Document of

The World Bank

FOR OFFICIAL USE ONLY

Report No. 5969

PROJECT PERFORMANCE AUDIT REPORT

PHILIPPINES

TARLAC IRRIGATION SYSTEMS IMPROVEMENT PROJECT
(LOAN 1080-PH)

AND

JALAUR IRRIGATION PROJECT
(LOAN 1367-PH)

December 12, 1985

Operations Evaluation Department

ABBREVIATIONS

ADD	-	Agricultural Development Division
ADCC	-	Agricultural Development Coordinating Council
CAMRIS	-	Camiling River Irrigation System
EIRR	-	Economic Internal Rate of Return
FIA	-	Farmers' Irrigation Association
FIG	-	Farmers' Irrigation Groups
ISF	-	Irrigation Service Fee
MAF	-	Ministry of Agriculture and Food
NEDA		National Economic and Development Authority
NIA	-	National Irrigation Administration
NISIS	-	National Irrigation Systems Improvement Study
OED	-	Operations Evaluation Department
O&M	-	Operation and Maintenance
PAC	-	Provincial Agricultural Council
PCR	-	Project Completion Report
PPAM	-	Project Performance Audit Memorandum
PPAR	-	Project Performance Audit Report
SAR	-	Staff Appraisal Report
SER	-	Shadow Exchange Rate
SMORIS	-	San Miguel-O'Donnell River Irrigation System
TARRIS	-	Tarlac River Irrigation System
TISIP	-	Tarlac Irrigation Systems Improvement Project
WPI	-	Wholesale Price Index

PROJECT PERFORMANCE AUDIT REPORT

PHILIPPINES
TARLAC IRRIGATION SYSTEMS IMPROVEMENT PROJECT
(LOAN 1080-PH)

AND

JALAUR IRRIGATION PROJECT
(LOAN 1367-PH)

TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd)

PROJECT PERFORMANCE AUDIT REPORT

PHILIPPINES
TARLAC IRRIGATION SYSTEMS IMPROVEMENT PROJECT
(LOAN 1080-PH)

AND

JALAUR IRRIGATION PROJECT
(LOAN 1367-PH)

PREFACE

This is a Project Performance Audit Report (PPAR) on Tarlac Irrigation Systems Improvement Project and Jalaur Irrigation Project in the Philippines. Loan 1080-PH in the amount of US$17.0 million was approved in December 1974 for Tarlac Irrigation Project. This loan was closed in June 1983. The final disbursement took place in December 1983, when the undisbursed balance of US$7,800 was cancelled. Loan 1367-PH in the amount of US$15.0 million was approved in February 1977 for Jalaur Irrigation Project. This loan was closed in June 1984. The final disbursement was made in September 1984, when the undisbursed balance of US$114,000 was cancelled.

The audit report includes a Project Performance Audit Memorandum (PPAM) prepared by the Operations Evaluation Department (OED) and a Project Completion Report Overview prepared for each project by the Bank's East Asia and Pacific Regional Office. Project Completion Reports (PCRs) were prepared for each project by the National Irrigation Administration. As these were very long and detailed they have not been included in the PPAR but have been retained in OED's files. The audit of these two projects has been combined because of the similarity between these two irrigation projects.

The audit memorandum is based on a review of the two project completion reports and the following Bank documents: Tarlac Irrigation Project - the Staff Appraisal Report (521a-PH) dated December 3, 1974, the President's Report (P-1538-PH) of December 4, 1974, and the Loan Agreement dated January 27, 1975; Jalaur Irrigation Project - the Staff Appraisal Report (1311a-PH) and the President's Report (P-1973-PH) both dated January 5, 1977, and the Loan Agreement dated February 14, 1977. Correspondence with the Borrower and internal Bank memoranda on project issues, as contained in relevant Bank files, have been studied, while Bank staff associated with the project have been interviewed. An OED mission visited the Philippines in June 1985. Discussions were held in Manila with officials from the National Irrigation Administration (NIA) and the National Economic and Development Authority (NEDA). A visit was also made to Tarlac Irrigation Project to inspect project works, hold discussions with local officials, and interview farmers.

The PPAM agrees with the principal conclusions in the two PCRs and Overviews. In addition to summarizing the objectives and results of the two projects, the PPAM discusses the reasons why the projects were not able to develop all of the areas proposed for irrigation, examines issues concerning cost recovery and operation and maintenance, and considers the comparative advantages of groundwater and gravity irrigation systems.

A copy of the draft report was sent to the Borrower in August 1985. Comments received from the National Irrigation Administration, the National Economic and Development Authority, and the Ministry of Agriculture and Food are included in Attachments I to III.

The audit gratefully acknowledges the assistance provided by officials from the National Irrigation Administration and the National Economic and Development Authority and by farmers.

PROJECT PERFORMANCE AUDIT REPORT

PHILIPPINES: TARLAC IRRIGATION SYSTEMS IMPROVEMENT PROJECT (LOAN 1080-PH)

BASIC DATA SHEET

KEY PROJECT DATA

	Appraisal Estimate	Actual or Estimated Actual	Actual as % of Appraisal Estimate
Project costs (US$ million)	34.0	45.2	133
Loan amount (US$ million)	17.0	17.0/a	100
Date Board Approval	-	12/17/74	-
Date Effectiveness	-	04/30/75	-
Date physical components completed	06/80	04/84	169/c
Proportion completed by above Date	100	100/b	-
Closing date	12/31/80	06/30/83/a	141/c
Economic rate of return (%)	15	13	87
Financial Performance (%)	-	Fair	-
Institutional Performance	-	Fair	-
Agricultural Performance	-	Good	-

CUMULATIVE DISBURSEMENTS

	FY76	FY77	FY78	FY79	FY80	FY81	FY82	FY83	FY84
Appraisal Estimate (US$ million)	2.5	7.7	14.0	16.5	17.0	17.0	17.0	17.0	17.0
Actual (US$ million)	0.2	2.2	6.3	9.2	11.1	13.1	14.6	16.9	17.0/a
Actual as % of Estimate	8.0	28.6	45.0	55.7	65.3	77.1	85.9	99.4	100.0

Date of Final Disbursement: December 23, 1983
Principal repaid to 04/08/85 US$1.44 million

MISSION DATA

Mission	Date (mo./yr.)	No. of Persons	Mandays in Field /d	Specializations Represented /e	Performance Rating /f	Trend /g	Types of Problems /h
Identification/Preparation:	Done by National Irrigation Administration						
Appraisal	04/74	4	84	a,e,h,i	-	-	-
Subtotal		4	84				
Supervision 1	04/75	3	18	a,i,p	1	-	-
Supervision 2	03/76	5	15	a,f,h,i,p	1	2	M
Supervision 3	01/77	2	10	i,p	1	1	-
Supervision 4	10/77	2	8	h,p	1	1	-
Supervision 5	07/78	2	12	i	2	1	T
Supervision 6	09/78	2	8	a,e/h	-	-	-
Supervision 7	05/79	3	27	i,h	2	2	F,T
Supervision 8	09/79	2	8	a,e/h	-	-	-
Supervision 9	01/80	2	10	i	2	2	M,T
Supervision 10	09/80	1	5	a	-	-	-
Supervision 11	11/80	3	18	i,c	2	2	M,T
Supervision 12	09/81	1	6	i	2	2	M,T,F
Supervision 13	05/82	2	10	i	2	2	M,T
Supervision 14	02/83	1	14	i	2	2	M,T
Subtotal		31	169				
Total		35	253				

OTHER PROJECT DATA

Borrower: Republic of the Philippines
Executive agency: National Irrigation Administration (NIA)
Fiscal Year of Borrower: January 1-December 31

Name of currency (abbreviation): Peso P

Appraisal year average	1974	US$1.00 = P 6.72
Intervening years average	1975-82	US$1.00 = P 7.59
Completion year average	1983	US$1.00 = P 11.00

Follow-on project:
Name: Balog Balog Multipurpose Project /i

/a The closing date was formally amended to 06/30/83 but the last disbursement was made on December 23, 1983 bringing the utilized loan amount to US$16,992,215. The undisbursed amount of US$7,784 was cancelled as of December 27, 1983.
/b With the exception of some very minor portion of work estimated to cost about $150,000.
/c From date of Board approval.
/d Supervision missions covered more than one project. Time spent has been prorated.
/e a = agriculturist; c = civil engineer; e = economist; h= hydrologist; i = irrigation engineer; p = procurement specialist; f = financial analyst.
/f 1 = problem-free of minor problems; 2 = moderate problems.
/g 1 = improving; 2 = stationary; 3 = deteriorating.
/h F = financial; M = managerial; T = technical.
/i Originally scheduled for 1984, but deferred due to difficult economic situation in the Philippines. Tentatively rescheduled for 1992.

PROJECT PERFORMANCE AUDIT REPORT

PHILIPPINES: JALAUR IRRIGATION PROJECT (LOAN 1367-PH)

BASIC DATA SHEET

KEY PROJECT DATA

	Appraisal Estimate	Actual or Current Estimate	Actual as % of Appraisal Estimate
Total Project Costs (US$ million)	34.0	33.3	98
Loan Amount (US$ million)	15.0	14.9 /a	99
Date Board Approval		01/25/77	-
Date Effectiveness		05/12/77	-
Date Physical Components Completed /b	06/30/82	06/30/84	137
Closing date	12/31/82	06/30/84	-
Economic rate of return (%)	20%	20%	100
Institutional Performance	Good	Good	
Agronomic performance	Good	Good	
Number of direct beneficiaries (1984)		10,900	

CUMULATIVE DISBURSEMENTS

	FY78	FY79	FY80	FY81	FY82	FY83	FY84
Appraisal Estimate (US$ million)	3.1	7.6	11.5	13.5	14.7	15.0	-
Actual (US$ million)	0.3	3.3	6.1	9.1	10.0	13.7	14.9
Actual as % of Estimate	10	43	53	67	68	91	99
Date of Final Disbursement	09/26/84						
Principal Repaid to 11/01/84	US$3.395 million						

MISSION DATA

Mission	Date (mo./yr.)	No. of Persons	Man-weeks in Field	Specializations Represented /c	Performance Rating /d	Trend /e	Types of Problems /f
Identification	1960	N/A		b	-	-	-
Preparation	11/75	Consultants		a,b	-	-	-
Appraisal	06/76	5	20	a,b,c	-	-	-
Subtotal		5	20				
Supervision 1	05/77	2	3	a,b	1	1	
Supervision 2	03/78	3	3	b,c	1	1	
Supervision 3	01/79	3	3	b,a	1	1	
Supervision 4	09/79	3	3	b	1	1	
Supervision 5	09/80	1	3	b	1	1	
Supervision 6	05/81	1	3	b	1	1	
Supervision 7	02/82	1	3	a	2	1	
Supervision 8	10/82	1	3	a	1	2	
Supervision 9	06/83	1	3	a	1	1	
Supervision 10	03/84	1	1	a	1	1	
Supervision 11	07/84	1	1	a	1	1	
Subtotal		18	29				
Total		23	49				

OTHER PROJECT DATA

Borrower: Government of the Philippines
Executing Agency: National Irrigation Administration
Fiscal Year of Borrower: January 1 - December 31

Name of Currency (Abbreviation) Peso (P-)

Appraisal Year Average	1977	US$1.00 = P- 7.40
Intervening Years Average	1978-82	US$1.00 = P- 7.72
Completion Year Average	1983	US$1.00 = P- 11.00

Follow-on Projects:

/a Undisbursed balance of $114,103.75 was cancelled effective September 26, 1984.
/b The project was substantially completed by 12/31/83 except for the purchase of some O&M equipment and spare parts.
/c a = agriculturist; b = engineer; c = economist.
/d 1 = problem-free or minor problems; 2 = moderate problems; and 3 = major problems.
/e 1 = improving; 2 = stationary; 3 deteriorating.
/f F = financial; M = managerial; T = technical; P = political; and O = other.
/g The feasibility studies and the detailed engineering of Stage II have been completed but implementation has been deferred due to the present economic conditions in the country.

PROJECT PERFORMANCE AUDIT REPORT

PHILIPPINES
TARLAC IRRIGATION SYSTEMS IMPROVEMENT PROJECT
(LOAN 1080-PH)

AND

JALAUR IRRIGATION PROJECT
(LOAN 1367-PH)

EVALUATION SUMMARY

Introduction

This Project Performance Audit Report covers two similar irrigation projects in the Philippines, both of which were designed to increase production of paddy. Tarlac Irrigation Systems Improvement Project was expected to rehabilitate 21,000 ha of irrigated land on three irrigation systems in Tarlac and Pangasinan Provinces in Luzon, and extend these systems by a further 13,000 ha. Jalaur Irrigation Project was designed to rehabilitate 22,000 ha of irrigated land on four irrigation systems on the island of Panay. This project also involved extending these systems by a further 2,700 ha. Each project was expected to cost US$34.0 million. A Bank loan of US$17.0 million was provided for Tarlac Project and another loan of US$15.0 million for Jalaur Project.

Objectives

Both projects were designed to increase paddy production, thus helping to achieve national self-sufficiency in foodgrains. Jalaur Project also aimed to promote development in one of the less developed areas of the country. Tarlac Irrigation Project also included a pilot groundwater irrigation component designed to study the suitability of using groundwater to supplement water available from the main gravity-fed systems. In addition, Tarlac Project provided for a study of other existing irrigation systems in the Philippines, with the aim of identifying those areas which should be given highest priority for rehabilitation.

Implementation Experience

Both projects were implemented by the National Irrigation Administration broadly as planned. Completion of Tarlac Project was delayed by about five years and Jalaur Project by two years. Several factors contributed to these delays, especially poor experience with construction contracts and difficulties in securing rights of way. Tarlac Irrigation Project also experienced a 33% cost overrun (a 55% overrun if expressed in Philippine Pesos), although expenditure on Jalaur Project was 2% less than estimated at appraisal.

Results

The irrigated areas developed under both projects fell short of the targets set at appraisal. For Tarlac Project the irrigated area at project completion was 22% less than the target; some land which was used for communal irrigation or sugarcane production was not made available for the project, as expected, while other areas proved to be unsuitable, either because they were too low-lying and susceptible to flooding, or too high to be supplied with water by gravity. For Jalaur Project the small shortfall of about 5% in the area developed for irrigation was due to the unexpected diversion of land for urban development. In both projects crop yields are now expected to be somewhat better than forecast at appraisal, although in some areas of Tarlac Project cropping intensities may be below expectations due to shortage of water. In the case of Jalaur Project annual cropping intensity at full development is now expected to be substantially higher than the appraisal estimate. Water shortages are likely to be serious with Tarlac Project due to problems with illegal abstraction of water upstream from the project and denudation of the catchment area. The pilot groundwater irrigation component was implemented under Tarlac Project, but due to rapidly escalating operating costs, especially energy costs, the pumps were shut down in 1980/81. A thorough economic evaluation of this pilot project was not completed even though this was required by the Loan Agreement. The reestimated economic rates of return for the two projects are 13% for Tarlac and 20% for Jalaur.

Sustainability

Both projects have suffered from inadequate cost recovery and NIA has had insufficient income to pay for fully adequate maintenance. Irrigation Service Fees (water charges) have not been set at levels sufficient to fully recover operating costs and part of the capital investment. Further, only about 50% of the amounts levied have been collected, and the amounts actually received have not been sufficient to cover even the cost of maintenance at prevailing less-than-adequate standards (PPAM para. 24 and Tarlac PCR Overview para. 29). A significant improvement in the standard of maintenance will have to be made soon if the irrigation systems are not to deteriorate. In addition, the long-term sustainability of benefits from the Tarlac Project will be adversely affected if steps are not taken to control illegal diversion of water upstream from the project, and prevent further denudation of the watershed in the project's catchment area.

Findings and Lessons

For both projects, but especially for Tarlac Project, the amounts of land available for irrigation were overestimated at appraisal. More care should have been taken to find out whether the landowners wished to participate in the project, and more careful engineering studies should have been completed to ensure that land proposed for inclusion under the project was physically suitable (PPAM para. 20).

Project implementation, especially at Tarlac, suffered from long delays, due largely to poor experience with construction contracting procedures and difficulties encountered in securing essential rights of way (PPAM para. 3 and Tarlac PCR Overview para. 13).

The pilot groundwater sub-project at Tarlac was shut down in 1980/81 due to the very high operating costs resulting from high power charges which the farmers could not afford to pay. No thorough economic evaluation was undertaken. Despite the high operating costs for pumped groundwater systems, these may still compare favorably with gravity systems in some circumstances due to the high capital costs involved with the latter (PPAM para. 30 and Tarlac PCR Overview paras. 14 to 16).

At Tarlac there has been a growing problem with lack of water in the dry season, due to illegal abstraction upstream and progressive deterioration of the watershed in the catchment area (PPAM para. 21 and Tarlac PCR Overview para. 10).

PROJECT PERFORMANCE AUDIT MEMORANDUM

PHILIPPINES
TARLAC IRRIGATION SYSTEMS IMPROVEMENT PROJECT
(LOAN 1080-PH)

AND

JALAUR IRRIGATION PROJECT
(LOAN 1367-PH)

I. PROJECT SUMMARY

1. Over a number of years the Bank has supported a series of irrigation projects in the Philippines. The two projects covered in this report are both very similar, being based primarily on rehabilitation and upgrading of existing irrigation systems. Originally, both of these projects were expected to be the first, and smaller, phases of larger projects. However, implementation of the second phases has now been postponed on account of their high cost and the difficult country economic situation.

A. Tarlac Irrigation Systems Improvement Project

2. Tarlac Irrigation Systems Improvement Project (TISIP) was designed to rehabilitate 21,000 ha of irrigated land on three existing irrigation and drainage systems in Tarlac and Pangasinan Provinces of Luzon. These were the Camiling River Irrigation System (CAMRIS), the Tarlac River Irrigation System (TARRIS), and the San Miguel-O'Donnell River Irrigation System (SMORIS). These systems were also to be extended by a total of 13,000 ha. In addition, the project provided for construction and upgrading of 425 km of roads, a pilot groundwater irrigation project, training in water management, a study to identify priority areas for further improvement of irrigation systems, and provision of vehicles and equipment. The project was to be implemented by the National Irrigation Administration (NIA).

3. Project Cost. At appraisal the project was expected to cost US$ 34.0 million and be completed within four years. The Bank provided a loan of US$17.0 million, the remaining 50% of project cost being financed by Government. In practice, it took nine years to complete the project and the actual project cost was 33% higher in terms of US Dollars than expected at appraisal (55% higher in Philippine Pesos). Several factors contributed to the long delay in project implementation, including poor performance with construction contracts, problems in acquiring rights of way, and inadequate budgetary support. Several major construction contracts were terminated and completed by force account.

4. Achievements. The project was completed along the lines planned, although the irrigated area developed was significantly less than anticipated

at appraisal. The total irrigation service area actually developed is stated to have been 26,389 ha compared with 34,000 ha expected at appraisal (PCR Overview para. 3). This represents a shortfall of 22%. This shortfall occurred because several areas of land could not be used, even though they were thought to be suitable for the project at the time of appraisal. Some of this excluded land was retained as a sugarcane plantation, while areas elsewhere continued to be used for communal irrigation systems. Other areas were subject to flooding, while 3,300 ha proved to be at too high an elevation to provide irrigation water by gravity.

5. At appraisal it was expected that the full irrigation service area of 34,000 ha would be irrigated in the wet season, but only 6,200 ha would be irrigated in the dry season, due to shortage of water. This would have been equivalent to a cropping intensity of 118%. The PCR Overview (para. 4) suggests that the cropping intensity is now expected to reach 125% at full development, based on the reduced service area. However, as discussed later, the audit believes that this is probably too optimistic an assessment, primarily because the availability of water is very limited in the dry season, largely due to illegal abstraction of water in an area upstream of the project.

6. Yields of paddy are now expected to be somewhat higher than forecast at appraisal (PCR Overview para. 5). This was confirmed by the farmers interviewed during the audit mission. They stated that since completion of the project they had been able to obtain much higher yields than previously wherever sufficient water was available to irrigate paddy.

7. In addition to developing the main gravity irrigation system, the project included a pilot groundwater development project. This was intended to provide data on the water availability from the aquifers in the project area and evaluate the technical and economic feasibility of irrigation using groundwater, primarily to supplement the dry season supply from the main gravity system. This pilot groundwater project was completed as planned, with 19 tubewells, each capable of irrigating 50 ha of paddy. However, the operating costs proved to be much more expensive than expected, for this development took place at a time of rapidly escalating energy prices. For this reason, NIA shut the system down after a few years and it remains out of operation today. However, no thorough economic evaluation of this pilot project was undertaken, the decision to shut down the system being based solely on the inability of NIA to recover operating costs from the beneficiaries. This issue is discussed in more detail later in this report.

8. The project included a training program designed to train 300 water management technicians. Initially, this component was implemented successfully and 360 technicians were trained. However, NIA was obliged to suspend this program after a few years due to a shortage of funds. Furthermore, NIA was not able to employ one technician for every 500 ha of irrigated land, as expected originally, but increased the area per technician to 750 ha. This experience illustrates the need to ensure that training programs are undertaken on a scale which is consistent with Government's ability to support the long term costs involved.

9. The project also included a National Irrigation Systems Improvement Study (NISIS), which was designed to complete an inventory of the existing irrigation systems and identify those areas which should be given the highest priority for rehabilitation and improvement. This study was completed successfully and it has led to two Bank-supported rehabilitation projects (Phases I and II of the National Irrigation Systems Improvement Project - Loan Numbers 1414-PH and 1526-PH).

10. Operation and Maintenance. Maintenance of the irrigation systems has been somewhat unsatisfactory, primarily because of the serious financial constraints faced by NIA. Most of the available operation and maintenance (O&M) budget has been required to meet the cost of salaries, and insufficient funds have been available for fuel, materials or equipment. Consequently, it has not been possible to carry out routine maintenance in a timely manner. Some silt has not been removed from canals, some canals have at times become overgrown, while there have been instances where damaged structures have not been repaired. Although most of these problems could be rectified if the O&M budget were increased, the system will deteriorate if this is not done soon.

11. Cost Recovery. Farmers are expected to pay irrigation service fees (water charges) to NIA, which is able to use this income to meet operation and maintenance costs. This system has considerable attraction in principle, because NIA has direct control over the revenue it raises, and because the service fees are expressed in terms of physical quantities of paddy, i.e., are effectively indexed. However, in practice the level of service fees is fixed by Government, not by NIA, and actual collections have been running at only about 50% of billings.[1/] The amount collected has not been sufficient to provide for proper maintenance, let alone for any recovery of capital costs. Unsatisfactory experience with collection of irrigation service fees is in fact a nationwide problem, although there has been considerable variation between different irrigation systems, depending to some extent on the attitude of the local people and the performance of the irrigation system. For example, at Tarlac collections have been much better at CAMRIS compared with SMORIS. At CAMRIS, which is the best of the three irrigation systems at Tarlac, the people seem to have a progressive attitude and the collection efficiency in the last few years has been about 60%. However, at SMORIS, where there have been technical problems with the irrigation system, especially silting in some parts of the canals, the people have also been rather unhelpful, and collection efficiency has been only about 40%. Issues concerning cost recovery and operation and maintenance are discussed in more detail later in this report.

12. The Economic Rate of Return. The PCR has reestimated the economic rate of return (ERR) to be 15%, the same as at appraisal. This result occurred because the negative impact of the reduction in the area of irrigated land was offset by higher than expected yields and an increase in the economic price of paddy. However, the audit believes that the ERR has

---

1/ The amounts not collected in one year are not written off but are carried forward with interest to the next year.

probably been overestimated in the PCR because the assumptions made about the area of land which could be irrigated in the dry season were too optimistic. If the incremental benefits from the project were 20% less than forecast in the PCR, the ERR would be about 13%. The audit believes that this is probably a more realistic estimate.

B. Jalaur Irrigation Project

13. Jalaur Irrigation Project was designed to rehabilitate 22,000 ha of irrigated land on four existing irrigation systems on the island of Panay, one of the least developed areas in the Philippines. The project also aimed to extend these systems by a further 2,700 ha. Other components of the project included improvement of access roads, staff training in water management, and provision of equipment for operation and maintenance. When fully developed the project was expected to benefit about 80,000 people and result in incremental production of 91,000 tons of paddy.

14. Project Cost. At appraisal the project was expected to cost US$ 34.0 million and be completed within five years. The Bank provided a loan of US$15.0 million, sufficient to finance the foreign exchange element of project costs. The balance of the project cost was to be financed by Government. In practice, completion of the project was delayed by two years. As with Tarlac Irrigation Project, this was due in large part to poor experience with construction contracts, several of which were terminated on account of unsatisfactory performance. Actual expenditure under the project amounted to US$33.3 million, 2% less than estimated at appraisal.

15. Achievements. The project was completed essentially as planned, although the area of land developed was about 5% less than expected. This reduction was due to the loss of land for urban development. Agricultural production at full development is now expected to be about 11% higher than estimated at appraisal, due to better than expected yields and a higher intensity of cropping. The cropping intensity at full development is now expected to be 170%, compared with 149% estimated at appraisal, while paddy yields are expected to be about 15% higher than the appraisal estimates (PCR Overview Table 2).

16. Operation and Maintenance. Jalaur Irrigation Project has experienced problems with inadequate funding of operation and maintenance, the same as Tarlac Irrigation Project. This is also, as with Tarlac, related to the issue of cost recovery. For Jalaur Irrigation Project the PCR (Table 10.1) indicates that in the last few years the proportion of irrigation service fees (water charges) actually collected has averaged only 45%. With this level of collection it is not possible for NIA to provide adequate maintenance.

17. NIA is planning to transfer most of the responsibility for maintenance to Farmers' Irrigators Groups (FIGs) and Farmers' Irrigators Associations (FIAs), which are formed from several FIGs. However, at the time of project completion only about 10% of these were fully operational. It seems inevitable that a considerable amount of time will be required before these farmers' organizations can become fully effective.

18. The Economic Rate of Return. The PCR Overview has reestimated the economic rate of return (ERR) from the project to be 20%, the same as at appraisal.[2/] The audit would like to draw attention to the fact that this estimate is based on the assumption that the irrigation system will be adequately maintained and the benefits from the project will be sustained over time. A significant improvement over the present standard of maintenance will be required if this is to prove a realistic assumption.

II. MAIN ISSUES

A. General

19. Jalaur Irrigation Project was more successful overall than Tarlac Project. Jalaur Project had no cost overrun, there was less delay in completing the project, and it is expected to show a higher economic rate of return than Tarlac. Nevertheless, there were certain common problems with both projects. For example, the experience with many construction contracts was unsatisfactory, and this was a major factor contributing to implementation delays. Likewise, both projects suffered from low collection rates for irrigation service fees (water charges) and, consequently, inadequate budgets for operation and maintenance. In fact, this is an issue which affects all national irrigation projects in the Philippines. Both projects also failed to achieve the full irrigated area development targets, although this problem was much more serious in the case of Tarlac Project. All of the above issues have also been reported with other irrigation projects.[3/]

B. Failure to Achieve Area Development Targets

20. Both projects failed to achieve the targets set at appraisal for the area of irrigation to be developed, although the shortfall was much higher in the case of Tarlac Project. For Jalaur Project the service area actually developed was about 5% less than expected at appraisal, and this shortfall was due entirely to the unanticipated diversion of land to urban development. For Tarlac Project the shortfall was 22%. Furthermore, due to lack of water, the proportion of this service area which can be irrigated in the dry season is likely to be considerably lower than expected. At Tarlac the area of land available for irrigation was lower than expected because some sugarcane producers and farmers on communal irrigation systems were

---

2/ The PCR reestimated the ERR to be 24%, but this was reduced to 20% in the PCR Overview.

3/ The PPAR for Aurora-Penaranda Irrigation Project reported problems with poor contracting procedures, failure to achieve area development targets due to lack of water, and inadequate collection of irrigation service fees (OED Report Number 4555, page 3 et seq.). Similar issues have also been raised in the audit report for Mindoro Rural Development Project (PPAR in preparation).

unwilling to participate in the project, while other areas were also subject to flooding or were too high to be included within the gravity irrigation system. It seems clear that appraisal of this project was deficient, both because the intended beneficiaries were not adequately consulted, and insufficient survey work had been done to identify areas which were either subject to flooding or at too high an elevation to be supplied with water. Since this project was appraised the Bank has instituted a rule which requires that detailed designs be substantially completed before presentation of new projects to the Board. If this had been done for Tarlac Project it would have prevented the inclusion within the project of areas which were physically unsuitable, while it would have increased the reliability of project cost estimates.

21. At Tarlac a shortage of water in the dry season has seriously constrained irrigated paddy production. At appraisal it was expected that the full service area (34,000 ha) would be irrigated in the wet season, but only 18% of this (6,200 ha) could be irrigated in the dry season. The PCR suggests that the cropping intensity will now reach 125% at full development, although the total service area would be 22% lower than planned at appraisal. The audit believes that the PCR has overestimated the amount of land which will be irrigated in the dry season. In practice, it may prove possible to achieve no more than 50% of the PCR targets for dry season irrigation.

22. The availability of water in the dry season has been reduced for two main reasons. First, there has been a growing problem with illegal abstraction of water upstream from the project, especially upstream of SMORIS. Second, increasing denudation of the watershed has contributed to more erratic stream flows and shortages of water in the dry season. Although in some of the catchment areas steps are being taken to protect the watershed, denudation of the watershed could well become more serious in future as population pressure on the land continues to grow.

23. The possibility of illegal abstraction of water upstream was known at the time of appraisal. However, the appraisal report stated that "In sizing the project area, no account was taken of any diversions upstream of the system diversion dams. These rights do not pose a problem and such rights may be cancelled if the Government needs the water for water resources development projects." (SAR para. 4.07). This assessment has proved to be unrealistic. Especially in the present political circumstances, Government has not been effective in preventing abstraction of water upstream. This is particularly serious for the SMORIS sub-project, for in this area people are able to divert most of the river flow in the dry season. This is not a problem in the wet season because water is plentiful at that time and the primitive offtake structures used to divert water upstream are washed away each year when the river is in flood.

C. Cost Recovery and Operation and Maintenance

24. Both projects under review here have suffered from inadequate cost recovery. This has created financial difficulties for NIA which has not been

able to afford to pay for satisfactory maintenance. Irrigation service fees (water charges) are fixed by Government. At their present levels they could provide more than sufficient income to pay for the prevailing less-than-adequate standard of O&M costs, if all the amounts due were collected. However, as collections have been running at an average of 43% of the amounts billed for Tarlac and 45% for Jalaur, the revenue obtained has not been sufficient to pay all essential O&M costs, let alone make any repayment of capital costs. The PCRs for these two projects estimate that the income from irrigation service fees would be adequate to meet the O&M budget if collections at Jalaur were 50% and about 60% at Tarlac (Tarlac PCR Table 11.4 and Jalaur PCR Table 10.4). However, the figure used in the budget for O&M costs per hectare is too low to provide satisfactory maintenance (see Jalaur PCR Overview para. 22). Thus, higher proportions of irrigation service fees would need to be collected than indicated in the PCRs if maintenance is to be satisfactory.

25. Inadequate cost recovery and poor maintenance have been long-standing problems in the Philippines, although they have been aggravated recently by the financial difficulties encountered by NIA and the unsatisfactory overall economic situation in the country. For this reason, the loan agreements for both projects contained covenants which required that adequate funds be budgeted for operation and maintenance, that all necessary action be taken to ensure that charges for the use of irrigation water are levied and collected, and that the level of fees be sufficient to cover all O&M costs and repayment of the capital invested (para. 4.03 in each of the relevant loan agreements). These requirements have clearly not been complied with. Government has not been willing to set the irrigation service fees at levels which would provide sufficient funds for adequate O&M, let alone permit significant recovery of capital costs. Further, it has not been able to enforce full collection at the present level of fees. In the present circumstances it seems that there are few, if any, effective measures which NIA can take to insist on prompt payment of water charges. It is probably not realistic to contemplate withholding water from groups of farmers who fail to pay on time. At present farmers are provided with a cash discount for prompt payment, although other incentives may be worth considering. For example, at present a standard amount is budgeted for operation and maintenance regardless of the level of cost recovery achieved. It may be preferable to make sure that where a high level of cost recovery is achieved a high standard of operation and maintenance is also provided.

26. Possible ways of improving cost recovery and operation and maintenance are being considered in an irrigation study being financed under the Agricultural Sector/Inputs Project (Loan 2469), while these issues are also being addressed in a proposed Irrigation Operations Project. However, it seems clear that these long-standing issues will not be easy to rectify.

27. While direct cost recovery from farmers has been inadequate, farmers have apparently been making indirect transfers to the rest of the economy through the controlled price structure for paddy and rice.[4/] With

---

4/ However, rice prices were decontrolled on October 1, 1985.

the recent decontrol of rice and paddy prices, this type of indirect transfer will no longer take place. If farmers receive higher incomes, as a result they may improve their repayment performance. This would certainly seem an appropriate time at which to introduce improved collection procedures.

D. Comparative Advantages of Groundwater and Gravity Irrigation Systems

28. Tarlac Irrigation Project included a pilot groundwater project designed to evaluate the technical and economic feasibility of irrigation using groundwater, primarily to supplement water available from the main gravity-fed system. This pilot project was established along the lines proposed originally, with 19 tubewells, each with the capacity to irrigate 50 ha of paddy. However, the operating costs proved to be much more expensive than expected and the system was shut down in 1980/81 because NIA could not afford to pay the operating costs, while farmers were not willing to do so either. For example, in the dry season of 1980 NIA's costs of operation and maintenance per hectare were equivalent to the value of about 750 kg of paddy, while the irrigation service fee charged to farmers was 250 kg of paddy. Furthermore, a high proportion of service fees were not collected. For example, in 1980 overall collections amounted to only 35% of the amount billed (PCR Table 2.6). The timing of this pilot project coincided with a period of rapidly escalating energy prices, while the way in which the pumps were installed and used seems to have required the use of excessive energy. Some of the pumps were installed in areas where no water was available in the dry season from the gravity-fed main system. Thus, the pumps were not used as intended to supplement the gravity system, but all of the required water had to be pumped in the pilot areas. Furthermore, some of the pumps were installed in areas where the soils had relatively high percolation rates and water requirements were high. Also, as the farmers were expected to pay irrigation service fees at fixed rates, they apparently did not feel a strong inducement to try to minimize the use of water.

29. It was expected that a thorough evaluation of this pilot project would be undertaken and the loan agreement (page 15) provided for "the preparation of an evaluation report after operation of pilot areas for about two years, including, if warranted on the basis of the evaluation, a framework plan and preliminary cost estimate for conjunctive use of surface and groundwater in each system." In fact, no such evaluation was undertaken. The decision to close down the tubewells was based entirely on the high level of operating costs, not on a thorough evaluation of their economic merits. As pointed out in the PCR Overview (para. 15), the structure of NIA's irrigation service fees favors farmers who use gravity water supplies, rather than pumped water, because the service fees are geared primarily to the recovery of operating costs, with no serious attempt to recover capital costs. Thus, as gravity systems normally have much lower operating costs than pumped systems, a lower scale of water charges is possible with gravity systems.

30. While groundwater irrigation systems normally have higher operating costs than gravity systems, the reverse is often true as far as capital costs are concerned. Thus, an economic evaluation which takes account of all costs

involved with these alternative systems, could well show that groundwater is preferable to gravity systems, although it has not been possible to undertake such an analysis as part of the audit for this project. If decisions on whether or not to continue operating groundwater systems are taken solely on the basis of their operating costs, it is possible that these decisions will not lead to the most economic solution. However, if NIA were required to recover both capital and operating costs, and its scale of water charges was designed accordingly, this would most likely place NIA in a position where it would make better decisions concerning the relative merits of alternative irrigation systems.

31. In 1982 Government decided that NIA should take direct responsibility for paying all costs associated with new loans taken out for development of irrigation systems. The implication of this is that water charges would have to be set at a level which would permit recovery of both capital and operating costs. While this has considerable merit, both on economic efficiency grounds, and because there would be full cost recovery from beneficiaries, it would require a substantial increase in the level as well as collection efficiency of water charges.

This page blank

BORROWER'S COMMENTS

Attachment I

ZCZC DIST4791 RCA0869
OEDUD
:REF : TCP HC

RCA0869
248423 WORLDBANK

10-21-85

248423 WRLDBANK
WASHINGTON D C

FOR DIR. YUKINORI WATANABE, OPERATIONS EVALUATION DEPT. REUR LTR AUG 26 REQUESTING OUR VIEWS ON DRAFT PROJ PERFORMANCE AUDIT REPORT (PPAR) ON THE TARLAC IRRIG SYSTEMS IMPROVEMENT PROJ (LOAN NO 1080 PHL N JALAUR IRRIG PROJ (LOAN NO: 1367-PH). PLS BE INFORMED THAT WE DO NOT HAVE MAJOR/SUBSTANTIAL COMMENT ON SAID REPORT N WE AGREE WITH THE FINDINGS N CONCLUSIONS OF THE MISSION. WE SUGGEST, HOWEVER, THAT ANOTHER PROJ EVALUATION BE CONDUCTED SOMETIME IN 1988, THE LAST YEAR OF THE FIVE-YEAR BUILD-UP PERIOD.

THANK U FOR GIVING US THE OPPORTUNITY TO REVIEW THE REPORT PRIOR TO ITS FINALIZATION. REGARDS.

TECH/RDAPHIL

248423 WORLDBANK

=10210607

ALI RTD FROM:0FDM

NNNN

This page blank

REPUBLIC OF THE PHILIPPINES
NATIONAL ECONOMIC AND DEVELOPMENT AUTHORITY
NEDA sa Pasig, Amber Avenue
Pasig, Metro Manila

Cable Address: NEDAPHIL
P.O. Box 419, Greenhills
Tels. 673-50-31 to 50

28 October 1985

Mr. Yukinori Watanabe
Director, Operations Evaluation Department
International Bank for Reconstruction and
Development
1818 H Street, N.W.
Washington D.C. 20433
U. S. A.

Dear Mr. Watanabe:

RE: Project Performance Audit Report on the Philippine Tarlac Irrigation Systems Improvement Project (Loan No. 1080-PH) and Philippine Jalaur Irrigation Project (Loan No. 1367-PH)

We thank you for sending us a copy of the draft Project Performance Audit Report on the abovementioned project for our review and comment. The concerns expressed by the post-evaluation mission with respect to reduced area coverage, non-operation of certain project facilities, irrigation service fees (ISF), collection efficiency, and the capability of NIA to effectively maintain the irrigation systems in view of financial constraints apply also to other irrigation systems that have been completed by NIA. NIA is well aware of the implications on its present and future operations and we believe the agency is making the necessary adjustments.

Although NIA is well aware of these problems the audit believes it will be very difficult for NIA to make necessary adjustments regarding cost recovery (PPAM paras. 24-26).

We would like to give only a few remarks on the following items:

Achievements (Para. 4, p. 2). We concur with the mission's finding that appraisal for the Tarlac Irrigation System Improvement was deficient (p. 10) resulting in the shortfall in appraisal target of area coverage. Non-conversion of lands to paddy in favor of other crops and urban encroachment must be viewed as real alternatives rather than negligible constraints or factors to attainment of full area coverage.

(Para. 7, p. 3). Operating pumps for groundwater tubewells is admittedly much more expensive than gravity systems, and in other irrigation projects, pumps have also been inoperative since the rapid increase in energy cost. However, in certain areas where there is a

strong need for NIA pump irrigation systems (as opposed to private pump operation, and in the absence of gravity systems), pump operations still remain viable. This may happen if farmers have a strong positive attitude about the benefits of irrigation. In other areas we have studied, farmers operating on 1.5 ha. to 2.5 ha. farms are quite capable of paying pump irrigation service fees. However, there had been effective institutional support for strengthening the FIGs, to the extent that cultural technology had been optimized.

As noted in the PPAM (para. 17) it will take a long time before these farmers' organizations become fully effective.

Operation and Maintenance (Para. 17, p. 7). Related to strengthening FIGs, the transfer of maintenance to FIGs would be ideal because NIA would be able to save substantial amounts of its resources. But before this can be achieved, intensive and extensive institutional development work must be undertaken by NIA in coordination with other agencies. Institutional strengthening as contained in its Five-Year Agricultural Development Plan must be given priority together with rehabilitation and maintenance programs.

This comment supports the views in the PPAM paras. 24-26.

Cost Recovery and Operation and Maintenance (Para. 25, p. 12). While it is true that recovery of both capital and operating costs would require a substantial increase in the level and collection efficiency of water charges, NIA has major constraints in carrying out these functions effectively. For one thing, NIA has no real authority to prevent illegal abstraction from its systems. Moreover, it has no power to force farmers to pay for the use of the irrigation facilities.

Groundwater and Gravity Irrigation Systems (Para. 28, p. 14). An issue that has also been noted in other irrigation systems is the differential in rates between gravity-and pump-sourced water which, in certain cases, occur in contiguous farms. A uniform rate taking a possible average could be thought about. If an acceptable level is derived, the pumps may still be put into operation.

We have noted that the report does not take up production yields and financial performance of the farms and the project as a whole in detail. This might be important in considering possible increases in ISF.

We appreciate this opportunity to comment on the report and we hope that our comments will be helpful in its finalization. We continue to welcome opportunities for us to be of assistance in future audit missions to the Philippines in conjunction with our own post-project evaluation work.

Best regards.

Very truly yours,

EDUARDO G. CORPUZ
Assistant Director-General

BORROWER'S COMMENTS

Attachment III

Republic of the Philippines
MINISTRY OF AGRICULTURE AND FOOD
Office of the Minister
Elliptical Road, Diliman, Quezon City

22 October 1985

Mr. Yukimori Watanabe
Director
Operations Evaluation Department
I B R D
1818 H. Street, N.W.
Washington D.C. 20433
U. S. A.

Dear Mr. Watanabe:

Thank you for providing us with a copy of the Project Performance Audit Reports and Project Completion Reports for the Tarlac Irrigation Systems Improvement Project (Loan 1367-PH) and the Jalaur Irrigation Project (Loan 1367-PH).

The reestimated economic rates of return have remained satisfactory due to higher than expected yields, higher cropping intensity at Jalaur, and higher economic prices for paddy. But these results assume that maintenance will be improved (PPAM para. 18).

It is indeed unfortunate that many factors ranging from uncontrolled typhoon occurrences, general economic conditions, poor performance of contractors, ROW difficulties to project management deficiencies and even incomplete project studies and appraisal reports all conspired to cause cost overruns, work slippages, and reduction in service area. It is surprising though that the IRR has remained unchanged at 20% for Jalaur and dropped only slightly from 15% to 13% for Tarlac. The report attributed this to the unexpected higher than estimated palay yield and prices. Future project studies and appraisal reports should therefore include sensitivity analysis so that the full range of possibilities can already be foreseen.

The audit believes it could become increasingly difficult to control denudation of the watershed. (PPAM para. 22).

As regards the concern of the Bank over the watershed denudation in Tarlac and the low irrigation fee collection (43% in Tarlac and 45% in Jalaur) and hence, the grim prospects of deteriorating facilities, these problems will have to be attended to by our appropriate agencies, the Bureau of Forest Development and the NIA. As a member of the NIA's Board, the Ministry of Agriculture and Food will of course be ready to cooperate with these agencies in a collective effort to identify and implement remedial measures.

Very truly yours,

ORLANDO I. SACAY
Deputy Minister

Cable: "Minagri" Manila Telephones: 998741; 998946 Telex: (722) - 27726 MAF - PH

This page blank

PHILIPPINES

TARLAC IRRIGATION SYSTEMS IMPROVEMENT PROJECT (LOAN 1080-PH)

PROJECT COMPLETION REPORT

Overview

General

1. The Project Completion Report for the Tarlac Irrigation Systems Improvement Project was prepared by the National Irrigation Administration (NIA), the implementing agency of the Government of the Philippines. The document reflects the findings and opinions of NIA and presents details relating to project implementation as well as project impact. It has not, however, been cleared by other Government agencies. We agree in general with the information presented and support the principal conclusions reached. However, further elaboration is justified on a few points. Some of the more important features of the project presented in the completion report as well as certain additional aspects are discussed in what follows. Attached to this overview are the following: Key Aspects of the Project, Table 1; Irrigation Service Areas, Table 2; Project Cost, Table 3; and Allocation of Loan Proceeds, Table 4.

The Project

2. The project was designed to provide for the following:

(a) Rehabilitation and upgrading to standards adopted in the Upper Pampanga River Project, the existing Tarlac, San Miguel-O'Donnell and Camiling River Irrigation Systems, (TARRIS, SMORIS and CAMRIS respectively) serving about 22,700 ha and the extension of these systems to cover an additional 11,300 ha of rainfed land, so as to provide a dependable supply of water to the full area of 34,000 ha during the wet season and 6,200 ha during the dry season, totalling 40,200 ha annually. Provision was also made for the upgrading and construction of about 425 km of roads within the project area;

(b) A groundwater irrigation pilot project;

(c) A water management training program;

(d) A National Irrigation Systems Improvement Study (NISIS). This study was to inventory existing NIA systems covering some 400,000 ha, each system ranging in size from about 130 ha to 83,000 ha, and identify a total of about 150,000 ha with the highest priority for improvement. In establishing priorities, scope for institution-building and the poverty of the region were to be criteria in addition to economic factors; and

(e) Procurement of equipment and vehicles for operation, maintenance and project execution.

Provision was also made in the project for NIA to engage consultants to assist with the ground water pilot project, the water management training program and the preparation of feasibility reports under NISIS.

Rehabilitation and Extension of Surface Irrigation

3. Area Developed. The service area of 34,000 ha anticipated at appraisal was reduced by 22%, to 26,389 ha actually developed under the project. Details are presented at Table 2. The total area of 9.017 ha eliminated from the project comprises 1,401 ha of sugar land under TARRIS extension; 2.602 ha of small communal irrigation systems under TARRIS rehabilitaion and SMORIS extension, the farmers of which were unwilling to come under the project; 1,696 ha of low lying lands subject to frequent flooding under TARRIS and SMORIS; and an aggregate of 3,318 ha of rainfed rice land which at appraisal was believed to be irrigable by gravity under these three irrigation systems, but which during implementation were found to be too high. This reduction has been slightly offset by an additional area of 1,406 ha which was developed under SMORIS rehabilitation, reducing the area eliminated to 7,611 ha. The developed extent of 26,389 ha consists of 22,235 ha of rehabilitated land and 4,154 ha of new land. (Ref. PCR pages II-2 and 3).

4. Area Irrigated and Cropping Intensity. The area irrigated in two seasons is expected to be below appraisal estimates, but anticipated cropping intensity will be somewhat above estimates. The area that would be irrigated in 1984, as determined by the project inventory conducted at the end of 1983 was 29,970 ha, of which the wet and dry season areas were 20,636 ha and 9,334 ha respectively. At full development in 1988 it is envisaged that 32,990 ha, 82% of the appraisal target, would be irrigated annually, the wet and dry season areas being 23,009 ha and 9,981 ha. The difference of 3,380 ha between the wet season area at full development and the area actually developed represents low lying portions which are too wet for cultivation during the wet season. This portion is cultivated towards the later part of the wet season and continues into the dry season, and is locally referred to as the Octoberian crop. (This area is included in the dry season irrigated area of 9,981 ha.) The 1984 cropping intensity of 113.6% would, on the basis of these projections, rise to 125% at full development in 1988, against the appraisal projection of 118%. (Ref. PCR pages II-3 and X-3).

5. Yield and Production Increase. Yields are expected to be above appraisal estimates, and incremental production should exceed the appraised level by 2-3%. Based upon observed yields of irrigated paddy during implementation, which rose from 2.6 and 2.4 tons per ha in the wet and dry seasons of 1975 respectively, to 3.99 and 3.62 tons per ha respectively in 1983, the projected paddy yields at full development in 1988 have been estimated to be 4.20 and 4.32 tons per ha for the wet and dry seasons respectively. The corresponding appraisal projections are 3.8 and 4.1 tons per ha. The related increase in annual paddy production at full development on the basis of the above amounts to 52,240 tons over the without-project situation as compared to the appraisal estimate of 51,000 tons. (Ref. PCR pages X-3 and X-5).

6. Internal Economic Rate of Return (IERR). The expected IERR which has been computed on the basis of actual area and yield data during project implementation, the future projections discussed above, and IBRD price projections for rice, amounts to about 15% as anticipated at appraisal. The main reasons for the project continuing to be viable despite the decrease in service area and increased costs is due to the higher than anticipated paddy yields and the considerable increase in the economic paddy price at the farmgate used in the re-analysis. The PCR uses an economic farm gate price of P 2,218 per ton based on IBRD forecasts for 1983 expressed in 1981 constant prices, converted to 1983 constant prices using the Unit Value Index of Manufactured Exports (MUV), for the entire project period, as compared to the corresponding figure of P 900 in 1974 constant prices used at appraisal and follows the appraisal methodology. In the event of inadequate levels of inputs and necessary farming practices prevailing, it is estimated that the IERR could drop to about 13.6%. However, this reduction in the IERR is likely to be offset by several other indirect benefits which would accrue from the project but which have not been reflected in this analysis because of the difficulty of quantifying them. (Ref. PCR pages X-1 to 17).

7. If, rather than assume that 1983 prices apply throughout the project period in evaluating benefits, one looks at actual rice prices for the period 1976-1983 and World Bank projections for 1984-1995 (and assumes that the 1995 figure will apply through 2024, the end of the period of analysis), then a rosier picture of benefits emerges. The present value of production benefits from 1974-1983 rises by 20% over what it is when the 1983 price is assumed to apply for the whole 50 years. Also, on average the prices (hence, benefits) of rice in 1983 constant terms are about 18% higher from 1987 on by the latest World Bank projections. These two effects give a substantial boost to the EIRR.

8. The above effect is offset to some extent if the investment costs are adjusted to 1983 constant prices by applying the domestic Wholesale Price Index (WPI) to the Government contribution and the Unit Value Index of Manufactured Exports (MUV) to the Loan financed costs. The resulting value of the investment cost, in 1983 constant prices, is about 11.6% higher than that computed in the PCR. (Ref. PCR pages X-5 and X-9.)

9. The two factors discussed above net out as a gain to the IERR. Since the available data do not permit much further analysis and since the rate of return would in any case be somewhat higher, rather than falling to a lower level which would cause concern over the economic viability of the project, there would be no major purpose in pursuing the issue further.

10. These re-calculations do not appear to take cognisance of three problems which are not brought out in the PCR. The first which adversely affects the dry season benefits of SMORIS, is the unauthorized diversion of water upstream of the SMORIS intake to irrigate low lying lands on the banks of the O'Donnell river. At the close of the project the area thus served was assessed at about 2,900 ha. Following tactful negotiations by NIA staff, some 270 of these farmers, representing about 630 ha consented to inclusion under the project to the extent that they have agreed to take water on a regime agreed with NIA so as to minimize interference with water supply for the pro-

ject. They have also agreed to be served with water from the project, if this will be made possible at a future date. The farmers of the remaining area and others who are liable to encroach upon yet undeveloped pockets of similar land which can be served from the river in this vicinity, will continue to pose a problem, particularly during the dry season when the shortage of water is most felt. It has been observed during such times, that while the project farmers are making efforts to reduce the area cultivated, and economize on water use, those making unauthorized diversions are generally prone to be wasteful. The effects are often compounded by the fact that the paddy fields under the project are usually at the vegetative and reproductive stages at the time when those served by the unauthorized diversions are often still at the land preparation and seeding stages. NIA has thus far dealt with the situation through seasonal dialogue with the offending farmers, and amicably reaching agreement upon more appropriate cultivation calendars and some level of water rotation. At times limited force has been resorted to. Although this may not be fully satisfactory, little else can be done at present given the somewhat delicate peace and order situation in the locality. There i a similar but less serious unauthorized irrigation of about 380 ha upstream of the TARRIS intake.

11. The other two problems not discussed in the PCR affect the cost side of the rate of return calculation. These are: (a) the very large bed load of fine silt in the O'Donnell river which continuously chokes the main canal of SMORIS obstructing flow, causing heavy recurrent expenditure; and (b) the highly abrasive bed-load of boulders which characterizes the Camiling river, and which has now eroded the concrete floor of the silt ejector bays at the CAMRIS headworks. In respect of SMORIS, NIA's designs unit effected some experimental modifications of the headworks with a view to reduce canal silting. Some improvement was noted, but much more is yet to be done. In the case of CAMRIS, a steel floor lining is to be provided. The cost of these works have not been taken into account in the recalculation of the IERR. However, as these works could be done without incurring heavy expense, it is not expected that this additional cost will be of such a magnitude as to significantly affect the projected IERR.

12. The slight negative effect of these three factors are very likely to be offset by the positive effects of the factors discussed in paragraph 9 resulting in an IERR which will be very close to the appraisal projection of 15%. Data are not available to calculate this, however.

13. Force Account and Contract Works. At appraisal the aggregate cost of civil works to be carried out by force account was limited to 20% of the total cost of civil works in the project (Ref. Legal Agreement, Schedule 4, para. 2). This limit was later raised to 40% by Bank's letter of May 18, 1977. Based on PCR expenditure figures (Ref. PCR, Annex 5, Sheet 1), the extent of civil works actually carried out by force account amounts to about 62%. With hindsight, the low limit set at appraisal for force account works was unrealistic in view of: project works being scattered over the project area; the large proportion of rehabilitation works involved; the need to plan and execute these works at short notice taking into account the cultivation seasons, irrigation releases to existing paddy lands, and bad weather; and difficulties experienced by NIA in the past in attracting even local contractors for similar works under the Upper Pampanga River Project, all of

which make force account more suitable than contract for works of this nature (Ref. SAR, para. 4.24). In addition to the above reasons, NIA also had to take over portions of several major contracts which were terminated due to poor contractor performance, financial management difficulties of contractors, bad weather and right-of-way problems.

Ground Water Pilot Project

14. Pumped irrigation under this pilot project commenced during the 1976/77 cultivation year with the irrigation of 304 ha and 286 ha during the wet and dry seasons respectively. As more wells were constructed the program was expanded to cover three pilot areas until cultivation year 1980/81 when 598 ha and 495 ha were irrigated in the wet and dry seasons respectively. However, normal pumping under the wells installed under the project was suspended after the dry season of 1980/81, because NIA found that it was not able to cover its O&M cost through the Irrigation Service Fee (ISF) levied and collected. Not only was the fee itself inadequate, ranging from 10% to 37% of the O&M cost incurred, but in addition, the actual rate of collection of ISF for these schemes in 1980 was as low as 25% to 59% (Ref. PCR page II-17 and Table 2.6). NIA asserts that the costs of operating and maintaining the pilot areas "raises serious doubts on the viability of operating this type of project on a larger scale or in conjunction with gravity irrigation." (Ref. PCR page II-17, pages 2.03, 2.04, 2.05.)

15. However, by its very structure, NIA's irrigation service fee favors farmers who use gravity water supplies, over those who use pumped water. The initial capital cost of a gravity scheme is in general much higher than that of a pumped system, while the converse is true for O&M costs. NIA's irrigation service fee for gravity schemes does not earnestly seek to recover the high capital costs, only O&M costs, while in the case of pumped systems the capital cost is added on to the (higher) O&M cost. It also appears that overhead costs which correctly should be charged to O&M on gravity schemes, including periodic expenditures on unscheduled repairs, etc., seldom get reflected as O&M expenditures, but the identifiction and allocation of costs on a pumped system, by virtue of its smaller size and separate character, is easier. The present ISF for gravity irrigation, based upon the prevailing government support price for paddy, is 5 cavans per ha, 2 cavans and 3 cavans for the wet and dry seasons respectively (1 cavan = 50 kg). The collection rate for the gravity irrigation ranged from 40% to 58% in 1983 over the three systems. For pumped irrigation the ISF has been fixed at 8 cavans per ha, 3 cavans and 5 cavans for the wet and dry seasons respectively. According to NIA's reckoning this is inadequate. Taking into account the high cost of energy NIA estimates that the ISF for pumped irrigation should be about 27 cavans, 12 cavans for the wet season and 15 cavans for the dry season.

16. Since pumping was suspended in 1980/81 NIA has explored several approaches by which the wells could be utilized without NIA having to bear losses. Specifically NIA entered into special agreements regarding eight wells, details of which are discussed at PCR pages II-20 and 21. NIA also attempted several other options, but these efforts have not been successful and today these wells remain idle. The high cost of energy compounded by high percolation rates and rather low water tables in the area have undoubtedly

contributed towards this failure. It is quite understandable that the farmers in the project area are unwilling to enter into any long-term commitment which would require them to pay levels of irrigation fees higher than that paid by their counterparts under gravity irrigation.[1/] Farmers hesitate to embark upon long term high cost commitments even to raise high value crops such as pepper, onion, watermelon and other vegetables because of the uncertainty of the market, prices and marketing facilities, the additional care needed at the harvest and post-harvest stages, and above all the fear that, should there be initial success, production would soon exceed the demand and prices fall. They embark more readily upon similar ventures, using small pumps and shallow wells, which do not impose upon them any long term commitment involving an outside agency.

Water Management Training

17. By the later part of 1981 a total of 364 water management technicians had been trained, 174 for the Upper Pampanga River Project, 65 for the Tarlac Project, 7 for the Central Luzon Ground Water Project, 44 for the National Irrigation Systems Improvement Projects I and II, 21 for the Philippine Rural Development Project and 53 for Aurora-Penaranda Irrigation Project. By this time NIA was experiencing financial constraints and was compelled to suspend the training program. NIA's current difficult financial situation has also prompted a cut back in staff, recently leading NIA to increase the area of coverage of a water management technician to 750 ha, from the previous limit of 500 ha. Although the coverage per technician has been increased, NIA has made provision for providing funds to employ additional casual labour in specific situations when warranted. The scheme has been introduced only recently (later part of 1984) and understandably there are visible signs of strain. However, with proper monitoring and reporting NIA could apply its limited O&M funds more effectively in this way. Currently NIA is trying to make fuller use of Irrigator Associations and is working on a program which would develop the capability of water management technicians to interface successfully with Irrigator Associations. As of July 1984 out of the 292 technicians trained for Upper Pampanga and Tarlac projects only 118 were still in service. This reduction resulted primarily from the difficult financial

---

1/ NIA has completed a draft Irrigation study, financed under the Agricultural Sector/Inputs Project, Loan 2469-PH, which reviews options on the subject of irrigation service fees and O & M costs. (The draft study discusses various options which might be adopted over the longer term, including the question of increasing irrigation fees and the related issues, which warrant further consideration by Government. The study also lists the strategies whcih should be pursued immediately with a view to improving irrigation fee collections. NIA is currently pursuing these strategies to varying degrees. Although the coverage in this respect is yet quite limited, the results are reported to be encouraging.) The question of irrigation service fees and O & M costs continues to be under review and will be addressed further in the context of the proposed Operation and Maintenance Project.

situation. This experience shows that training is worthwhile only if Government can afford to support the related long term costs.

Impact

18. The roads constructed under the project provide greatly improved accessibility and enable O&M and farmer activities to be carried out more expeditiously at less cost than would have been the case without the project. Likewise the improved irrigation works facilitate better water control and management, particularly during the dry season when water supplies are low and water rotation is necessary. Consequent to these improvements and based upon performance during project implementation the PCR envisages a significant rise in farmer incomes (Ref. PCR, Page x-17). The annual paddy production, at full agricultural development in 1988 is estimated at 139,700 tons, about 52,240 tons above the without project situation. Because of the smaller overall area developed and irrigated, this is only slightly more than the appraisal projection of 51,100 tons.

Bank Performance

19. The PCR refers to a few Bank supervision missions and some of the Bank's activities relating to project implementation but does not make an assessment of the Bank's performance either in appraisal or supervision (Ref. PCR, Page V-19).

20. With hind-sight the appraisal was deficient. Had the factors referred to in paragraph 3, 10 and 11 - such as the area under communal irrigation, the area served by unauthorized diversions and the site conditions and river characteristics at SMORIS and CAMRIS - been reviewed in greater detail at appraisal, project design could have been modified to deal with some of them. However, while these deficiencies have now become more pronounced and more readily visible, it is entirely conceivable that they were not so evident at appraisal and hence deserving of special attention.

21. A total of 14 Bank supervision missions, aggregating about 169 man-days, visited the Project during the 9 years of implementation. Bank missions continuously reviewed all aspects of the project during implementation. Missions frequently participated with country personnel in the review of implementation problems and in formulating appropriate solutions. Visiting missions were often effective in convincing NIA management to respond to project level requirements, particularly with regard to staffing and timely financial advances from NIA's corporate funds, to sustain implementation during the last few years when local funds were scarce.

Lessons Learned

22. Preparation and Design. The fairly significant desparity between the service area anticipated at appraisal and that actually developed might not have occurred had adequate investigations been conducted at the preparation stage, particularly with respect to: ascertaining the willingness or otherwise of the owners of the sugar lands and small communal irrigation systems (which had to be left out of the project) to be included under the

project; examining the viability of including those areas subject to heavy flooding, particularly in cognisance of the fact that the project correctly was not designed to provide flood protection measures specifically applicable to the river basins concerned, since this would have required a separate major undertaking; and determining in greater detail the topographic characteristics of the highland areas which were found to be above the command elevations of the three irrigation systems constituting the project.

23. It is unlikely that unauthorized diversions of water upstream of the intakes of SMORIS and TARRIS systems did not exist prior to the project. Had these diversions been taken into full account during appraisal, it would have been possible to redesign the project so as to regularize the diversions and plan the dry season irrigated areas accordingly.

24. Certain specific aspects peculiar to the site conditions and river characteristics of SMORIS and CAMRIS do not appear to have been recognized at design. The head-structure at SMORIS is not designed to cope with the exceedingly heavy bed-load of fine silt, which recurrently chokes the canal system and at CAMRIS, the silt ejector bays are of traditional concrete design, although the river carries an intense bed-load of boulders of assorted sizes which move in sizable quantities during floods, causing abrasion and erosion of the concrete floor and sub-structure.

25. During implementation the project suffered considerable damage due to several typhoons and spells of very adverse weather contributing significantly to the overall cost escalation of 55% (Ref. PCR page VII-3). The appraisal cost estimates provided 20% physical contingencies. A higher level, perhaps about 30% might have been more appropriate given the certainty with which typhoons strike the country each year.

26. In this project as in others proper land leveling, bunding and other related land preparation activities vital for efficient on-farm water usage has been lacking and lagging behind the provision of the irrigation distribution system. In order to irrigate such poorly prepared paddy lands, farmers often resort to the use of a series of unauthorized checks, by which the water in the supply canals is headed up to levels of excessive overloading. The excessive heading up of water results in heavily increased losses and consequently considerably impaired overall efficiency of the system. Situations of this nature frequently existed in various portions of the project during construction and up to completion in 1984. Had the project design included specific provision aimed at encouraging properly scheduled optimal on-farm land leveling, bunding, etc., to blend with irrigation system development, these effects would have been reduced and full agricultural development could have been expected earlier than 1988. The PCR does not discuss this.

27. Implementation. As in most projects of this type in the Philippines implementation delays are often attributed to delays in finalizing designs, cumbersome and slow contracting procedures, cumbersome steps needed to take over contract work following default by a contractor, lengthy and often difficult procedures for right of way acquisition, and often inadequate and unsatisfactory timing of budget releases, etc. While these aspects are addressed in general at appraisal and assurances are obtained from Government, history

shows that such requirements are observed more in the breach, although in this particular case whenever such problems arose, NIA exerted much effort in resolving them.

28. Equipment Procurement. Project expenditures and to a greater extent the status of loan disbursement are used as a convenient key indicator of implementation progress. Perhaps spurred by this interpretation and for reasons of economy and convenience, project equipment is often procured in a single stage fairly early in the project. This often leads to the under-utilizing, misutilization and sometimes even the neglect of such equipment. From the experience of TISIP and other projects NIA has concluded that in future projects, equipment procurement should be phased to match planned project implementation schedules, with O&M equipment in particular being acquired only in relation to the extent of civil works that would be completed and ready for O&M activities at any given stage. It would be useful to incorporate this concept more deliberately in future project designs.

29. Production and O&M. Although there has been a 22% decrease in the service area and in spite of increased implementation costs, at full agricultural development in 1988, the projected annual incremental production is expected to be slightly above appraisal expectations at 52,240 tons of paddy and, (ignoring some relatively minor cost increasing factors), the project's IERR 15%. The main factors upon which this projection is based are an increase in the acreage cultivated by 1988, accompanied by increases in yields in the wet and dry seasons. This, of course, assumes that the necessary O&M levels will be maintained, so as to enable the irrigation infrastructure now in place to function effectively. Unfortunately for TISIP, project completion in 1983/84 coincided with the critical financial constraints that NIA and the country as a whole is facing. During construction, O&M activities, though frequently less than adequate, were often buttressed through the project. With the closing of the Loan in December 1983, accompanied by phasing out of most key staff who were acquainted with the project and the handing over of the work to the O&M wing of NIA, which had a budget barely sufficient to meet its staff costs, TISIP suffered considerable neglect. Bank staff who visited some areas of the project during late 1984 noted several short comings which had resulted from inadequate O&M. Drawing from this experience, it would be worth considering whether a suitable mechanism could be established through which NIA would have access to funds which it could use in critical circumstances such as this to maintain necessary O&M levels in newly completed projects, thereby stemming their deterioration and the inevitable related long-term losses. The rate of deterioration of a newly constructed irrigation system if not properly maintained is much higher than that of a system which has achieved a stable regime over several years of operation.

Table 1

PHILIPPINES

TARLAC IRRIGATION SYSTEMS IMPROVEMENT PROJECT (LOAN 1080-PH)

PROJECT COMPLETION REPORT OVERVIEW

Key Aspects of the Project

Item	Preproject situation	Appraisal estimate	Actual at project completion. April 1984	Anticipated at full agric. dev. in 1988	Anticipated final as percentage of appraisal
Construction period (years)	-	6	10	-	167
Total Project Cost (Current, $ mln)	-	34	45	-	133
Loan amount as % of project cost	-	50	38	-	76
Loan disbursements ($ mln)	-	17	17	-	100
Service Area (ha)					
Rehabilitation	22,700	22,700	22,235	22,235	98
Extension	-	11,300	4,154	4,154	37
Total	22,700	34,000	26,389	26,389	78
Irrigated Area (ha)					
Wet season	20,650	34,000	20,636	23,009	67
Dry season	4,650	6,200	9,334	9,981	161
Total	25,300	40,200	29,970	32,990	82
Cropping Intensity (%)	114	118	114	125	106
Yield (tons/ha)					
Wet season irrigated	2.50	3.80	3.99	4.20	111
Dry season irrigated	2.50	4.10	3.62	4.32	105
Production increase (tons paddy)	-	51,000	41,129	52,240	102
IERR	-	15	-	15	100

Table 2

PHILIPPINES

TARLAC IRRIGATION SYSTEMS IMPROVEMENT PROJECT (LOAN 1080-PH)

PROJECT COMPLETION REPORT OVERVIEW

Irrigation Service Areas, Appraisal vs. Actual Developed

System	Appraisal area (ha)	Deviation (+/-) (ha)	Actual developed area (ha)
Area by System			
Tarlac River Irrigation System (TARRIS)			
Rehabilitation area	8,600	-1,721	6,879
Extension area	5,400	-3,616	1,784
Subtotal	14,000	-5,337	8,663
San Miguel - O'Donnel River Irrigation System (SMORIS)			
Rehabilitation area	5,100	+1,406	6,506
Extension area	4,700	-2,794	1,906
Subtotal	9,800	-1,388	8,412
Camling River Irrigation System (CAMRIS)			
Rehabilitation area	9,000	-150	8,850
Extension area	1,200	-736	464
Subtotal	10,200	-886	9,314
Total	34,000	-7,611	26,389
Area by Type			
Total rehabilitation area	22,700	-465	22,235
Total extension area	11,300	-7,146	4,154
Total	34,000	-7,611	26,389

Table 3

PHILIPPINES

TARLAC IRRIGATION SYSTEMS IMPROVEMENT PROJECT (LOAN 1080-PH)

PROJECT COMPLETION REPORT OVERVIEW

Project Costs

Item	Appraisal Estimate (₱'000)	Appraisal Estimate ($'000)	Actual Expenditure /a (₱'000)	Actual Expenditure /a ($'000) /b
Project service area (Headworks and facilities)	96,840	14,410	237,590	29,857
Operation and maintenance equipment	11,090	1,650	30,472	4,021
Groundwater pilot project	6,920	1,030	12,965	1,756
Water management training	4,405	655	20,456	2,750
National Irrigation System Improvement Study	14,310	2,130	6,360	861
Engineering, supervision and administration, etc.	11,570	1,720	46,855	5,930
Physical contingencies	23,555	3,505	-	-
Price contingencies	59,810	8,900	-	-
Total Project Cost	228,500	34,000	354,698	45,175

/a Based on annual expenditures.

/b Conversion rates used are at PCR page X-3.

PHILIPPINES

TARLAC IRRIGATION SYSTEM IMPROVEMENT PROJECT (LOAN 1080-PH)
PROJECT COMPLETION REPORT OVERVIEW

Allocation of Loan Proceeds
(US$)

Category	Appraisal	Amended w.e.f. July 1, 1981	Actual
1. Civil Works			
(a) Mobilization and construction equipment and vehicles for civil works contracts	1,600,000	1,500,000	1,093,080.28
(b) Other civil works	8,900,000	12,300,000	12,746,962.02
2. Equipment and vehicles	3,700,000	2,600,000	2,603,996.23
3. Consulting services and overseas training	1,000,000	600,000	548,177.30
4. Unallocated	1,800,000	-	-
Total	17,000,000	17,000,000	16,992,215.83/a

/a The undisbursed balance of $7,784.17 was cancelled on December 27, 1983.

This page blank

PHILIPPINES

JALAUR IRRIGATION PROJECT (LOAN 1367-PH)

Project Completion Report

Overview

Introduction

1. This overview is based on the PCR for the Jalaur Irrigation Project (Ln. 1367-PH) prepared by the Project Inventory-Project Completion Report Committee of NIA and presented to the Bank in June 1984. The report reflects the views and opinions of Government officials who have been closely associated with the project. Generally, the report gives a detailed and objective view of the project's performance and impact, and the Region has no major disagreement with the findings and conclusions presented in the report. Some of the more important aspects of project implementation are brought out in this overview.

2. Project Objectives. To increase production and achieve self-sufficiency in rice, the project was originally conceived as a multipurpose two-stage undertaking in Panay Island. The first stage comprised rehabilitation and upgrading of four existing national irrigation systems with a total service area of some 22,000 ha, construction of irrigation and drainage facilities in additional new areas of about 2,700 ha and improved farm practices and services, construction of a project headquarters building and facilities for O&M, and procurement of equipment and vehicles. The project also provided for a water management training program.

3. The second stage of the project which required additional studies (financed under another Bank loan) to refine the engineering and economic studies, would have comprised the construction of a 141 m high rock-fill type storage dam across the Jalaur River to provide year-round irrigation for about 36,000 ha including the service area of the first stage, generation of 62.7 GWH of power annually, domestic and industrial water supply, and fishery development. However, in view of the magnitude and complexity of Stage II, only Stage I of this project was taken up for implementation under Ln. 1367-PH. This loan was signed on February 14, 1977 and became effective in May 1977 with an implementation period of about five years and the original closing date of December 31, 1982. Feasibility studies and detailed engineering of Stage II were completed by end of 1984 and the project is included in NIA's list of proposed projects for possible financing by the Bank and/or other international development agencies.

Project Management

4. The organizational set up of NIA, with a Project Development Department at the Central Office in Manila responsible for the overall implementation of new projects involving major construction activities and the Project

Management Unit in the Regional Office in Iloilo City, worked very well. The Regional Irrigation Director was appointed as ex-officio Project Manager who was assisted by a full time Assistant Project Manager. During the entire implementation period there was a good esprit de corps between engineers and agricultural staff working on the project. At the start of the Project NIA had 470 staff in the field which number increased to almost 2,977 staff by June 1981 including some 1,500 farmers paid to lay out the on-farm works. By June 1983 the total Project Staff was reduced again to 473, its pre-project level. Management found the use of labor services either from an individual farmer or through Farmers Irrigators Associations (FIAs) significantly cheaper and more effective than labor engaged through contractors. It also developed a spirit of involvement and participation among the farmers served by the project facilities and gave them an interest in the preservation and maintenance of the facilities.

Physical Implementation

5. The review and inventory of project facilities at completion identified a total net service area of 23,244 ha of which 2,900 ha are within the new Jalaur Irrigation Project Extension Area. This is less than the original target area, mainly due to urban development and industrial expansion in the area, in particular in Santa Barbara, not foreseen during appraisal. Compared to appraisal estimates of 24,700 ha and 12,000 ha for wet and dry season irrigation, respectively, the implemented service area at project completion, is 23,344 ha or 5.5% lower during the wet season but 16,260 ha or 35.5% higher during the dry season. The annual cropping intensity actually achieved in 1983 is 159% which is significantly higher than the appraisal estimate of 149% on full development. It is now expected that on full development in 1988 an annual cropping intensity of 170% will be achieved.

6. The PCR's comparative summary (Annex I) of principal project features between the appraisal estimates and the actual implementation figures, shows substantial reduction of the targets for O&M roads, and on-farm drainage facilities with an average intensity of about 15 and 12 m per ha (m/ha) respectively as compared with 24 and 24 m/ha estimated in the SAR. On the other hand, the density of irrigation farm ditches as constructed has increased to 59 m/ha from the appraisal estimate of about 47 m/ha. The adequacy of NIA's standards for on-farm works was reviewed in November 1982 and confirmed by the results of an extensive survey which indicated that overall about 75% of all individual farm lots had direct inlets from farm ditches and laterals. The densities of on-farm facilities actually constructed in the Jalaur project area are very similar to those achieved in the Upper Pampanga River Irrigation Project (Ln. 637-PH) - in fact, for farm ditches and O&M roads the Jalaur densities are slightly higher than Upper Pampanga. On the whole, physical implementation is satisfactory following NIA's minimum standards set for national irrigation systems.

Contracts

7. The PCR gives a good account of the 10 major, seven local minor and several small package contracts for civil works. A few contractors failed to mobilize or complete in time partly because of the 1979 oil crisis and cement

shortage and also because of NIA's accreditation procedures, the establishment of unrealistic completion dates, the delays between award and notice to proceed and NIA's long-winded contract administration leading to delayed and untimely decisions on deletion and/or taking over of civil works contracts from defaulting contractors (also see para. iii of the Highlights). Although many improvements were made in the contract procedures during the first two years, some contractors could still not comply and NIA had to take over various contracts for the Jalaur Extension and several minor packages for civil works. This reduced the ratio of civil works carried out through contract from 60% to 47% and also delayed the substantial completion of the project works by one year until December 31, 1983. As a result, at the end of 1983 much of NIA's Project equipment was worn out and badly needed replacement for future O&M of the Jalaur irrigation systems. The project's closing date therefore was extended by another half year until June 30, 1984 mainly for procurement of O&M machinery and spare parts.

Project Costs and Finances

8. The project was estimated at appraisal to cost US$34.0 million of which 44% or US$15.0 million would be funded by the IBRD loan. By the end of 1983, about 96% of the total estimated project cost was spent leaving only a balance of about $1.25 million, including $0.67 million from the loan, of which about $0.5 million was spent in 1984 for procurement of O&M equipment. Although major shifts of funds from one category to another were made at different stages of the project (the latest was under the Special Action Program in August 1983, retroactively effective from September 1, 1982) and the Philippine peso was devalued three times during implementation, the actual project cost was virtually the same as the estimated project cost at appraisal. This was reached through (i) the application of more economical and less rigid design standards in the water delivery system as developed by NIA; (ii) the fact that most rights-of-way were acquired through donation; (iii) the need for lower physical contingencies than allowed for; and (iv) the reduction of the expected service area by 1,356 ha because of urban development and industrial expansion within the service area. At the end of 1983 total project expenditures were US$32.75 million of which about 43.8% came from the loan. The final disbursement date was September 26, 1984 with total disbursements of US$14,885,896.25. The remaining balance of $114,103.75 was cancelled. Final project costs amounted to about $33.3 million of which about 44.7% came from the Bank loan, which is very close to the 44.1% envisaged at appraisal.

Economic Evaluation

9. The project's EIRR is estimated at 24.4% in the PCR compared to 20% at appraisal. However, this is based on a significant understatement of costs. The local costs for 1981 and 1982 (in current prices) have been shown as P 4.99 million and P 6.63 million respectively on page 88 of the PCR. These figures, which have been reproduced from Annex 6, Sheet 4 (needing correction) should actually be P 34.99 million and 26.63 million respectively (as correctly shown in dollar terms on sheet 8 of Annex 6). Moreover, the foreign costs for 1983 do not include about US$0.5 million disbursed in 1984 and these costs have not been included anywhere in the PCR. Taking these into

account, the investment costs used in the economic analysis in the PCR have been understated by about 25% in current terms.

10. A recalculation of the EIRR was, therefore, undertaken by the Region and is summarized in Table 4. The revised local cost figures in current terms were converted to 1983 constant terms by applying the domestic consumer price index. For convertng the foreign costs, Bank's Manufacturing Unit Value (MUV) index was used. Moreover, since project expenditures continued through late 1984, the foreign costs for 1983 were converted to economic costs using a Shadow Exchange Rate (SER) of P 16.80 = US$1 (corresponding to the official exchange rate of P 14 = US$1) in contrast to the PCR analysis which uses the early 1983 SER of P 10.98 = US$1 (corresponding to the average official exchange rate of P 9.15 = US$1). The SER of P 16.80 = US$1 is consistent with that used for other projects completed in 1983/84, such as Tarlac Irrigation Systems Improvement Project (Loan 1080-PH) and Mindoro Rural Development Project (Loan 1102-PH). The economic farmgate price of paddy was also reestimated using the revised SER and the actual 1983 and Bank's projected 1990 world rice prices (the fob Iloilo price of US$363/mt for 25-35% brokens used in the PCR Table 9.9 is excessively high). An economic farmgate paddy price of P 1,951/mt was used for the 1983-87 period and P 2,446/mt for the full development period. For the pre-1983 period, a price of P 1,300/mt was used, based on average actual world rice prices in 1983 constant terms and an average SER of P 9 = US$1. Farm input costs as given in the PCR were used. The fertilizer prices given in Table 9.8 of the PCR (for example, a cif Iloilo price of urea of US$320/mt) are excessively high. Using world prices given in bank forecasts and the revised SER of P 16.80 = US$1, the input costs would be approximately the same as reported in Table 9.7 of the PCR. The EIRR, based on the new cost and benefit streams as indicated above, works out to 20.2%, about the same as at appraisal.

11. One caveat which needs to be mentioned is that the farm labor costs estimated at project completion (Table 9.6 of the PCR) are substantially less than apraisal estimates. No explanation for this has been provided in the PCR. It is also not clear whether family labor has been included in economic costs in addition to hired labor. To the extent labor costs have been underestimated in the PCR, the EIRR would be lower. On the other hand, substantial benefits from the road infrastructure created by the project and possible expansion in marketing and processing activities in the project area as a result of the project would accrue. These benefits have not been quantified and included in the economic analysis (nor were they included at appraisal).

Irrigation Service Fee (ISF)

12. The ISF structure, actual collection performance from 1977 to 1983, and projected collections up to full development in 1988 are given on pp. 103 to 106 of the PCR. While the rates for the rice crop, both for gravity and pump systems, are still at the reported levels, NIA has subsequently promulgated lower rates for annual crops and for diversified crops. For the annual crops (bananas and sugarcane) the annual fee is assessed at the cash value of three cavans of rice. For the other diversified crops, the fee level is 60% of that for rice. The fees for rice were established over the years assuming a break-even point for NIA's O&M cost of the project at a 50% collection

level. Due to the construction activities from 1977 to 1983, the project could only collect an average 45% of all the fee charges. In order to repay the monies invested in the project, the ISF collection rate has to be improved considerably and reach at least 80% which is far above the 1983 improved recovery level of 53%. ISF, therefore, needs constant serious attention from NIA. By transferring most of the responsibility for O&M activities, including the maintenance of some lateral canals, to Farmers Irrigation Associations (FIAs), NIA hopes to make FIAs more independent and also to reduce its own costs. However, at the time of project completion only 10% of all Farmers Irrigation Groups (FIGs) were well established and fully operational but NIA intends to continue this effort with zeal. The entire matter of ISF relating to the whole of NIA is proposed to be addressed through an Irrigation Study commissioned under the Agricultural Sector/Inputs Project (Ln. 2469-PH). The draft study, recently completed by NIA, discusses various options which might be adopted over the longer term, including the question of increasing irrigation fees and the related issues, which warrant further consideration by Government. The draft study is presently under review in the Bank and with concerned Government agencies. The question of ISF and O&M costs is also expected to be addressed further in the context of the proposed Operation, Maintenance and Development Project presently being prepared by NIA.

Organization of Agricultural Development

13. During project implementation an Agricultural Development Division (ADD) was established to handle primarily the various agri-institutional development activities in the project area. It was composed of three sections namely: Land Use and Water Management; Farmers Assistance and Training; and Evaluation and Statistics. It employed a work force of about 70 personnel at the peak of project activities. ADD was instrumental in the establishment of the Agricultural Development Coordinating Council (ADCC) which served as a forum for all provincial agencies involved in agricultural production in the project area, resolving issues pertinent to the delivery of various support services to the farmers. Moreover a Water Management Training Core Staff was also installed in the project for the training of irrigation system operating personnel both for the project and other systems within the Visayas Region. Towards the end of the project implementation an Input-Output Monitoring Program (IOMP) was organized dealing with the monitoring and evaluation of agricultural activities and accomplishments. One of the main tasks of ADD was to organize 10,918 farmers into 515 FIGs which would be further grouped into 33 FIAs within the five system areas of the project. The FIGs are organized on the basis of the average rotational area of 30-50 ha of irrigated land in order to maintain and operate the irrigation system within each rotational area by the farmers themselves. By the end of 1983, seven FIAs with 243 FIGs were organized and registered with the Securities and Exchange Commission. The steps taken by NIA generally fulfilled the project objectives and satisfied the relevant covenant as incorporated in para. 5.05 of the SAR and Section 3.01 (c) of the Loan Agreement for the duration of the project implementation period.

14. Continuing Agricultural Development Program. For the post-project period, the PCR assumes that agricultural and institutional development activities will continue to be pursued through a Five Year Agricultural

Development Plan (FYADP). The plan provides for an integrated scheme of implementing development activities/services formulated mainly by the concerned line agencies through the project's ADCC. The plan includes, among others, a continuing program of developing farmer organizations and training; the strengthening of integrated agricultural development in the area; and the installation of an appropriate project benefits monitoring and evaluation system. The PCR assumes a rapid development of all FIGs to take over many of the O&M activities of the irrigation systems in the project area and envisions that through this new approach of participation by FIAs the efficiency, productivity and viability of the systems will be greatly enhanced. This is a valid assumption based on general NIA policy. However, in order to ensure the development of the full agricultural potential of the project's service area, there is continuing need to review and identify the related organizational and funding requirements. Realizing this need for inter-agency coordination, the government promulgated the Executive Order No. 803 in 1982 establishing integrated Area Management Councils and Provincial Agricultural Councils (PACs) for all agricultural services, which makes the Ministries of Agriculture and Food (MAF), Natural Resources, and Local Governors responsible for all agricultural development including the development of irrigated areas. It is expected that the PACs, functioning under the chairmanship of the provincial Governors, will prove to be effective instruments in securing the development of the full agricultural potential of the project area. However, there is not enough feedback yet on the efficiency of the new coordinating mechanisms.

Impact

15. About 400 km of O&M, farm-to-market and access roads have been constructed/upgraded under the project. Aside from the direct impact on the agricultural activities in the service area - better maintenance of irrigation facilities, inflow of non-water agricultural inputs and outflow of farm production - these roads make a major contribution to the general economic and social uplift of the area's population. These additional benefits to other sectors of the economy, which are by no means insignificant, were unfortunately ignored both during appraisal and in the PCR in matters of cost recovery as well as in the economic evaluation of the project.

16. The improved irrigation facilities provided under the project facilitate better water control and management, particularly during the dry season when water supplies are low and water rotation is necessary. In conjunction with the availability of other farm inputs and extension services, annual paddy production in the project area is expected to reach about 181,000 mt at full agricultural development in 1988. This is about 101,000 mt more than the pre-project situation and about 34,000 mt higher than the appraisal estimate of production at full development. The additional production would greatly contribute to meeting the expected demand for rice without resorting to importation thus conserving precious foreign exchange. Farm incomes would also increase in the project area. It is estimated that on a sample farm of 1.5 ha, an owner-operator and a leaseholder would respectively have an annual net farm income of about P 12,678 and P 10,766. These incomes are higher than appraisal expectations because of increased cropping intensity, better yield and higher Government support prices for paddy. The higher farm incomes would in turn generate more economic activity and contribute to generally higher living standards in the area.

17. The project would also generate additional employment opportunities in the area. During the implementation of the project, a good number of skilled and unskilled labor were employed. Substantial permanent staff would also be required to operate and maintain the irrigation facilities. Employment opportunities would be enhanced for members of the rural communities each year in the production of irrigated dry season crops as well as in other sectors in related endeavors such as milling, storage, marketing and manufacture of farm inputs.

Bank Performance

18. PCR has commented favorably (see page 49 - "IBRD Supervision ") on the assistance given by Bank missions in project implementation. We are generally in agreement with these comments. A total of 11 Bank supervision missions, aggregating about 29 man-weeks, visited the project during the seven years of its implementation. Bank missions continuously reviewed all aspects of project implementation and actively participated with NIA staff at all levels in addressing problems and in finding appropriate solutions. Of particular significance and effectiveness was the Bank missions' role as a bridge between top NIA management in the central office and the project field staff, particularly in the resolution of the project's staffing and funding requirements. Bank missions also made useful suggestions in technical matters and regarding quality control of irrigation works. In the last years of implementation, acute shortage of local funds became a serious problem. Under Bank's Special Action Program, disbursement percentage for civil works was increased from 60% to 95% effective September 1, 1982 which materially assisted project implementation.

Lessons Learned

19. The PCR (pages 119-121) gives adequate coverage to this aspect and we generally agree with it. We would, however, like to add the following remarks by way of emphasis and/or elucidation.

20. Contractor Performance. Except for some notable instances (e.g., the large contract for Magat Dam - Ln. 1567-PH - won through ICB by a local contractor and completed on time) overall contractor performance on this as well as other Bank-assisted projects implemented during the last seven or eight years has generally been less than appraisal expectations. In order to complete the projects, more work had to be done through force account than originally envisaged. Over the years NIA has improved its contractor accreditation procedures and the general tone of contract administration. Government has also taken measures to streamline contract procedures: (a) comprehensive amendments of the "Implementing Rules and Regulations of Presidential Decree (PD) No. 1594 Governing Infrastructure Projects" promulgated in June 1982; (b) "Guidelines Covering the Delineation of Approving Authority for Contracts" approved by the President in May 1983; (c) further amendments to the Implementing Rules and Regulations of PD 1594 by fixing the upper limit for award of contracts at the Approved Agency Estimate and eliminating the lower limit; and (d) approval accorded by the President in July 1984 increasing the escalation ceiling in contract prices from 12% p.a. to 30% p.a. However, the adverse economic conditions in the country have supervened to partially negate

these improvements. International contractors are wary of investing in the country. In the domestic market, the private sector has practically stopped all investment in construction and commercial banking sources have almost dried out for the construction industry. In view of this situation, while all requisite steps should be taken to strengthen the construction industry and improve contract administration by Government agencies like NIA, it appears that in the short- and medium-term more work may have to be performed through force account.

21. Equipment Procurement. Project implementation suffered to some extent both through late procurement of construction equipment and the rather early arrival of O&M equipment. Equipment procurement should be phased to match planned project implementation schedules, with construction equipment being acquired in the very early stages and O&M equipment procured strictly in relation to the extent of civil works that would be completed and ready for O&M activities at any particular time. This concept needs to be incorporaced more deliberately in the design of future projects.

22. The project has been quite successful in terms of its clearly stated objective of providing an appropriate irrigation infrastructure. The project design did not include any provision for O&M of completed facilities, not even during the course of project implementation, and considered it sufficient to obtain an assurance from Government (Clause 4.03 of the Loan Agreement) that the facilities shall be "operated and maintained in accordance with sound agricultural, engineering and financial policies and practice, and shall make available sufficient funds to NIA for such purposes." Similarly, the full agricultural development of the service area was left entirely to the recourse of related Government agencies. However, Philippines has not been able to provide fully and effectively for post-project activities either for want of funds (e.g., P 163 per ha per year provided for the project O&M - page 105 of PCR - is quite inadequate) or appropriate organization or both. The Region is now in the process of addressing this issue. NIA, with appropriate input from MAF, is preparing a project for possible Bank assistance.

Table 1

PHILIPPINES

JALAUR IRRIGATION PROJECT (LOAN 1367-PH)

PROJECT COMPLETION REPORT

Key Aspects of the Project

Item	Preproject situation	Appraisal estimate	Actual at project completion June 1984	Anticipated at full agric. dev. in 1988	Anticipated final as % of appraisal
Construction Period (years)	-	5	7	-	140/a
Total Project Cost (Current $ mln)	-	34.0	33.3	-	98
Loan Amount as % of Project Cost	-	44.1	44.7	-	101
Loan Disbursements ($ mln)	-	15.0	14.9	-	99
Service Area (ha)					
Rehabilitation	22,000	22,000	20,444	20,444	93
Extension	-	2,700	2,900	2,900	107
Total	22,000	24,700	23,344	23,344	95
Irrigated Area (ha)					
Wet season	22,000	24,700	22,744	23,344	95
Dry season	7,500	12,000	15,210	16,260	135
Total	29,500	36,700	37,954	39,604	108
Cropping Intensity (%)	134	149	167	170	114
Yield (tons/ha)					
Wet-season irrigated	2.7	4.0	4.1	4.5	113
Dry-season irrigated	2.4	4.0	3.7	4.7	118
Rainfed	1.8	-	-	-	-
Paddy Production (tons)	80,000	146,800	149,527	181,470	123
Economic Rate of Return (%)	-	20.0	-	20.2/b	122

/a Project was substantially completed by December 31, 1983. So, in effect this figure is closer to 130% than 140%.

/b As recalculated by the Region. The evaluation made in the PCR is 24.4%.

PHILIPPINES

JALAUR IRRIGATION PROJECT (LOAN 1367-PH)

PROJECT COMPLETION REPORT

Project Costs
(US$'000)

	Appraisal estimate	Actual expenditure
Irrigation systems	17,090	17,482
O&M buildings	560	1,735
Water management training	570	535
Force account and O&M equipment	430	5,142
Technical assistance	100	151
Preconstruction works and surveys	-	986
Rights-of-way	-	282
O&M during construction	-	2,612
Engineering supervision and administration	2,140	4,352
Contingencies	4,390	-
Expected price increases	8,720	-
Total	34,000	33,277

PHILIPPINES

JALAUR IRRIGATION PROJECT (LOAN 1367-PH)

PROJECT COMPLETION REPORT

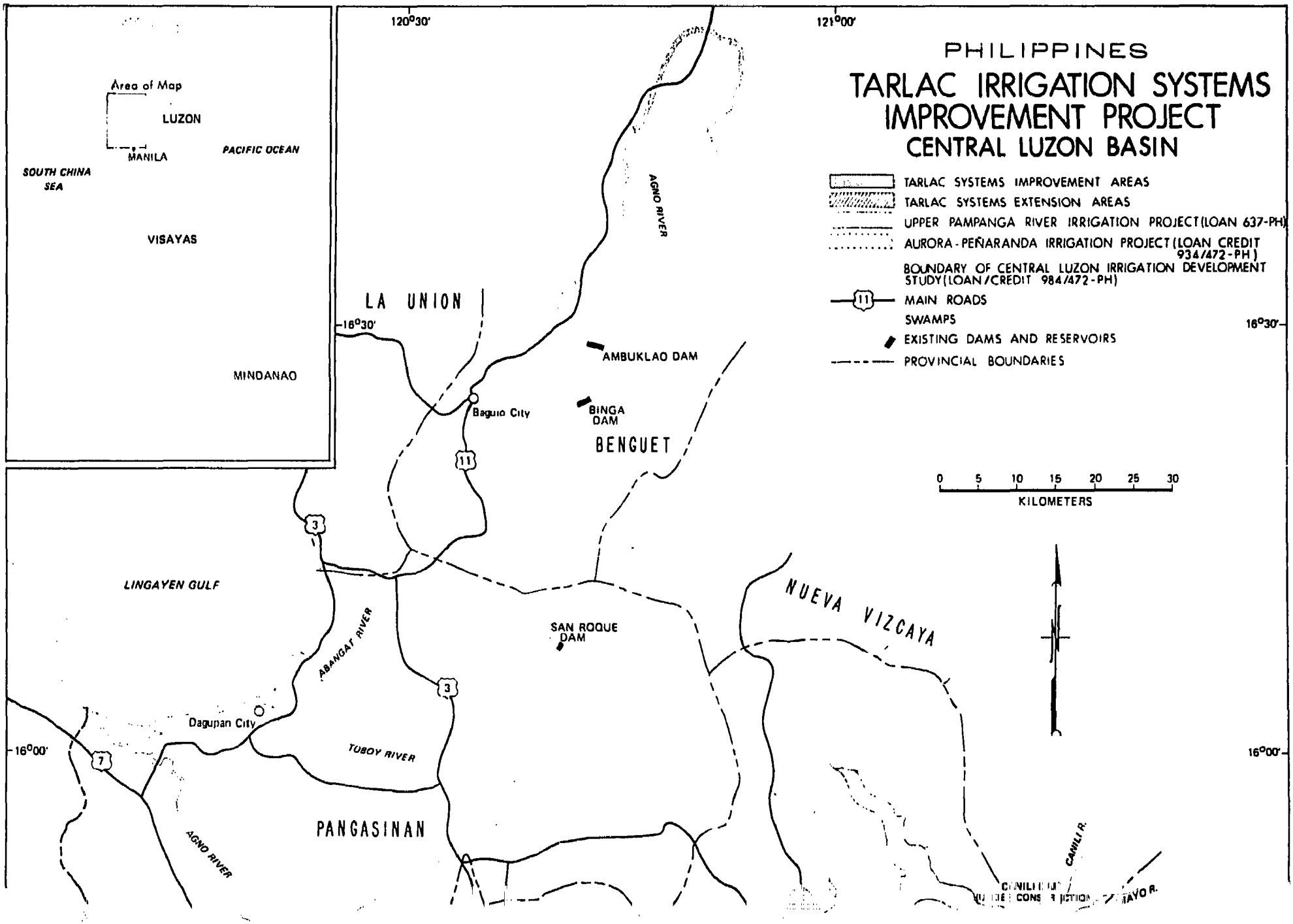
Economic Costs and Benefits /a
(₱'000)

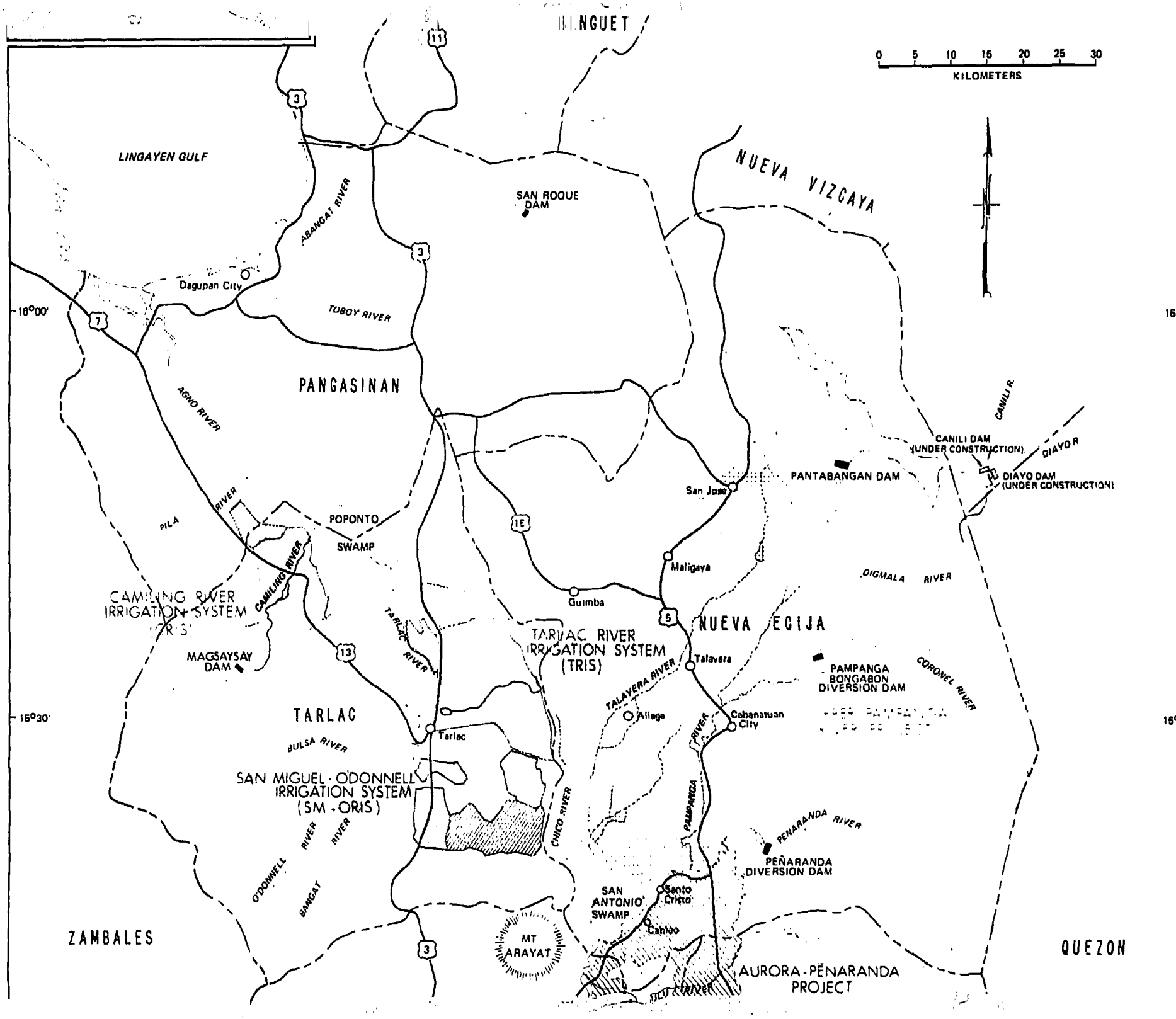
Year	Investment cost	Residual value of construction equipment	Incremental O&M cost	Total cost	Project benefits	Net project benefits
1977 (1)	13,117	-	-	13,117	0	(13,117)
1978 (2)	72,064	-	-	72,064	0	(72,064)
1979 (3)	52,614	-	-	52,614	(2,282)	(54,896)
1980 (4)	57,397	-	881	58,278	15,900	(42,378)
1981 (5)	55,353	-	1,244	56,597	36,660	(19,937)
1982 (6)	61,433	-	1,315	62,748	17,750	(44,998)
1983 (7)	54,562	5,808	2,000/b	50,754	31,080	(19,674)
1984 (8)	-	-	2,000	2,000	72,640	70,640
1985 (9)	-	-	2,000	2,000	85,950	84,950
1986 (10)	-	-	2,000	2,000	90,760	88,760
1987 (11)	-	-	2,000	2,000	94,600	92,600
1988 (12-50)	-	-	2,000	2,000	128,580	126,580

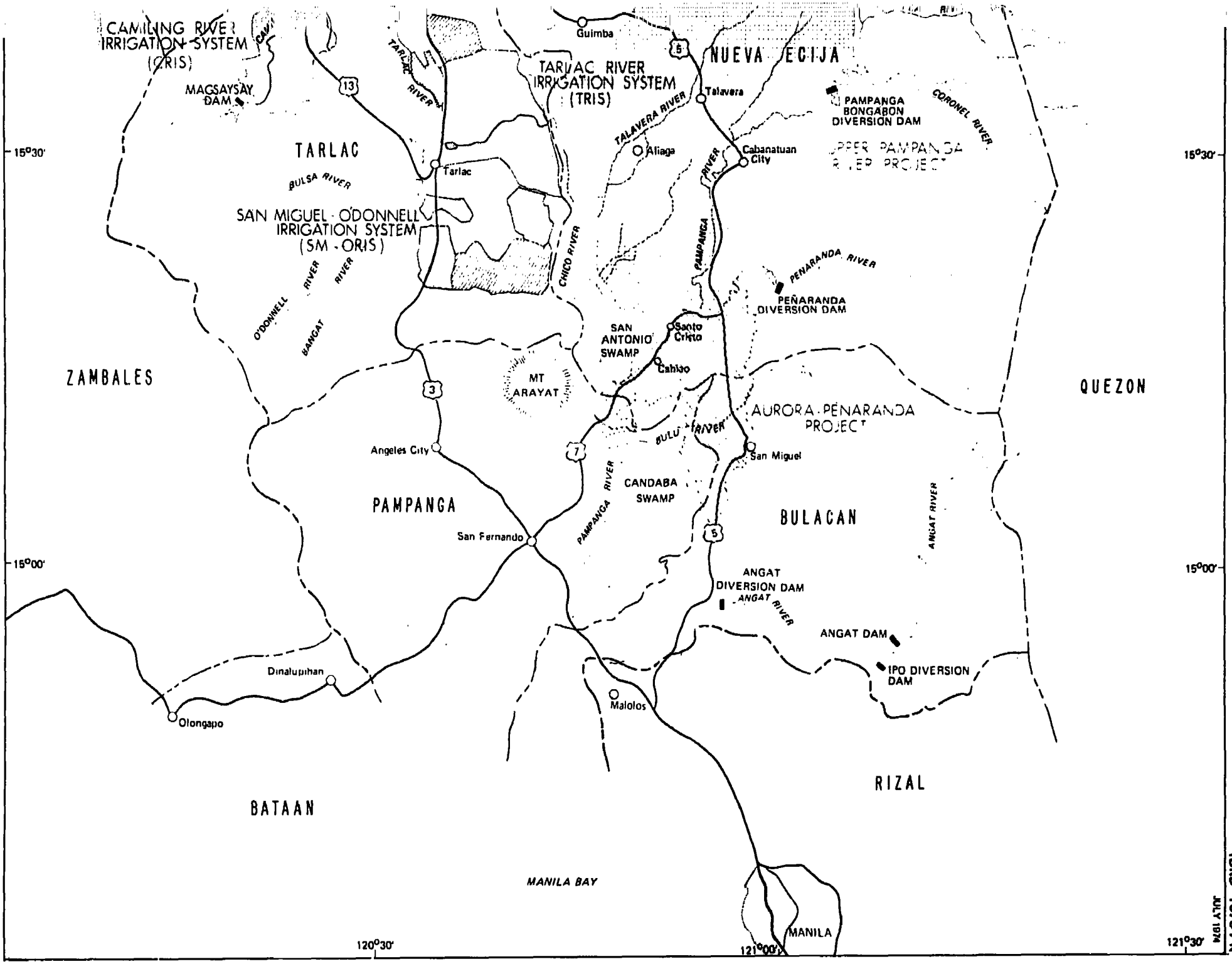
ERR = 20.2%

/a This table replaces Table 9.11 in the PCR.

/b The PCR figure was ₱ 1,723,000. However, with the estimated SER of ₱ 16.80 = US$1, the cost has been increased to ₱ 2 million, assuming a 20% foreign exchange component.


PHILIPPINES
TARLAC IRRIGATION SYSTEMS IMPROVEMENT PROJECT
CENTRAL LUZON BASIN
TARLAC SYSTEMS IMPROVEMENT AREAS
TARLAC SYSTEMS EXTENSION AREAS
UPPER PAMPANGA RIVER IRRIGATION PROJECT (LOAN 637-PH)
AURORA - PEÑARANDA IRRIGATION PROJECT (LOAN CREDIT 934/472-PH)
BOUNDARY OF CENTRAL LUZON IRRIGATION DEVELOPMENT STUDY (LOAN/CREDIT 984/472-PH)
MAIN ROADS
SWAMPS
EXISTING DAMS AND RESERVOIRS
PROVINCIAL BOUNDARIES
Area of Map
LUZON
MANILA
PACIFIC OCEAN
SOUTH CHINA SEA
VISAYAS
MINDANAO
120°30'
121°00'
16°30'
16°00'
LA UNION
AGNO RIVER
AMBUKLAO DAM
BINGA DAM
Baguio City
BENGUET
NUEVA VIZCAYA
SAN ROQUE DAM
LINGAYEN GULF
ABANGAT RIVER
Dagupan City
TUBOY RIVER
PANGASINAN
AGNO RIVER
CANILI R.
0 5 10 15 20 25 30
KILOMETERS

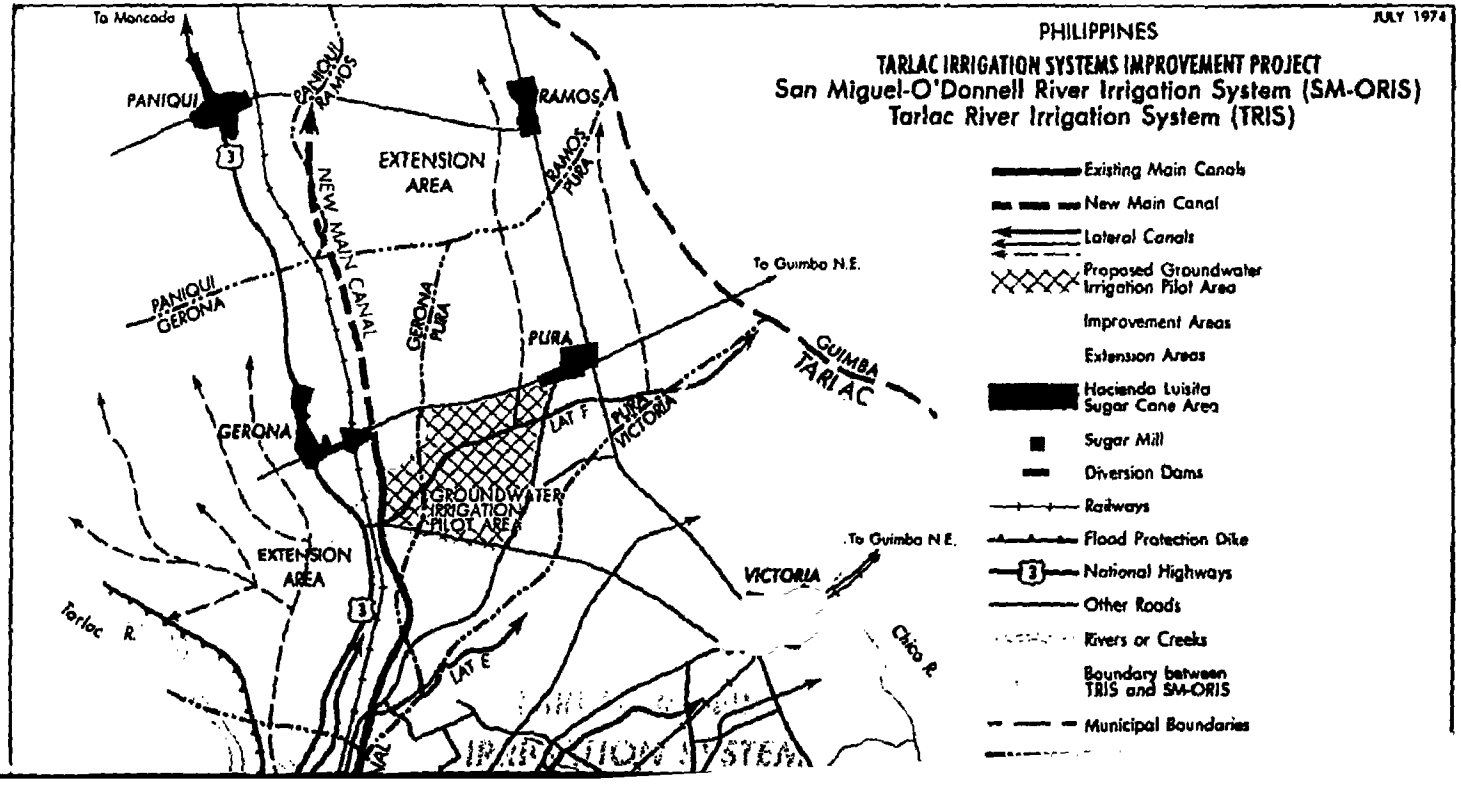

BENGUET
0 5 10 15 20 25 30
KILOMETERS
LINGAYEN GULF
ABANGAT RIVER
SAN ROQUE DAM
NUEVA VIZCAYA
Dagupan City
TUBOY RIVER
16°00'
PANGASINAN
AGNO RIVER
CANILI R.
CANILI DAM (UNDER CONSTRUCTION)
DIAYO R.
PANTABANGAN DAM
DIAYO DAM (UNDER CONSTRUCTION)
San Jose
PILA
RIVER
POPONTO SWAMP
Maligaya
DIGMALA RIVER
CAMILING RIVER IRRIGATION SYSTEM (CRIS)
CAMILING RIVER
Gumba
TARLAC RIVER
TARLAC RIVER IRRIGATION SYSTEM (TRIS)
NUEVA ECIJA
MAGSAYSAY DAM
Talavera
TALAVERA RIVER
PAMPANGA BONGABON DIVERSION DAM
CORONEL RIVER
15°30'
TARLAC
Aliaga
Cabanatuan City
RIVER
BULSA RIVER
Tarlac
SAN MIGUEL-O'DONNELL IRRIGATION SYSTEM (SM-ORIS)
CHICO RIVER
PAMPANGA
PEÑARANDA RIVER
PEÑARANDA DIVERSION DAM
O'DONNELL RIVER
BANGAT RIVER
SAN ANTONIO SWAMP
Santo Cristo
Cabiao
ZAMBALES
MT ARAYAT
AURORA-PEÑARANDA PROJECT
QUEZON

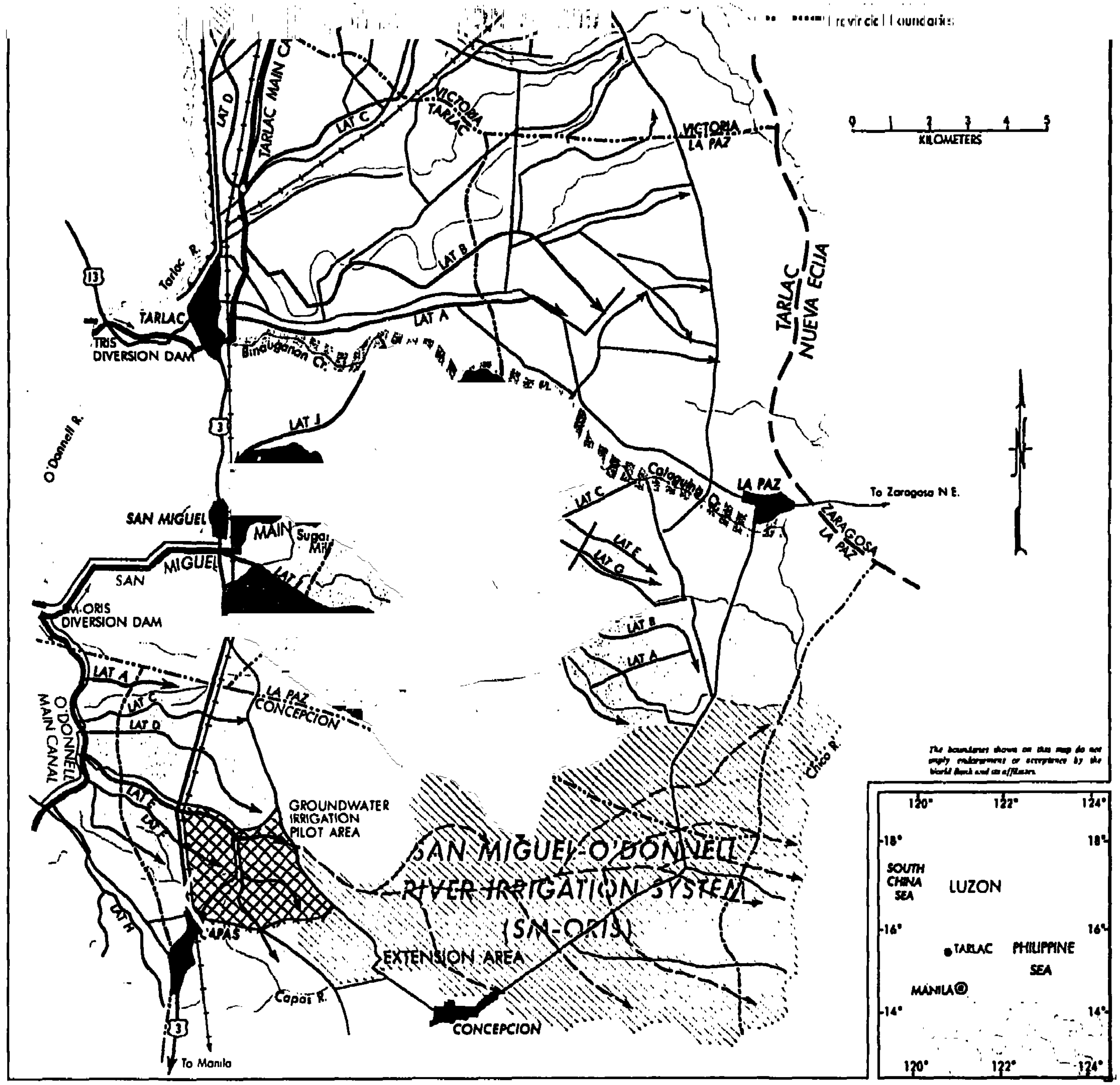


IBRD-10769R
JULY 1974

IBRD-11137

JULY 1974





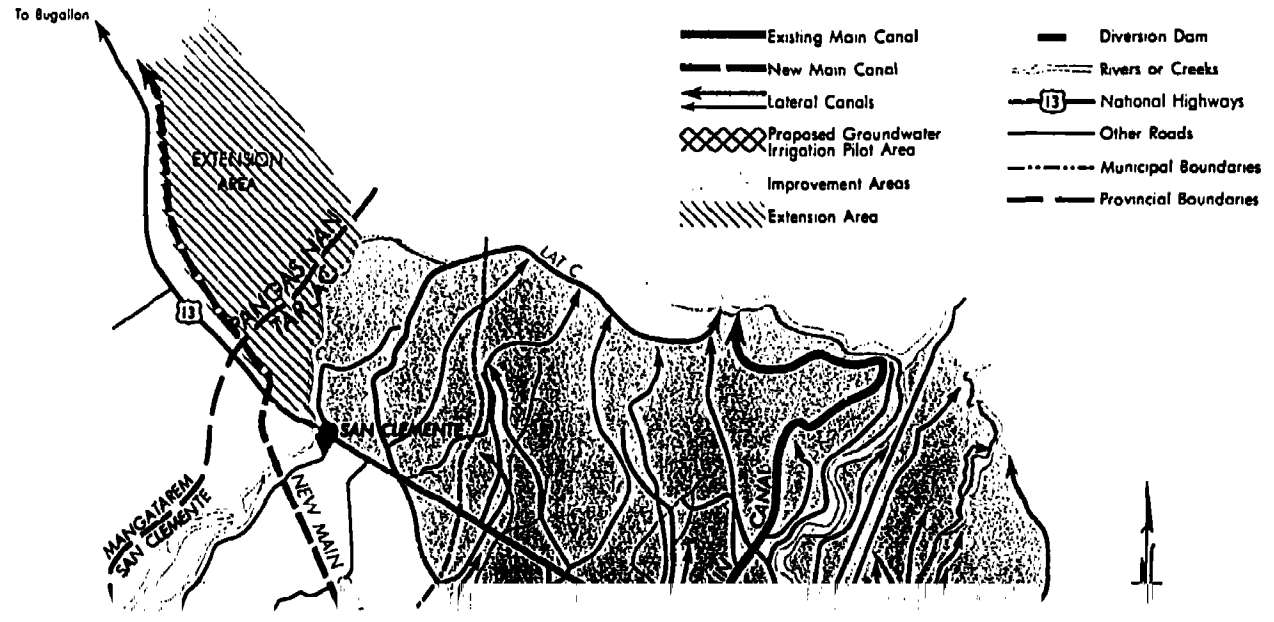
Provincial Boundaries
KILOMETERS
0 1 2 3 4 5
VICTORIA
TARLAC
VICTORIA
LA PAZ
TARLAC MAIN CA
LAT D
LAT C
LAT B
LAT A
LAT J
Tarlac R.
TARLAC
TRIS DIVERSION DAM
Binauganan Cr.
O'Donnell R.
TARLAC
NUEVA ECIJA
Calaguihi Cr.
LA PAZ
To Zaragosa N E.
ZARAGOSA
LA PAZ
SAN MIGUEL
MAIN
Sugar Mill
SAN MIGUEL
SM-ORIS DIVERSION DAM
LAT C
LAT E
LAT G
LAT B
LAT A
LA PAZ
CONCEPCION
LAT D
O'DONNELL MAIN CANAL
LAT E
LAT F
LAT H
GROUNDWATER IRRIGATION PILOT AREA
SAN MIGUEL-O'DONNELL RIVER IRRIGATION SYSTEM (SM-ORIS)
EXTENSION AREA
Chico R.
CAPAS
Capas R.
CONCEPCION
To Manila
120° 122° 124°
18° 16° 14°
SOUTH CHINA SEA
LUZON
TARLAC
PHILIPPINE SEA
MANILA

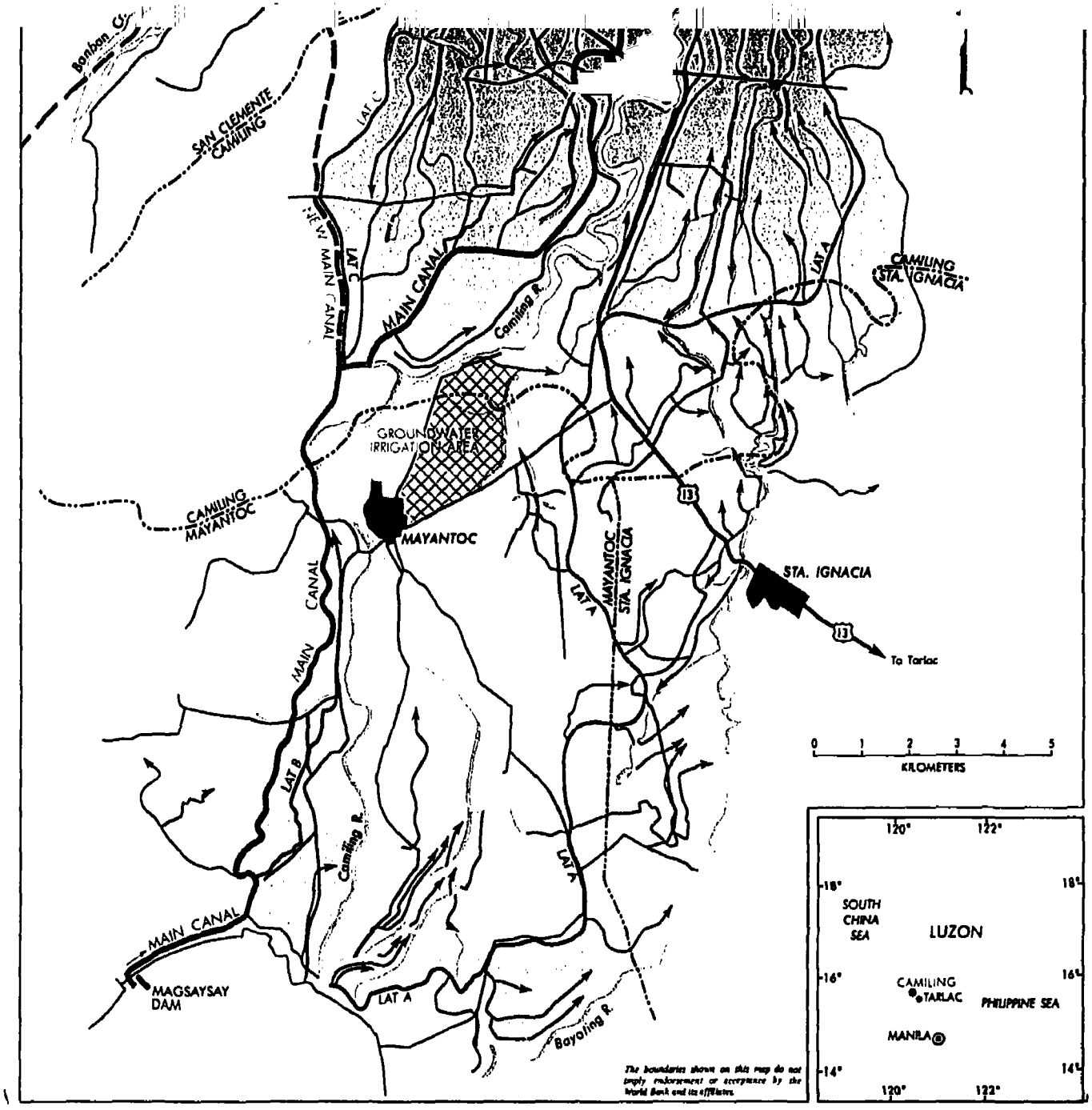
IBRD-11138

JULY 1974

PHILIPPINES

TARLAC IRRIGATION SYSTEMS IMPROVEMENT PROJECT
Camiling River Irrigation System (CRIS)




Bamban Cr.
SAN CLEMENTE
CAMILING
LAT C
RT VI MAIN CANAL
LAT C
MAIN CANAL
Camiling R.
LAT A
CAMILING
STA. IGNACIA
GROUNDWATER
IRRIGATION AREA
CAMILING
MAYANTOC
MAYANTOC
MAYANTOC
STA. IGNACIA
LAT A
STA. IGNACIA
13
13
To Tarlac
MAIN CANAL
LAT B
Camiling R.
LAT A
MAIN CANAL
MAGSAYSAY
DAM
LAT A
Bayoling R.
0 1 2 3 4 5
KILOMETERS
120°
122°
18°
18°
SOUTH
CHINA
SEA
LUZON
16°
16°
CAMILING
TARLAC
PHILIPPINE SEA
MANILA
14°
14°
120°
122°
The boundaries shown on this map do not imply endorsement or acceptance by the World Bank and its affiliates.

IBRD 12414

PHILIPPINES

JALAUR IRRIGATION PROJECT