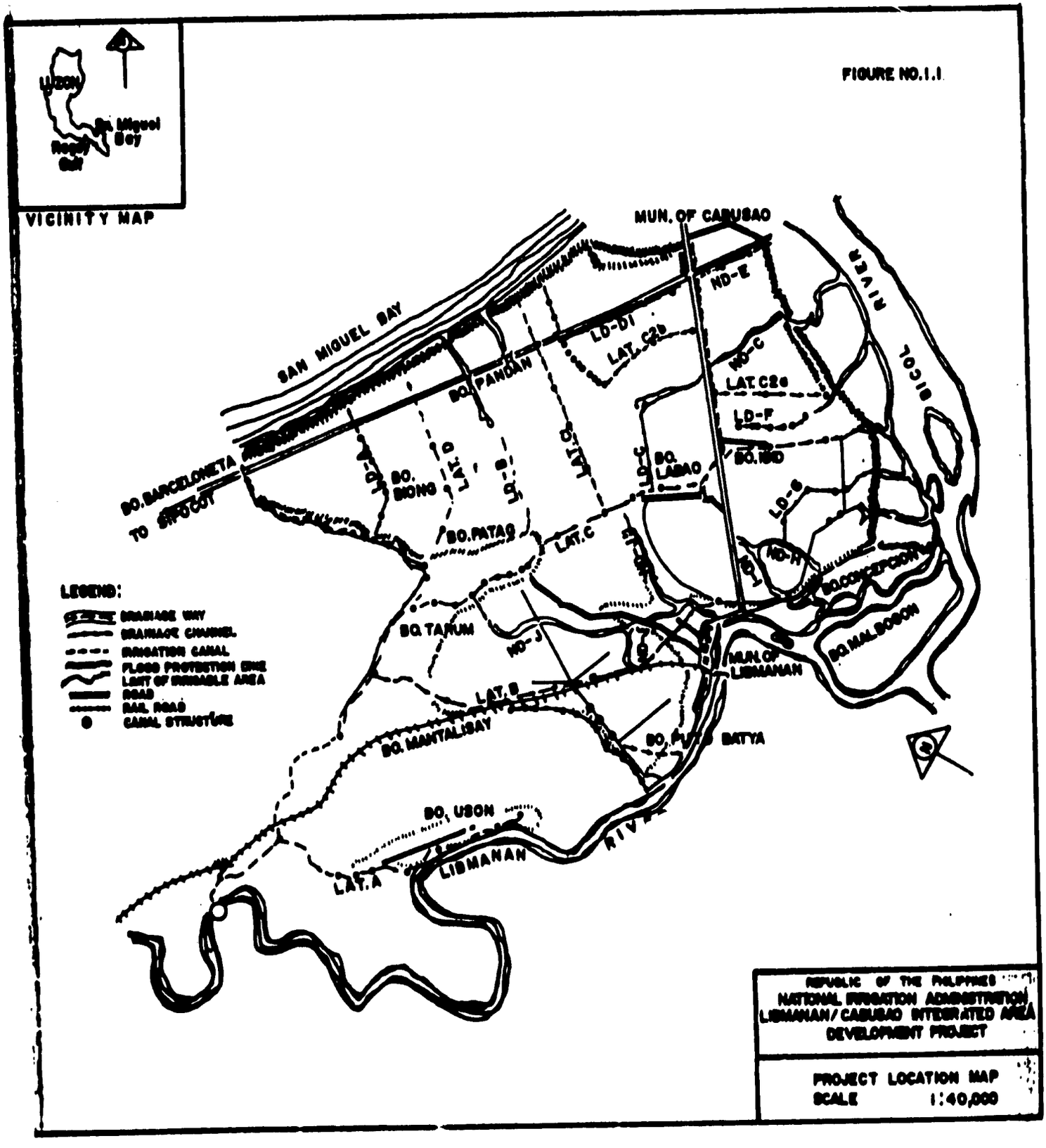


FIGURE NO.1.1
VICINITY MAP
LUZON
San Miguel Bay
Ragay Gulf
MUN. OF CABUSAO
SAN MIGUEL BAY
BICOL RIVER
ND-E
LD-D1
LAT. C2b
ND-C
LAT. C2a
LD-F
BO. PANGAN
BO. BIONG
BO. LABAO
BO. ISIO
LD-G
BO. BARCELONETA
TO SRPCCOT
BO. PATAG
LAT. C
ND-H
BO. CONCEPCION
BO. MALBOGON
LEGEND:
DRAINAGE WAY
DRAINAGE CHANNEL
IRRIGATION CANAL
FLOOD PROTECTION DIKE
LIMIT OF IRRIGABLE AREA
ROAD
RAIL ROAD
CANAL STRUCTURE
BO. TABUM
ND-J
MUN. OF LIBMANAN
LAT. B
BO. MANTALISAY
BO. BATYA
BO. USON
LIBMANAN RIVER
LAT. A
REPUBLIC OF THE PHILIPPINES
NATIONAL IRRIGATION ADMINISTRATION
LIBMANAN/CABUSAO INTEGRATED AREA DEVELOPMENT PROJECT
PROJECT LOCATION MAP
SCALE 1:40,000

LIBMANAN-CABUSAO PROJECT

Project Components

A. Irrigation, Drainage and Service Roads
B. Compact Farm and Extension Development
C. Irrigator's Association
D. Operation Land Transfer
E. Applied Research and Demonstration
F. Area Development Council and Area Development Team

Project Coverage

Hectares to be Irrigated	3,873
Hectares Harvested, 1982 Wet Season	1,968
Percent of Target	51
Hectares Harvested, 1983 Dry Season	1,672
Percent of Target	43
Number of Planned Farmer Beneficiaries	2,310
Number of Farmer Beneficiaries Currently Receiving Water	1,843
Percent of Target	80

Project Funding

Project Agreement

GOP Contribution	₱ 19.15M
USAID Contribution	₱ 28.14M
Total	₱ 47.29M

Revised Total Cost as of June 30, 1983

GOP Contribution	₱ 59.56M
USAID Contribution	₱ 27.91M
Total	₱ 87.67M

Project Cost Per Hectare	₱23,127
Project Cost Per Project Beneficiary	₱38,775
Rice Yields (m.t./ha)	
Dry Season: 1983 mean yield (est.)	2.99
Project Paper Projection	4.75
Wet Season: 1982 mean yield (est.)	2.5
Project Paper Projection	3.75
Water Supply	
Water Supply Per Hectare, 1983 Dry Season	17,479 M^3
Water Supply Per Hectare, 1982 Wet Season	7,080 M^3
Operations and Maintenance Costs	
Cost Per Hectare Harvested (1982-83)	₱ 524
Total Cost for System (1982-83)	₱993,472
Energy Costs 1982-83)	₱407,518
Energy Costs as Percent of Total O&M Costs	41
Irrigation Fees and Collections Rate	
Irrigation Fee Per Year (in cavans at ₱85)	12
Percentage of Fees Collected in 1982-83	30
Irrigators Association	
Membership of Libmanan-Cabusao Irrigation Service Corporation	1,200
Percent Membership of Farmer Beneficiaries Receiving Water	65
Percent Membership of Potential Farmer Beneficiaries	52

LIBMANAN-CABUSAO PROJECT:

The Libmanan-Cabusao Integrated Area Development Project is one of several projects sponsored by the GOP's Bicol River Basin Council to further refine and extend to the municipality level the basic policy, planning and management principles which underlie the 312,000 hectare Bicol River Basin Development Program. The project involves the concurrent and tightly coordinated implementation of five major sub-projects within the 3,873 hectares project. A sixth project, involving the consolidation of farm lands, will be implemented as part of the projects second phase which will begin upon completion of the projects basic infrastructure. The implementation of these various activities are geared towards increasing productivity in the area over twice the pre-project production levels. The lead agency in the project is NIA.

PHYSICAL INFRASTRUCTURE

Current Status

The physical system consisting of the pumping plant, canals and appurtenent structures is in place.1/ The main pumping station was planned with four pumps having a design capacity of 1450 lps each, yielding 1.5 lps/ha with the full simultaneous operation of all four pumps. Operation experience indicates that power line and transformer capacity can only sustain the combined load of three pumps. Furthermore, the pump capacities as measured show a combined yield of only 5420 lps as compared to the expected design capacity of 5800 lps. These operational limitations are compounded further by difficulties encountered during construction and in operations now in the fifth cropping season. During construction typhoon rains caused siltation of the cut and cover section of the main canal, reducing the effective cross sectional area and water capacity. This makes it impossible to operate more than two pumps without overtopping the canal bank.2/ Until this problem is solved the system is limited to the simultaneous operation of only two pumps.3/ With the yield of the pumps being less than the design this reduces the water supply to less than half (46.5%) of the design plan. The water supply is further reduced by CASURECO limiting pumping during peak power periods (no pumping during the period 6 p.m. to 10 p.m.) This power limitation effectively reduces the sustainable supply of the system to 84% of full operation. The combined limitations place the systems water delivery capability at about 40% of the design plan.

1/ See Completion Report for complete description of the system Completion Report Libmanan-Cabusao Integrated Area Development Project, National Irrigation Administration, March 1981.

2/ The project manager indicated that if three pumps are operated for three hours the canal bank will overtop.

3/ The correction of the silting problem was a major recommendation of the AID Assessment Report BIAD I (Libmanan-Cabusao) dated April - May 1981.

Table 1 shows the water pumped at Libmanan during the wet season of 1982 and the dry season of 1983. The table shows that the wet season of required 13.933 million cubic meters (MCM) and the dry season 29.208 MCM. Based on the area harvested during the wet season of 1968 ha, the gross application of pumped water was 708 mm/ha with a maximum average monthly flow of 1.07 liters per second per hectare (lps/ha) during June. For the dry season harvested area of 1671.8 ha, the gross application of pumped water amounted to 1747 millimeters per hectare (mm/ha) with a maximum average monthly flow of 1.46 lps/ha during March. Pump utilization was highest in March when the combined operation reached 44% on a total available time basis. From these data it appears that the present cropped and harvested area is matched to the system limitations described above.

It should be pointed out, however, that considerably more water was pumped and applied during the dry season at Libmanan than in either of the other two projects. By comparison, the 1747 mm/ha at Libmanan was 38% more than the 1265.4 mm/ha applied at Bula, the other pump project in the area, and 17% more than the 1491 mm/ha applied in Upper Lalo which is a gravity system where high pumping costs are not a factor associated with water use.

Drainage is another major problem in Libmanan. The canal embankments and roads force the excess water from irrigation and typhoons to take a more circuitous route to the San Miguel Bay, substantially increasing the draindown time. It was stated by farmers and residents that where draindown time took two to three days before the project, it now takes 10 days to two weeks. The problem of drainage is also aggravated by inoperative protection dike flap gates, silted or inadequate culvert capacity and poor maintenance of drainage channels, especially the interceptor channel. Many additional recommendations were made for system improvement in the Assessment Report referred to above.

An operations plan compatible with the system as designed and built must be developed. The block system being tried cannot function when the canals are receiving full water supply and all lands are being served with water. It is not working well even now, with less than half the potential area being harvested and a water supply at less than half that envisioned. A major effort must be directed toward the development of such a water delivery plan which would be a part of a manual containing other features of the operation and maintenance of the total system (canals, roads, communications, drainage ways, pumps and structures).

Recommendations

1. The major constraints to providing a full water supply should be removed with priority given to:

   a. The removal of silt in the cut and cover section

   b. Improvement of canals and laterals to bring them to design standards

   c. Eliminating the power restriction to allow continuous pumping when agricultural demands are high.

d. Correct other remaining deficiencies as recommended in previous evaluations - See Assessment Report Bicol Integrated Area Development I (Libmanan-Cabusao), June 1981.

e. Maintain records of water levels and water available at the pumpsite.

2. The drainage constraints existing in the project area should be corrected with priority given to:

a. Reducing the draindown time in the farming area to minimize crop damage by improving existing facilities and installing new facilities where required.

b. Putting flapgates in working order or redesign.

c. Cleaning the silt and obstructions from the interceptor channel

d. Procuring the necessary heavy equipment for maintenance of facilities (canals, drains, roads and etc.)

3. A realistic and enforceable water delivery and management plan, consistent with the physical design and limitations of the system, must be developed and put into operation as soon as possible. Priority should be given to:

a. Development of rotation schedules for water delivery to all parcels.

b. Detailed water management plan for system operation with special emphasis on utilization of rainfall to minimize pumping.

c. Development of a detailed manual for system operations and maintenance.

d. Establishment of a communications system linking the PMO and the pump house, WT stations, relift stations and other important points.

Table A-1
Libmanan Water Deliveries 1982-83

Wet Season			
Month	MCM	mm/AH	lps/Ha
May	4.442	225.7	0.84
June	5.441	276.5	1.07
July	1.983	100.8	0.38
August	2,067	105.0	0.39
Sept.-Nov.	No operation		
Total	13,933	708.0	
Dry Season			
December	2.295	137.2	0.51
January	3.791	226.7	0.84
February	5.739	343.3	1.42
March	6.530	390.6	1.46
April	5.032	301.0	1.16
May	5.821	348.2	1.30
Total	29.208	1747.0	

MCM = Million Cubic Meters
AH = Area Harvested = 1968.0952 Hectares Wet Season
= 1671.7932
mm/AH = Millimeters per unit area = mm/ha

INSTITUTIONS

Project Management

Realizing that the Irrigators Association/farmer beneficiaries staff lack the capability for managing the system, although it was envisioned to be turned over in 1983 (two years after completion), the NIA negotiated and signed an Interim Memo of Agreement with the LCISC on April 21, 1982.

An important feature of the Agreement was the creation of a Management Committee which is chaired by a representative of the LCISC which has four of the seven members of the Board.

The purpose of this joint Management Committee is to hasten the take-over of the sdystem by the Irrigators Association by involving them in decision making and providing on-the-job management training for system operation and maintenance.

To enhance farmer's involvement and participation, they were given responsibilities in the identification, programming and implementation of the remaining physical work for betterment of the system during the 1982-83 budget period. Labor for the work, if feasible, was to be drawn from the farmers ranks.

As a reinforcing measure, a new round of training programs and institutional development was initiated with the following important features: (1) capability development training/workshop for RACF leaders/members (2) consultation meeting/workshop for IPL (Identified Potential Leaders), and (3) Rice Production Technology Training.

Two other complementary activities to improve utilization and productivity of the system and individual farmers, are ongoing. These are the IRRI-NIA-BRBDP Water Management Research and Training Project, inaugurated in 1981 and the recently started (April, 1983), MA Agricultural Support Development Project. The latter, apart from improving farmers productivity, is a new attempt to reintroduce the inter-agency approach for delivery of services with the Ministry of Agriculture as the lead agency.

Farmer Organization

The Irrigators Association of Libmanan-Cabusao got a late start (in 1977), considering the start of project implementation in 1976. The formal organization has a tri-level structure, with rotational areas/compact farms as the base, with 119 units. Each unit is composed of a farmer leader situated in the head, middle and tail end portions of the laterals and sub-laterals. The membership to date is 1,200 which is 65 percent of the targeted 1,843 beneficiaries. Of these organized units only 50 are fully functional, and 35 percent are partially functional. The second level comprises the different

districts within the project area, presently having nine in all. The third level is the project wide LCISC. The association has been registered with the Bureau of Cooperative Development. Since May 1982, 25 meetings have been conducted between the Irrigators Association and NIA-PMO and the training has been conducted were on cooperatives, farm management, water management, and leadership. The training helped the farmers in their farming practices, but not to the extent needed. EDF has also conducted training on the same aspects. These however created a duplication of functions which should have been undertaken by PMO institutional staff.

Election of farm leaders on the laterals and farm-ditches was held only once in 1977, and no further election has taken place since then. Information from farmers disclosed some irregularities during the election. Nepotism and non-attainment of a quorum during election was experienced. This year, 1983, an election was conducted for a new set of officers in the Association, but the election called for the inclusion of non-members of the Association to attain a quorum. Attendance during the election and meetings was very low, reflecting the quality of leadership by the present set of officers. Low collection rates are also being experienced with a rate of only 45 percent as of this date. One major factor that aggravates the problem in Libmanan is the method of the redistricting of the area coverage. The divisions do not fit with the area. Some farmers are affected by being divided between two districts.

Because of the problems being encountered in the area, a gap between the PMO and the IA has been developed, causing major problems that must be solved.

Recommendations

1. An assessment of the institutional arrangements under the project should be done to see how the farmer organization can be restructured to increase involvement. The starting point for the assessment should be the layout of the irrigation system, so that those farmers with common diversion and drainage problemsd are grouped together.

2. On the basis of the above assessment, a reorganization of the farmer organization should take place, to represent five of the mutual interests of various groups.

3. A Promotion Committee, with an understanding of the potetials and constraints to further system development, should be established.

4. In lieu of the current IRRI effort to collect data on rice production in the project area, an alternative method should be initiated which involves farmers in record keeping, with the assistance of extension workers, to get data on the profitability of various farming systems.

5. The current management structure of the project should be reorganized. Of particular importance is selecting a senior officer as project manager who wishes to remain in the project area a long time. As is being currently

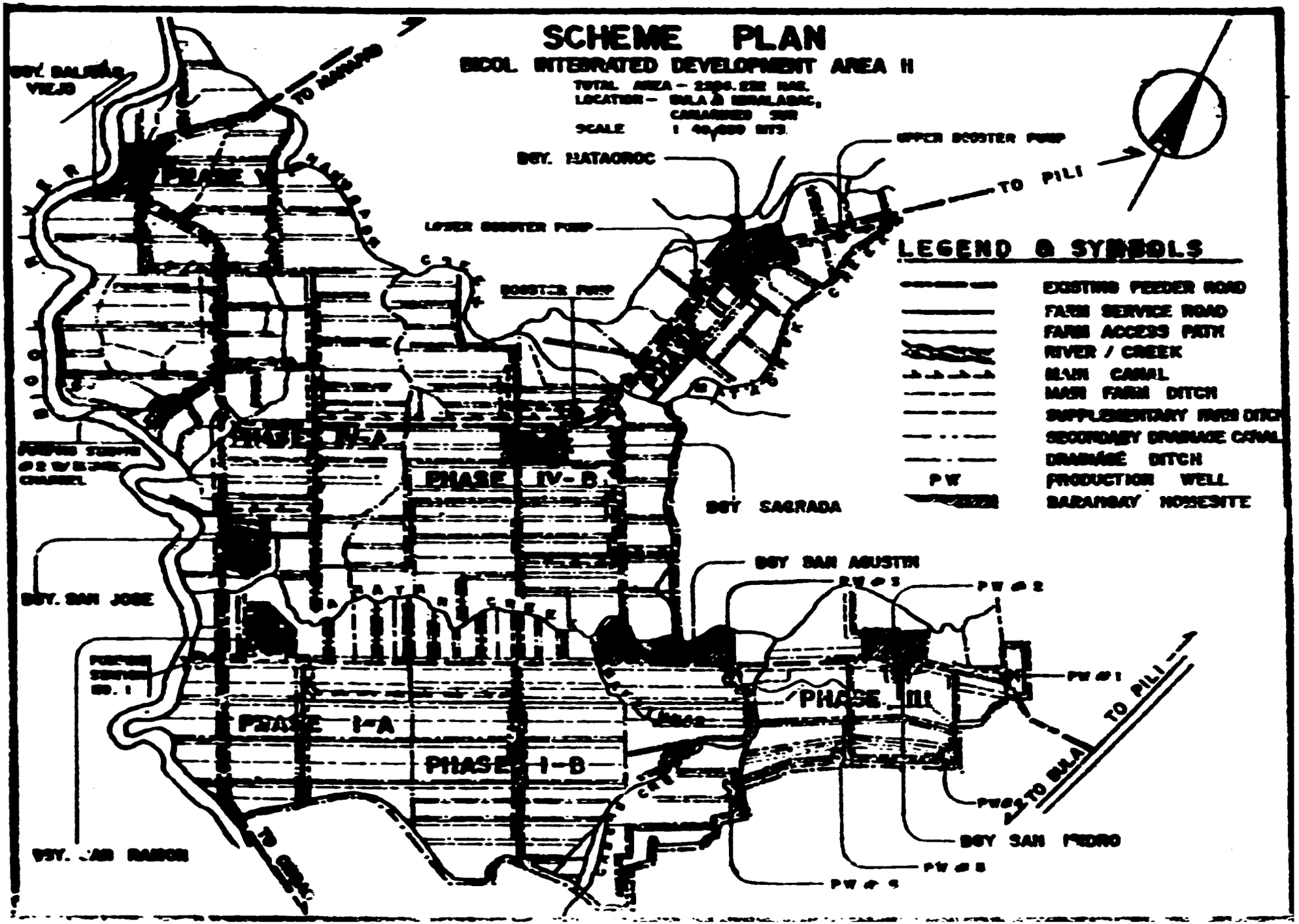
planned by NIA, there is a need for special incentives to hold quality people in the operations and maintenance phase of a project. Such a change would help the long-term durability of the system.

6. The inter-agency task form for the Project should be strengthened. some progress has been made in this direction through the Agricultural Development Support Project may be meeting these farmer needs.

ANNEX B

BULA-MINALABAC (IAD II)

PROJECT-SPECIFIC ANALYSIS AND RECOMMENDATIONS


SCHEME PLAN
BICOL INTEGRATED DEVELOPMENT AREA II
TOTAL AREA
LOCATION
SCALE
BGY. BALUBAG VIEJO
TO NAGA
BGY. NATAORIOC
UPPER BOOSTER PUMP
TO PILI
LOWER BOOSTER PUMP
BOOSTER PUMP
LEGEND & SYMBOLS
EXISTING FEEDER ROAD
FARM SERVICE ROAD
FARM ACCESS PATH
RIVER / CREEK
MAIN CANAL
MAIN FARM DITCH
SUPPLEMENTARY FARM DITCH
SECONDARY DRAINAGE CANAL
DRAINAGE DITCH
PW
PRODUCTION WELL
BARANGAY NOSESITE
PHASE IV-A
PHASE IV-B
BGY SAGRADA
BGY SAN AGUSTIN
BGY. SAN JOSE
PW # 3
PW # 2
PW # 1
PHASE III
PHASE I-A
PHASE I-B
TO PILI
TO BALA
PW # 4
BGY SAN PEDRO
PW # 6
PW # 5
BGY. SAN RAMON
TO GINAC

ANNEX B

BULA-MINALABAC PROJECT

Project Components

A. Construction of Major Irrigation Facilities
B. Homesite Development and Relocation
C. Land Consolidation and Tenure Reform
D. Organizational Development and Training
E. Applied Agricultural Research

Project Coverage

Hectares to be Irrigated	2181
Hectares Harvested, 1982 Wet Season	458
Percent of Target	21
Hectares Harvested, 1983 Dry Season	374
Percent of Target	17
Number of Planned Farmer Beneficiaries	1230
Number of Farmer Beneficiaries Currently Receiving Water	211
Percent of Target	17

Project Funding

Project Agreement:

GOP Contribution	₱ 17.64M
USAID Contribution	₱ 24.12M
Total	₱ 41.76M

Revised Total Cost as of June 30, 1983	
GOP Contribution	₱ 46.52M
USAID Contribution	₱ 22.5M
Total	₱ 69.02M
Project Cost Per Hectare	₱ 31,646
Project Cost Per Beneficiary	₱ 56,114
Rice Yields (m.t./ha.)	
Dry Season: 1983 mean yield (est.)	4.25
Project Paper Projection	4.8
Wet Season: 1982 mean yield (est.)	4.0
Project Paper Projection	4.2
Water Supply	
Water Supply Per Hectare, 1983 Dry Season	12,654 M^3
Water Supply Per Hectare, 1982 Wet Season	5,709 M^3
Operations and Maintenance Costs	
Cost Per Hectare Harvested (1982-83)	₱ 248
Total Cost for System (1982-83)	₱113,718
Energy Costs (1982-83)	₱ 94,488
Energy Costs as Percent of Total O&M Costs	83%
Irrigation Fees and Collection Rate	
Irrigation Fee Per Year (in cavans at ₱85)	24
Percentage of Fees Collected (1982-83)	94
Irrigators' Associations	
Membership of San Ramon Irrigators Association	206
Percent Membership of Farmer Beneficiaries Receiving Water	98
Percent Membership of Potential Farmer Beneficiaries	17

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BULA-MINALABAC PROJECT:

The Bula-Minalabac Land Consolidation Project is an Integrated Area Development (IAD) project that includes a major land consolidation and tenure reform program encompassing seven barangays in Bicol Re ion.

The project is a multi-sectoral and requires a significant level of integration at all management levels. This is illustrated by the involvement of 15 GOP agencies.

Management is decentralized vertically to the Regional and Project levels. Coordination is effected through a Composit Management Group, for policy; composed of the Regional Directors of the 15 agenices and by assigning personnel from various agencies to the Project Management Office (PMO). The PMO is under the leadership of the Ministry of Agrarian Reform (MAR) Regional Director, the Lead Agency, and is managed on a day-to-day basis by a Project Manager assigned by MAR assisted by the Land Consolidation Promotion Committee (LPCP). The LCPC is composed of the leaders of various sectors such as church, women's leage, youth leader land owners and farmer leaders as well as representative of the Sangguniang Bayan. This group assisted the PMO with various problems relative to finalization of plans, release of funds and right-of-way acquisition. It is interesting to note that the project did not spend a single centavo in acquring land for public use or right-of-way. The lands for these purposes were donated by farmers, shared by them, proportional to their land holdings. This allowed canals and roads to be located properly in relation to project requirements.

PHYSICAL INFRASTRUCTURE

Current Status - Physical

At Bula only Phase I consisting of 567 hectares is complete and receiving water. The total project is more than 82% complete and will eventually irrigate 2181 hectares. This is a pump project designed to deliver the water requirements during land soaking and provide crop maintenance of 1.5 liters per second per hectare (lps/ha) to the total land area. When completed the system will contain 6 river pumps 6 -elift pumps and 6 deep well pumps. The two river pumps San Ramon (Phase I) have a design capacity of 630 l/s each for a combined flow of 1260 l/s. This will satisfy the high demands during land soaking (2.25 l/s/ha) and be more than ample for crop maintenance of 1.5 l/s/ha on the 568 hectares. The four river pumps at San Agustin (Phase II and IV) have a combined design discharge of 2.4 cubic meters per second (m^3/sec) or a combined river demand for the six pumps at the two pumping stations of 3.6 M^3/s. It was stated that the minimum measured river flow at the pump site as 6.7 M^3/s or 3.1 M^3/S in excess of pump demand. However, it was noted that during the last dry season there were times when not enough water was running to the pumps for safe operation. The river is wide and even though there is ample flow in the river getting sufficient flow to the pumps during heavy drought may become a problem.

The synchronization of all 18 pumps when the project is fully developed is seen to be an operational challenge and suggests that an operations model should be developed, perhaps even computerized, for solving the water delivery/demand schedules.

Table 1 shows the water delivery experience for the wet season of 1982 and the dry season of 1983 of Phase I. It can be seen that the wet season required a total of 2.515 million cubic meters (MCM) to be pumped or 570.9 mm/ha, whereas, the dry season pumpage amounted to 4.733 MCM or 1265.4 mm/ha. The maximum flow required during the wet season amounted to 0.53 l/s/ha in November whereas May produced the maximum demand for the dry season at 0.89 l/s/ha. It is interesting to note also that the peak demands were well short of the 1.5 l/s/ha. indicating efficient operation or perhaps effective utilization of rainfall or both. The farmers have been advised regarding the high electric costs of pumped water and are consciously avoiding water waste.

It should be noted that energy costs will increase substantially for the parts of the project under the deep wells and relift pumps even at the current electric rates. This is due to the increased pumping lift and will vary with the lift required. For the lands served under relift station No. 1 the energy costs will be about 1.6 times the present cost at San Ramon. For lands under relift station No. 2 and No. 3 the multiplying factors are 2.12 and 2.68 respectively. For lands served by the deep wells the energy cost is estimated to be 2.55 times the cost at San Ramon.

Recommendations

1. An operation model and water delivery plan for the system should be developed to aid in the water supply management and the synchronization of the 18 separate water supply pumps. Priority should be given to:

   a. The development and verifying of a system management model.

   b. The development of realistic and enforceable delivery schedules and rotation plans.

   c. The development and publishing of a detailed operations manual with rules and regulations governing the use of water and the relationships between farmers and operating personnel. The manual should include the job description and duties of the operation and maintenance personnel and the qualifications or training required.

2. The irrigation association should be strengthened to continue its aggressive program for irrigation fee collection. Additional emphasis should be placed on advising farmers regarding the high cost of pumped water to gain their support in achieving efficient water use in order to reduce power cost.

3. A protection and betterment program for canals and laterals with high embankments should be developed. The severe erosion of embankment slopes and failure during operation requires more attention.

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TABLE B-1
Water Deliveries Bula Phase I
Wet Season 1982 - Dry Season 1983

Month	M^3	mm/ha	lps/ha
Wet Season 458 Hectares			
July	391,411	85.5	0.32
August	368,731	80.5	0.30
Sept. Oct.	680,400	148.6	0.28
Nov.	634,473	138.5	0.53
Dec.	439,606	117.8	0.44
Total	2,514.621	570.9	
Dry Season 374 Hectares			
January	685,972	183.4	0.68
Feb.	684,180	182.9	0.76
March	830,563	222.1	0.83
Apr.	793,368	212.1	0.82
May	895.493	239.4	0.89
June	843,480	225.5	0.87
Total	4,733,056	1265.4	

INSTITUTIONS

Project Management

As early as the mid-project last evaluation in 1981, a need was recognized for expert consultancy on Water Management to prepare a detailed system oeprational/synchronization plan in anticipation of the full operation of the system in early 1984. However, up till now no definitive response on this issue had been made by either the PMO or BRBDPO. It is important that this issue be addressed as soon as possible.

In the past, operating agreements on the maintenance and management of the system between the PMO and the San Ramon Irrigators Association has been reached informally through AD-Hoc conference/consultations as needed. As the project moves towards full system operation, however, it may be advisable to ensure smooth operation and avoid misunderstanding that these informal agreements be formalized into a Memorandum of Agreement for interim operation, as was done in Libmanan.

Probably due more to budget retrenchment measures initiated by the national government in early 1983, than a reflection of red tape in the GOP budgetary process, the PMO could not find funds to pay the honoraria of detailed inter-agency personnel. The personnel have not received their honoraria, since January 1982, and the PMO is understandably worried about their continuing participation.

Similarly, construction delays were experienced by the Project on the remaining physical work which delayed AID reimbursement as a result of the non-release of the GOP funds on Capital Outlay for accomplished work.

Appropriate training for personnel on system management and maintenance to prepare them for the complexities of full system operation is indicated.

Farmer Organizations

Farmers in Bula/Minalabac project had an early start in organizing their asociation since 1972, from the members of the existing Samahang Nayon. In 1977 the Irrigators Association was fully organized with a present membership of 211 from San Ramon and San Agustin only.

The dynamic and aggressive leadership being performed by the present leaders led the association to accumulate the necessary behavior, attitude, discipline and experience to develop their own capacity for comparative management. Presently, they have the highest collection rate of 90% in irrigation fees compared to Libmanan and Rinconada. They are experiencing marginal problems in collection and created a Promoting Group to settle any problems regarding the implementation of the project. Four cooperative stores in San Ramon, San Isidro, San Agustin and Mateoroc are operational and has an

average daily income of ₱1,500 in San Ramone alone. Early start of organizing pays off with early positive results, which are now being enjoyed by the farmer beneficiaries. They have accumulated a considerable capital base, big enough to loan PMO some ₱160,000 for payment of irrigation electric bills. They have financed the construction of a 30 x 25 meters drying payment for ₱23,000 which right now is a big problem considering that it will be reimbursed by PMO.

Farmers production increased from 40 cavans/hectare to 80 cavans/hectare, which was also a factor in the high payment of irrigation fee, now 12 cavans/cropping/hectare.

With these positive results, the farmers are not appreciative and responsive to the project system itself, by voluntarily donating labor resources including main canal and laterals. However, the only obsession the farmers are having right now, is the formal training and implementation of the rotational water distribution scheme, which they think would augment further the benefits they now receive, for maximizing water and increasing water benefits at the same time.

Recommendation

1. Although there appears to be excellent coordination with the Irrigation Associations and their members, all agreements tend to be informal rather than documented fully. There is a need to prepare a document defining the roles of the Irrigation Association and the Project and other agreements so if questions or conflicts arise in the future, reference can be made to a legally binding source.

2. As in the other two projects, there is a problem of integration, particularly in regard to training. While the Project has attempted to consolidate the leadership and organizations in the project area, there is a need for increased coordination which can be accomplished through the establishment of a more formal Promotion Committee, representative of the various groups in the area. The first question that should be addressed is the content of training programs and how to avoid duplication in programs.

3. As the system is completed, there will be a need for intensive training in the implementation of a rotational water distribution scheme; for reasons of efficiency and cost cutting, farmers see this as a critical requirement.

4. With the evolution of the various income-generating activities being carried out by the Irrigation Association, there is a need for a continuing training program in cooperative development.

5. Specialized training should be given to the long-term manager/operator of the irrigation system to upgrade skills to handle this complex, quasi-demand system.

ANNEX C

RINCONADA-BUHI/LALO (IAD III)

PROJECT-SPECIFIC ANALYSIS AND RECOMMENDATIONS

ANNEX C

RINCONADA/BUHI-LALO PROJECT

Project Components

A. Lake Buhi Water Source Development
B. Lalo Irrigation Construction
C. Agricultural & Institutional Development
D. Agro-forestation/Watershed Development

Project Coverage

Hectares to Be Irrigated	3100*
Hectares Harvested, 1982 Wet Season	1025
Percent of Target	33
Hectares Harvested, 1983 Dry Season	956
Percent of Target	31
Number of Planned Farmer Beneficiaries	2450
Number of Farmer Beneficiaries Currently Receiving Water	1418
Percent of Target	58

Project Funding

Project Agreement:

GOP Contribution	₱ 49.78M
USAID Contribution	₱ 40.2M
Total	₱ 89.98M

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* An additional 10,000 has. will be brought under irrigation due to other investments that will use water from Lake Buhi.

Revised Total Cost as of June 30, 1983	
GOP Contribution	₱ 50.41M
USAID Contribution	₱ 40.2M
Total	₱ 90.61M
Project Cost Per Hectare	₱ 29,229*
Project Cost Per Beneficiary	₱ 36,984*
Rice Yields (m.t./ha.)	
Dry Season: 1983 mean yield (est.)	3.12
Project Paper Projection	4.10
Wet Season: 1983 mean yield (est.)	2.9
Project Paper Projection	3.9
Water Supply	
Water Supply Per Hectare, 1983 Dry Season	14,910M^3
Water Supply Per Hectare, 1982 Wet Season	10,530M^3
Operations and Maintenance Costs	
Cost Per Hectare Harvested (1982-83)	₱ 239
Total Cost for System (1982-83)	₱ 245,000
Irrigation Fees and Collection Rate	
Irrigation Fee Per Year (in cavans at ₱85)	5
Percentage of Fees Collected in 1982-83	45

* These figures will be substantially reduced when the additional land area is brought under irrigation.

Irrigators Associations

Upper Lalo Irrigator's Association	143
Buhi Zone 1-A Upper Lalo Farmer Irrigators Association, Inc.	37
Zone II-A Upper Lalo Farmer Irrigators Association, Inc.	105
Percent Membership of Farmer Beneficiaries Receiving Water	20
Percent Membership of Potential Farmer Beneficiaries	12

RINCONADA-BUHI/LALO PROJECT:

This project component of the Bicol River Basin Development Program (BRBDP) pursues the program goal of improving the socio-economic situation and the quality of life of the rural poor residing in the project area. It focuses directly on the program sub-goals of (1) increasing agricultural production and productivity per hectare, (2) increasing productive employment opportunities, (3) increasing farmer participation in development activities affecting them and, (4) reversing the deterioration of upland watershed areas. This project is a multi-agency effort with NIA being the lead agency.

PHYSICAL INFRASTRUCTURE

Current Status

Based on the revised implementation schedule, the physical status of the project is evaluated at 57.92% against the target 57.66% as of June, 1983. Likewise, the actual expenditures as of the same period were ₱43.329 million which is 55.25% of the total revised cost of ₱74.413 million.

Construction of Lake Buhi control structure gained headway leaving the bridge and upstream approach protection wall including apron unfinished with optimism to be fully completed on or before the end Decmeber 1983. Daraga river flume/bridge has yet to be started which is scheduled for completion by the end of 1984 to coincide with the completion of all irrigation facilities at Lower Lalo. Forebay headworks have been completed while the Lower Lalo main canal, laterals and its appurtenant structures including terminal facilities are being pursued for completion on or before December 1984.

The rehabilitation of the irrigation facilities at Upper Lalo is completed and is now serving 1,025 hectares with water diverted directly from the river. This is a run of the river system and the supply is limited to the water available in the river. For example, when we inspected the Upper-Lalo Diversion on August 25, 1983 the river flow was only 900 liters per second (lps) which was all being diverted. This gives only 0.88 liters per second per hectare (lps/ha) compared to a design criteria demand of 1.5 lps/ha. Since this is the wet season and irrigation is supplemental to rainfall it may be sufficient. However, for crop maintenance in the dry season this flow would place a stress on the crops if 1.5 lps/ha is required. The area planted would probably be reduced accordingly.

Table 1 shows the monthly water deliveries for Upper-Lalo during the wet season of 1982 and the dry season of 1983. It can be seen that the diversion ranged from 59 millimeters per hectare (mm/ha) in July of 1982 during the wet season to a high of 385 mm/ha in December during the dry season. A total of 1,053 mm/ha was diverted during the wet season and 1,491 mm/ha during the dry season. Looking at lps/ha it can be seen during dry season, December, January and February about 1.4 lps/ha was diverted which is only slightly less than the 1.5 lps/ha design.

Table C-1
Water Deliveries, Upper Lalo
Wet Season 1982 - Dry Season 1983

Month Wet Season	MCM Area Harvested	mm/ha = 1,025 ha	lps/ha
May	1.211	118	.44
June	2.722	265	1.02
July	0.603	59	.22
Aug	2.309	225	.84
Sept	1.322	129	.50
Oct	2.638	257	.96
		1,053	
Dry Season	Area Harvested = 956 ha.		
Nov	2.766	289	1.12
Dec	3.683	385	1.44
Jan	3.594	376	1.40
Feb	3.247	340	1.40
Apr	0	0	0
May	2.678	101	.38
		1,491	

MCM - million cubic meters
mm - millimeters
ha - hectares

The Rinconada-Buhi/Lalo project is the one project that has developed an operations manual, in the Bicol dialect, to be used as a guide in training farmers and operators of the system. They are taking the leadership in this activity and should be encouraged to expand and perfect the manual giving particular emphasis to water delivery methods rotation schedules and water management. Although more hydrologic data are needed, it appears that the water supply may be short during drought periods which will place a premium on good water management practices and efficient water use.

Two environmental issues have been raised regarding the irrigation project. One concerns a high level of sulphur found in Lake Buhi at certain times. The effect of this chemical on the agricultural use of the water is probably nil but it should be determined.

The second problem but not within the scope of the irrigation evaluation is the denuding of the watershed tributory to Lake Buhi. This is thought to have increased the sediment being deposited in the Lake and may impair the storage capacity for the project. This problem is receiving some attention but should be carefully studied.

Recommendations

1. Realistic and enforceable rotation water delivery schedules should be developed and put into operation.

2. The environmental issues mentioned should be addressed by

   a. Initiating a data gathering program to determine the extent and magnitude of the environmental concerns related to water quality and sediment transport and deposits.

   b. Determine the environmental benefits and disbenefits related to the proposed fluctuations in the water surface of Lake Buhi. This will probably require a research effort.

INSTITUTIONS

Project Management

At about the time the project was experiencing technical difficulties in the construction of the Buhi control structure, i.e., dewatering of the structure during the dry season, serious adverse environmental impacts believed to be attributable to the lowering of the water level in the Lake by about one meter, plagued the project. The recession of water levels caused by the channelization of the nearby Tabao river adversely affected the continued inability of hundreds of fish pen ownrs both in the Lake and in the river. Not until the Mayor of Buhi raised the issue to the BRBCC through the CMB, was the issue addressed.

The BRBDPO is now considering commissioning a follow-up environmental impact assessment enlisting inter-agency participation with possible funding from USAID, in order to have a more detailed and comprehensive assessment of the adverse impacts and recommend ameliorative measures.

Farmers Organizations

The Buhi-Lalo project operates on a participatory approach, and the formation and organization of irrigators associatioins is one primary function of the Institutional component. Unfortunately, the Rinconada PMO gave priority to the physical construction phase with less emphasis on the institutional aspects. Aggravating the situation, is the weak institutional staff presently trying hard to put more emphasis on the growing problems of institutionalization. To date, three irrigators associations in Upper-Lalo have been organized with eight in the Lower-Lalo's area. Based on this evaluation, the total membership for the three irrigators association in Upper-Lalo is only 285 out of the targetted 1,418, which is more or less 27% of the total.

Table C-2
Breakdown of Membership (Upper-Lalo)

	Membership	Target	Area
Zone I	37	411	293 has.
Zone II	105	352	298 has.
Zone III	143	655	408 has.
TOTAL	285	1,418	999 has.

Since February 1980 the Upper-Lalo irrigation system started operating after undergoing a rehabilitation process, yet it is surprising that membership to date is very, very low. The present organization maintains four levels of groupings: the SFDL, the rotation areas, the main canals/laterals and the board of directors.

Collection rate last year was 77% under the control and supervision of PMO. However, after turning over the responsibility of collection to the farmers association, the collection rate dropped considerably. In wet 82, the collection totalled to only ₱5,000 as against the target of ₱40,000. In 1983 dry only ₱24,000 was collected with a target of ₱68,000. The collection did not reach the 50% mark in either season. This could be attributed to the abrupt turnover of responsibility of collection without proper training and actual experience, and aggravated by the unfixed political boundaries of the rotation areas. Another probable contributing factor is the practice of some farmers, mortgaging

farm lots with a special personal arrangements, which might confuse collectors as to who will pay the irrigation fee. Problems such as these should be documented, and must be dealt with. Presently, the PMO institutional staff gives less emphasis on results than actions taken. Programmed activities are given priority with special attention to deadlines set. This is a critical issue in the formulation of a well-balanced program for a behavioral change of some farmers. Civic groups could help in changing behavioral patterns towards the sustainability of the system itself.

Recommendations

1. Construction priorities in the project have tended to delay the work of the institutional development section. Internally, this section should be elevated to the same level as the engineering/construction section. In addition, more senior management support is required for institutional development.

2. A coordination council, with members from the important farmer organizations and other local interest groups should be formed to enhance the level of farmer involvement.

3. Because of low membership, the structure and leadership of the Irrigation Associations (as well as their activity program) should be assessed. The Irrigation Association should be encouraged to amend its by-laws so farmers who have mortgaged their land remain active participants.

4. Greater attention needs to be paid to the content and sequencing of training, especially for system and on-farm water management. The content of the training programs can be improved by a dialogue with farmers; the sequencing question is one of the coordination between the institutional and technical components. Two important guidelines are timing training so the lessons learned can be applied within thirty days of the course and follow-up from the technical staff takes place.

5. Excellent data are being collected for the agricultural activities being carried out by the Project. There is a need for an analytical framework and analysis ofthese data.

ANNEX D
FUTURE EVALUATION OF THE BRBDP

The focus of this annex is on determining the most productive use of the limited USAID resources available for future evaluation of the BRBDP. For the most part, USAID funding for the project components of the program has already expired or will terminate in the near future. This is true of funding for the irrigation projects (Rinconada, the last, will be completed in 1985), for the feeder roads project, and for the project that directly supports the BRBDP Office; the health project will end in 1985 as well. As the period of major USAID involvement draws to a close, and priorities in the USAID program channel development assistance funds to other areas[1/], there are valid reasons for doing an assessment of what the BRBDP has achieved over the past ten years.

USAID has carried out evaluations of its overall assistance program at two-year intervals since assistance to the BRBDPO began. The most recent of these, conducted with support from the Office of Evaluation in AID/Washington, was in June-July 1981, and attempted to measure the impact of the BRBDP on the institutions and beneficiary populations of the Basin. The team found, however, that the impact measurement exercise was premature, given the rate of implementation progress in the component projects of the BRBDP. Notwithstanding its title and its inclusion in the worldwide series of AID impact evaluations, the report could only offer hypotheses about probable impacts that would require further study and analysis at a later stage in the evolution of the program.

The next (and last) in the series of USAID's program evaluations in the Bicol was to have taken place in 1983. For several reasons - including the fact that the three irrigation projects were also due to be evaluated this year, and the fact that results from the Bicol Multipurpose Survey were not yet available - USAID decided to postpone the program evaluation to early 1984. Detailed terms of reference have not yet been drawn up. Based on the experience of the 1981 "impact evaluation" and this evaluation of the irrigation projects, goals and expectations for the final evaluation deserve careful thought.

It appears likely that the funds available for the program evaluation ($50,000) will be adequate for three to four person-months of short-term consulting services, if those services originate outside the Philippines; or for some combination of services involving locally hired consultants and a smaller amount of time from overseas consultants. It is also realistic to

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1/ Components of recently initiated projects (Rainfed Resources Development, and Local Resource Management) will be implemented in the Bicol Region, but not on a region-wide basis.

assume that funding for the evaluation will prove more difficult to secure the longer it is delayed. These limitations provide one parameter for deciding what can be accomplished in the program evaluation.

A second, equally important parameter is the rate of progress in implementation and the relative maturity of the BRBDP at different points in time. The results of this evaluation show that the irrigation systems will require a number of years to reach their full potential, and to achieve sustainability, beyond the date of physical completion. This suggests strongly that a "final" evaluation in early 1984 that attempts to measure impact and effects is likely to be a frustrating and inconclusive exercise.

Rather than committing more resources to an impact evaluation when the time is not yet ripe, evaluation funds could be used more effectively to assess the sustainability of the BRBDP mechanisms in the period after USAID funding has terminated. This type of evaluation would concern itself with the institutional dimensions of the program, and specifically, with the viability and future role of the Program Office. This is an appropriate subject for evaluation, for a number of reasons:

- The BRBDPO has a continuing responsibility to monitor and support implementation of projects that are still under way;

- The Program Office also continues to hold responsibility for identifying and planning new projects in the areas not yet served in by IAD projects, several of which may benefit from other donor support (e.g., the Asian Development Bank); and

- Finally, the basic premise of USAID support to the BRBDPO has been to help create a viable mechanism to coordinate and oversee the broad spectrum of development activities in the Bicol Region.

This perspective assumes that the sustainability of the BRBDPO itself is an important success measure for the considerable investment that has been made in the Bicol Region. To be sure, the BRBDPO itself does not generate revenue, and its budget must be met from some source, whether exclusively under the GRP budget or on a joint donor/GRP basis. Without question, a large amount of direct donor support was required for the establishment and early institutional development of the Program Office. It can be argued, however, that its capacity and value in terms of regional development should be subjected to a fair test after outside funding has been phased out.

The BRBDP was initiated with an approach which had three principal elements, and these elements provide a framework for evaluating the institutional growth and viability of the BRBDPO:

- First, development initiatives in the rural sector should be focused on defined areas of high growth potential and socio-economic need;

- Second, development planning for these areas should be cross-sectoral and integrated; and

- Third, project planning and management should be decentralized to the greatest extent possible, with the full involvement of the beneficiaries.

All three of these elements remain important to GRP development policies - indeed, they have guided project and program development in other regions of the country. In the specific context of the Bicol Region, it is appropriate to ask whether they have taken root, and in particular, whether the Program Office serves its intended function in promoting this approach.

Two years ago, the AID impact evaluation team highlighted the importance of the Program Office in the long-term development of the region, and raised questions about its future. That team's conclusion is worth quoting at some length, because it can serve as the point of departure for an evaluation conducted in the period after donor funding expires:

> "Without an infusion of strong and creative leadership in the BRBDP Program Office and a fresh mandate and authority from Manila, this potentially major integrating force will likely wither, leaving the action almost entirely to the line agencies and the attractively packaged integrated effort but a shell. Much remains to be done in the Bicol that can be best addressed through an integrative coordinating mechanism. More work is needed on the agro-forestry and forestry fronts to protect the rice bowl and the large infrastructure investments currently being made. Greater emphasis must also be placed on second generation issues such as credit availability and on the vigorous pursuit of the original land reform, agribusiness and rural industry, and other productivity and social service objectives. Rightly or wrongly, the Program Office is seen as the umbilical cord which transfers outside resources to the Bicol. Economic development aside, its abandonment would have significant psychological and political reverberations."1/

Appropriately, the discussion cited above points to relationships between the Program Office and the other GRP agencies operating in the region, and relationships between the Program Office and national-level GRP decision makers, as key determinants of institutional sustainability. Those relationships would be studied in depth during the proposed evaluaton.

In terms of timing, an appropriate time for the evaluation would be at or near the end of the planning and budgeting cycle for the GRP's 1985 fiscal year - in other words, toward the end of the 1984 calendar year. That cycle

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1/ Philippines: Bicol Integrated Area Development. AID Impact Evaluation No. 28, p. 17 (January 1982).

will be the first in which the capability of the BRBDPO to attract resources and coordinate regional development activities will be the fully tested. The Program Office will have had a full year without the kinds of financial and technical support that USAID has provided. If the evaluation shows that major weaknesses exist, and that further interventions and support are required, it will not be too late to provide them. At that point primary responsibility for remedial action will lie with the GRP. Given USAID's longstanding involvement in the Bicol Region, however, and its intimate role in the development of the Program Office in particular, funding for and participation in this evaluation exercise would be highly appropriate.

ANNEX E

EVALUATION TEAM AND METHODOLOGY

This evaluation examined three irrigation projects that have been developed and supported by the Bicol River Basin Development Program (BRBDP) and the United States Agency for International Development (USAID). It is a comparative evaluation with two main objectives:

- First, to do a comparative assessment of the three projects which highlights issues and alternatives for internal project decision making and for future, policy, program and project formulation; and

- Secondly, to assess the progress of each project and to make recommendations, specific and general, on what actions are needed to ensure the likelihood that the benefits generated by these investments continue after external resources are withdrawn.

Thus the focus of the evaluation has been on how to increase the likelihood that benefits from these small farmer irrigation projects will become self-sustaining.

The Evaluation Team

This evaluation was conducted as a joint BRBDPO/USAID effort. The evaluation team consisted of:

Team Leaders:

- Charles F. Sweet, Vice President, Development Alternatives, Inc.
- Tony Barclay, Vice President for Operations, Development Alternatives, Inc.

Technical Sub-Team

- A. Alvin Bishop, Irrigation Engineer, Utah State University
- Abraham Florendo, Engineer, National Irrigation Association
- Herminiano Echeverri, Engineer, Ministry of Agrarian Reform

Institutional Sub-Team

- R. Eduardo Quipit, NACIAD
- Fernando Alsisto, Jr., BRBDPO
- Reynaldo Licup, BRBDPO
- Ernesto Imperial, BRBDPO

In addition to the formal evaluation team, the following individuals were directly involved in the development and preparation of the evaluation:

- Oscar Bermillo, USAID/Naga
- Rebecca Paz, NACIAD
- Cho Roco, USAID/Manila
- Paul F. Novick, USAID/Naga

Coordination and supervision of the evaluation was done by Carmelo Villacorta, BRBDPO Senior Deputy Director, assisted by Pedro Olano and Wilfredo Olano. From USAID, this function was performed by James Dawson, Chief of the Regional Development Division/Office of Rural and Agricultural Development (ORAD). He was assisted in the Bicol Region review of the evaluation report by Douglas J. Clark, Deputy Chief, ORAD.

The three managers and the regional directors for MAR and NIA assisted in the conceptualization, review and field investigations for the evaluation. These include:

Pedro Favenir, Assistant Project Manager, Libmanan/Cabusao
Gregorio Beluang, Project Manager, Bula-Minalabac
Feliciano Berdin, Project Manager, Rinconada/Buhi-Lalo

Evaluation Methodology

This evaluation took place between August 7, 1983 and September 13, 1983. It was designed to be a process evaluation, with the participation of the concerned parties in defining issues to be addressed and in reviewing the findings and recommendations of the study.

The first step in the evaluation was for the team to identify the key issues to be investigated. With this preliminary listing, discussions were held with BRBDPO, USAID, the Regional Directors for MAR and NIA, and the three Project Management Offices. On the basis of these discussions, the list of main issues was modified and an outline prepared for the evaluation. In addition, the data requirements for addressing these issues in each project were defined, in addition to broader information needed which was relevant to all three projects.

On a trial basis, a small segment of the sample used in the 1978 and 1983 Bicol Multi-purpose Surveys was subjected to a computer analysis, in order to test hypotheses about the impact of the irrigation projects on beneficiaries and the broader social and economic effects of the investment in irrigation. The results were inconclusive, in part because of methodological issues (e.g., the coding techniques used for responses in the survey), and in part because there was no satisfactory control group in this segment of the sample. The fact that this exercise did not generate useful information for the evaluation should not prejudge the analysis of the full BMS data base; however, it suggests that the survey analysis may not yield the kinds of definitive quantitative results that the survey's sponsors (the BRBDPO and USAID) originally expected.

Field investigations of three days each were conducted in the project areas. The evaluation team was organized into two sub-teams--Technical and Institutional. At the end of the field investigation for each project, a discussion was held to identify major findings, recommendations, and additional data requirements. From these discussions, general conclusions were reached.

The initial report was drafted in Manila and then reviewed in the Bicol Region with the participation of the evaluation team, BRBDPO, USAID, the PMOs and the Regional Directors of NIA and MAR. On the basis of these discussions the report was finalized for review by national level agencies.

Data Requirements and Availability

The major problem in this evaluation has been the availability of data fo addressing key issues such as how much farmers are able to pay for irrigation services. It was found that the Multi-Purpose Survey provided little information from which broader conclusions could be reached, as has been discussed in Chapter Four. These shortcomings support strongly the recommendations in this evaluation for upgrading the projects' information systems. Although in certain cases the data used in the evaluation, are somewhat speculative, an attempt was made to verify these through several sources. The evaluation team believes that the major findings and recommendations would not change if more reliable data had been available.

ANNEX F
Summary of Agency Comments on the
Comparative Evaluation of
Three Integrated Area Development
Projects in the Bicol Region

The reactions from the NIA, MAR and IRRI during the presentation last September 13, 1983 revealed a general acceptance of the findings and recommendations of the evaluation team. Further consultations with NIA, MAR the Technical Board for Agricultural Credit (TBAC), NEDA, IRRI and the Cabinet Coordinator's Office generated more comments, clarificatory statements and requests for additional information. One of the more important observations made was that the report failed to state a plan of action that would indicate the responsibility center, the timing and schedule of the implementation of the recommendations.

Below is the consolidated summary of the agency comments classified according to the specific issue addressed.

Developing a Reliable Water Supply System

On the observation that the design of the systems is technically sound, IRRI maintains that present drainage problems in the Libmanan-Cabusao IADP are a result of design inadequacies. The drainage canals for example are not provided with approach roads thus hampering their proper maintenance. The flap gate cannot function properly due to siltation on the seaside. An analysis of the design criteria used for the drainage system is called for before improvements are undertaken.

Operations and Maintenance

The technical and water management problems referred to in LCIADP are due to the low and eroded embankments, unauthorized diversion and siltation at the

cut and cover and deep cut section. While NIA agrees with the recommendation that the system requires upgrading, it may be constrained by funds availability. It was explained that per NIA's experience, it is easier to secure funding for capital investments than for maintenance. Thus for future projects, NIA emphasizes strict adherence to its design criteria to lessen operation and maintenance costs.

An irrigation system's operational efficiency can be judged when its actual water supply is compared with its actual water demand. The concept of Relative Water Supply therefore is very useful for the purpose. A gross comparison of the two system's water consumption rates of two systems can be misleading if the two systems are not identical in certain respects. The mere fact that Bula-Minalabac had irrigated only 374 has. in the 1983 dry season makes a comparison of its water supply with that of LCIADP which has irrigated 1,852 has. of limited value because the larger system has to undergo a higher conveyance and operational losses compared to a smaller one.

In relation to the recommendations in Page A-8, an O & M plan following NIA guidelines and water management parameters has been prepared for the Irrigators Association (IA). A detailed O & M manual however does not exist yet. Two-way radios have been provided connecting the pumping station to the office and a mobile unit installed in the superintendent's service vehicle.

According to IRRI, the statement in the report on cost data nonavailability is not true for LCIADP. Their research activities in the area are fairly extensive.

Turning the System Over to Farmers

The policy of NIA on the repayment and turning over of an irrigation system to farmers is flexible, based mainly on the capability of the Irrigators Association to operate the system and their capacity to pay. However, while NIA seeks an affordable level, it likewise considers the perpetuity of the system given difficulties in securing an O & M budget. As suggested by IRRI, farm budgets should be established and be the basis for th negotiation of the O & M and irrigation fee with the Irrigators Association.

With regard to the LCIADP, NIA has no immediate plan to leave O & M of th system totally to the farmers. So far, the IA undertakes only the clearing and minor maintenance of irrigation canals while water distribution is supervised by NIA.

Irrigation Fees and Collection Rates

The collection rate of 30% for LCIADP is only for the first crop (dry season) as the second crop (wet season) has not been harvested. In past years, collection rates were higher: 4% for 1981 and 44% for 1982.

Farmers Involvement

The report gives the impression that farmers within the Libmanan-Cabusao project service area have not been involved at all in decision making. NIA wants to point out that farmers in the area were indeed consulted during the identification, location and construction of farm level facilities (although not in the location and construction of the main canals and laterals). They were likewise given preference in the "takay" system of constructing farm ditches. The representation of the Irrigators Association in the Management

Committee allowed its participation in the determination of t
method of collecting irrigation fees and system of water dist

Credit

Certain measures are already in place to address the prob
restrictions due to loan defaults. Letter of Instruction No.
May 1982 provided a special guarantee payment scheme to banks
loans under the Masagana 99 program which were three years or
1082. The directive allows loans thus covered to be restruct
five-year period. This enables the bank, if found eligible,
certain provisions, to restore its credit standing with the C
the farmers to repay the past due outstanding loans over a lo
time. The restructuring of the farmer's loans would be facil.
farmers organization is involved in the supervision, guarante
collection processes.

To properly assess the credit problem, TBAC would require
data such as number of farmers affected by non-repayment prob.
of their indebtedness, the financing institutions involved an
banks are affected by arrearages under the Masagana 99 progra

Supporting Institutions

IRRI expressed its disagreement to statements referring to
program in LCIADP. Contrary to what is said in the report, th
researches have been presented in two workshops held in collab
BRBDPO. Furthermore, the water allocation and distribution mo
in the LCIADP is based on recognition of the present capacity

The report misenterprets the IRRI economic study as being "designed to analyze yield response to a package of inputs". The study is actually aimed at an economic analysis of the farmers within the system's command. The final results of the study are scheduled to be ready in 1984 but several reports have been already prepared and distributed.

Information System

The NIA has identified the need for accurate data on water availability, water supply and drainage flows. Thus, the weater management study being undertaken with IRRI.

For the overall monitoring of project, NIA expressed its readiness to extend its Project Benefit Monitoring and Evaluation (PBME) system to the Bicol projects.

An improvement in the collection of farm level data should be considered. Rather than the system of recall, extension workers may be used to supervise farmers records keeping.