

RESTRICTED
PCR: PHI 15039

ASIAN DEVELOPMENT BANK

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PROJECT COMPLETION REPORT

OF THE

THIRD DAVAO DEL NORTE IRRIGATION PROJECT
(Loan No. 580-PHI)

IN THE

PHILIPPINES

June 1993

CURRENCY EQUIVALENTS

Currency Unit - Philippine Peso (P)

Appraisal Report (July 1982)

P1.00	=	\$0.118
\$1.00	=	P8.470

Project Completion Report (April 1993)

P1.00	=	\$0.040
\$1.00	=	P25.00

During the implementation of the Project, the exchange rate of the peso was determined on the basis of a floating rate system related to daily foreign currency transactions of the banking sector.

ABBREVIATIONS

BFD	-	Bureau of Forestry Department
BHSs	-	Barangay Health Stations
DA	-	Department of Agriculture
DENR	-	Department of Environment and Natural Resources
DOH	-	Department of Health
DPWH	-	Department of Public Works and Highways
EA	-	Executing Agency
EIRR	-	Economic Internal Rate of Return
FIG	-	Farmers Irrigators Groups
IAS	-	Irrigators' Associations
ISF	-	Irrigation Service Fees
NIA	-	National Irrigation Administration
O&M	-	Operation and Maintenance
SPIAL	-	Special Project Implementation Assistance Loan

NOTES

- (i) The fiscal year of the Government is the same as the calendar year.
- (ii) In this Report, "\$" refers to US dollars.

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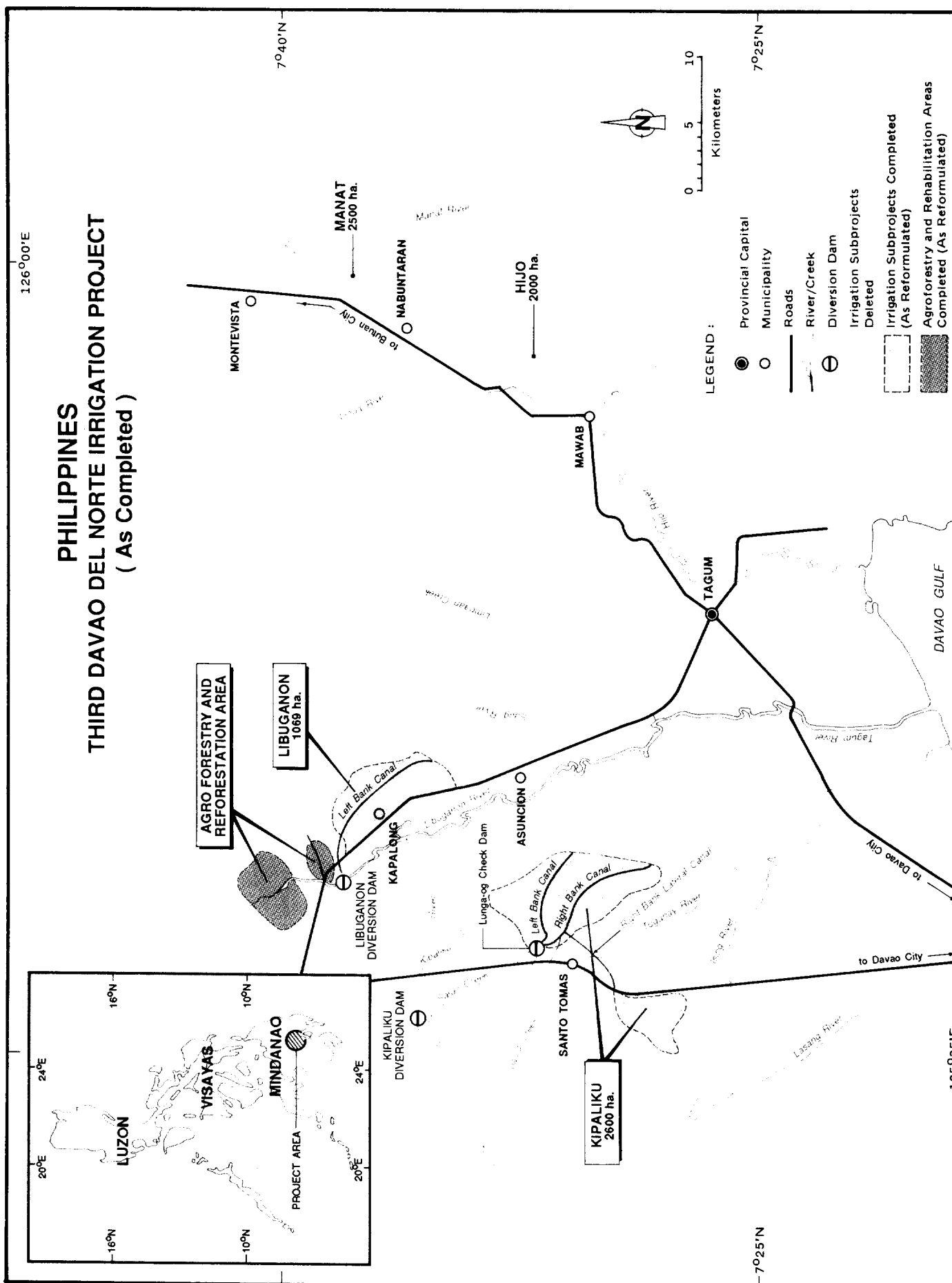
PHILIPPINES

June 1993

Note: This Report was prepared by a Bank Mission comprising Mr. K. Kulavaratharasah (Project Engineer/Mission Chief), Ms. L. H. Tang (Senior Clerk, Project Administration) and Mr. J. Sison (Staff Consultant, Agricultural Economist). The Mission visited the Project area and held detailed discussions with concerned officials and agencies from 10 February to 9 March 1993.

TABLE OF CONTENTS

	Page
Map - Project Location	(ii)
Basic Data	(iii)
I. Project Description	1
A. Objectives, Scope and Rationale	1
B. Project Reformulation	1
II. Evaluation of Implementation	3
A. Project Components	3
B. Project Implementation Arrangements	7
C. Project Schedule	7
D. Project Costs and Disbursements	7
E. Conditions and Covenants	8
F. Environmental and Social Impact	9
G. Project Benefits	9
H. Engagement and Performance of Consultants, Contractors and Suppliers	11
I. Performance of the Borrower and Executing Agencies	12
J. Performance of the Bank	12
III. Conclusions and Recommendations	14
A. Conclusions	14
B. Recommendations	14
Appendixes	16



(iii)

BASIC DATA

A. Loan Identification

- | | | |
|-------------------------|---|--|
| 1. Country | : | Philippines |
| 2. Loan Number | : | 580-PHI |
| 3. Project Title | : | Third Davao del Norte Irrigation Project |
| 4. Borrower | : | Government of the Republic of the Philippines |
| 5. Executing Agencies | : | (a) National Irrigation Administration (NIA)
(b) Department of Environment and Natural Resources (DENR)
(c) Department of Public Works and Highways (DPWH)
(d) Department of Health (DOH) |
| 6. Amount of Loan | | |
| - Original | : | \$45.3 million |
| - Actual (Loan No. 580) | : | \$17.7 million |
| (SPIAL No. 779/780) | : | \$ 2.0 million |

B. Loan Data

- | | | |
|-------------------------------|---|-------------------|
| 1. Appraisal | | |
| - Date Started | : | 12 April 1982 |
| - Date Completed | : | 30 April 1982 |
| 2. Loan Negotiations | | |
| - Date Started | : | 19 July 1982 |
| - Date Completed | : | 19 July 1982 |
| 3. Date of Board Approval | : | 02 September 1982 |
| 4. Date of Loan Agreement | : | 03 November 1982 |
| 5. Date of Loan Effectiveness | | |
| - In Loan Agreement | : | 03 February 1983 |
| - Actual | : | 28 March 1983 |
| - Number of Extensions | : | NIL |
| 6. Closing Date | | |
| - In Loan Agreement | : | 30 June 1988 |
| - Actual | : | 28 April 1992 |
| - Number of Extensions | : | three (3) |

(iv)

7. Terms of Loan
- Interest Rate : 11 % per annum
 - Service Charge : 0.0 %
 - Maturity : 30 years
 - Grace Period : 5 years
8. Terms of Relending : Not Applicable
9. Disbursements
- (a) Dates
- Initial Disbursement : 10 August 1983
 - Final Disbursement : 28 April 1992
 - Time Interval : 8.72 years
 - Effective Date : 28 March 1983
 - Original Closing Date : 30 June 1988
 - Time Interval : 5.3 years
- (b) Amount (\$)

Category No.	Category	Original Allocation	Last Revised Allocation	Net Amount Disbursed	Undisbursed Balance
01A	Civil Works - Steel Bars; Major Gates	3,200,00	821,000	384,019	436,981
01B	Civil Works - Contract Works	5,220,000	1,060,000	718,526	341,474
01C	Civil Works - Force Account Works	2,250,000	608,000	828,373	-220,373
02	Equipment, Vehicles and Medical Supplies	5,182,000	3,675,000	3,676,759	-1,759
03	Survey and Investigation	42,000	41,000	40,864	136
04	Consulting Services	573,000	417,000	416,849	151
05A	Local Expenditures for Civil Works	10,000,000	2,788,000	2,273,645	514,355
05B	Local Expenditures - Planting Materials, Supplies and Incremental Cost for Soil Conservation and Water Management	-	820,000	778,049	41,951
06	Detailed Design	200,000	70,000	69,419	581
07	Interest and Commitment Charge during Const.	13,300,000	8,500,000	8,500,000	-
08	Unallocated	5,333,000	-	-	-
TOTAL		45,300,000	18,800,000	17,686,503	1,113,497 ^{a/}

^{a/} This amount was cancelled on 28 April 1992.

(v)

10. Local Costs (Financed)

-	Amount	:	\$5.1 million
	(a) Principal Loan	:	\$3.1 million
	(b) SPIAL	:	\$2.0 million
-	Percentage of Local Costs	:	32 %
-	Percentage of Total Costs	:	40 %

C. Project Data

1. Project Cost

	Appraisal Estimate	Actual
(a) Foreign Exchange Cost	22.0	6.10
(b) Local Cost	40.7	9.7 ^{a/}
(c) Total Cost	62.7	15.8

^{a/} Inclusive of SPIAL of \$2.0 million.

2. Financing Plan (\$million)

(a) Implementation Costs

	Appraisal Estimate			Actual		
	Foreign	Local	Total	Foreign	Local	Total
Borrower Financed	-	30.70	30.70	-	4.195	4.195
Bank Financed	<u>22.00</u>	<u>10.00</u>	<u>32.00</u>	<u>6.065</u>	<u>5.121^{a/}</u>	<u>11.186</u>
Total	22.00	40.70	62.70	6.065	9.316	15.381

^{a/} Includes \$2.0 million disbursed for local expenditures for civil works under Special Projects Implementation Assistance Loan (SPIAL).

(b) IDC Costs

	Appraisal Estimate			Actual		
	Foreign	Local	Total	Foreign	Local	Total
Borrower Financed	-	-	-	-	-	-
Bank Financed	<u>13.3</u>	-	<u>13.3</u>	<u>8.50</u>	-	<u>8.50</u>
Total	13.3	-	13.3	8.50	-	8.50

3. Cost Breakdown by Project Component (\$'000)

		Appraisal Estimate			Actual		
		Foreign	Local	Total	Foreign	Local	Total
I.	Civil Works						
(a)	Irrigation	8,727	20,445	29,172	1,485	2,805	4,290
(b)	Rural Water Supply	142	406	548	303	451	754
(c)	Rural Health Services	94	311	405	29	106	135
(d)	Schistosomiasis Control	10	27	37	3	14	17
(e)	Watershed Rehab.	79	157	236	146	1,304	1,450
II.	Equipment and Supplies						
(a)	Construction and Maintenance Equipment for Irrigation	4,271	202	4,473	1,890	45	1,935
(b)	Drilling Equipment and T/W Materials for Rural Water Supply	1,305	56	1,361	488	8	496
(c)	Laboratory Equipment, Vehicle and Medicine for Schistosomiasis and Health Services	333	339	672	1,050	184	1,234
(d)	Equipment Vehicles and Supplies for Watershed Rehabilitation	193	524	717	250	455	705
III.	Agricultural Development	259	778	1,037	29	180	209
IV.	Consulting Services						
(a)	Irrigation	395	90	485	142	23	165
(b)	Watershed Management	344	73	417	200	80	280
(c)	Rural Water Supply	34	8	42	76	143	219
V.	Project Design and Administration	481	4,743	5,224	-	3,878	3,878
	Total Base Cost	<u>16,467</u>	<u>28,159</u>	<u>44,626</u>	<u>6,091</u>	<u>9,676</u>	<u>15,767</u>
VI.	Physical Contingencies	<u>1,772</u>	<u>2,935</u>	<u>4,707</u>	<u>0</u>	<u>0</u>	<u>0</u>
VII.	Price Escalation	<u>3,561</u>	<u>9,606</u>	<u>13,167</u>	<u>0</u>	<u>0</u>	<u>0</u>
	TOTAL COST	<u>22,000</u>	<u>40,700</u>	<u>62,700</u>	<u>6,091</u>	<u>9,676</u>	<u>15,767</u>
	IDC	13,300	0	13,300	8,500	0	8,500
	GRAND TOTAL	35,300	40,700	76,000	14,591	9,676^{a/}	24,267^{a/}

^{a/} This included \$0.532 million, the cost of remaining works.

(vii)

4. Project Schedule

		<u>Appraisal Estimate</u>	<u>Actual</u>
(a)	<u>Date of Contract with Consultants</u>		
	(i) Soil Conservation and Management Specialist (DENR)	March 1981	1 Jan 1984
	(ii) Construction Engineer (NIA)	March 1984	3 May 1984
	(iii) Groundwater Investigator (DPWH)	March 1985	22 March 1985
(b)	<u>Completion of Consultant's Assignment</u>		
	(i) Soil Conservation and Management Specialist (DENR)	Nov 1986	May 1986
	(ii) Construction Engineer (NIA)	Sep 1985	Sep 1987
	(iii) Groundwater Investigator (DPWH)	Nov 1987	Dec 1988
(c)	<u>Completion of Engineering Designs (NIA)</u>		
	(i) <u>Kipaliku</u>		
	Tunnel	Dec 1982	Aug 1985
	Feeder Canal	Dec 1982	Nov 1987
	Dam	Dec 1982	Dec 1983
	Lunga-og Checkdam	Dec 1982	Feb 1987
	Main Canal Left	Dec 1982	Oct 1986
	Main Canal Right	Dec 1982	Jan 1983
	(ii) <u>Libuganon</u>		
	Main Canal	Dec 1982	Jan 1984
(d)	<u>Civil Works Contract</u>		
	(i) <u>Libuganon</u>		
	1. Construction of Main Canal		
	- Commencement date	Mar 1983	Jan 1984
	- Completion of work	Mar 1986	Aug 1986
	(ii) <u>Kipaliku</u>		
	1. Construction of tunnel ^{a/}		
	- Commencement date	-	Aug 1985
	- Completion of work	-	Nov 1987
	2. Construction of feeder canal		
	- Commencement date	May 1983	Aug 1988
	- Completion of work	Dec 1985	Mar 1992
	3. Improvement of Salao Creek ^{a/}		
	- Commencement date	May 1984	Feb 1991
	- Completion of work	Jul 1987	Jul 1992

(viii)

	<u>Appraisal Estimate</u>	<u>Actual</u>
4. Construction of diversion works		
- Commencement date	Jun 1983	Feb 1988
- Completion of work	Jun 1985	Aug 1991
5. Construction of Lunga-og checkdam main canal, lateral A and B (left)		
- Commencement date	Jun 1983	Aug 1988
- Completion of work	Dec 1985	Aug 1990
6. Construction of afflux dike and bridge		
- Commencement date	Feb 1983	Jun 1990
- Completion of work	Feb 1986	Apr 1991
7. Construction of main canal & lateral A (right)		
- Commencement date	Feb 1983	Jul 1990
- Completion of work	Feb 1986	Mar 1992
(e) Equipment and Supplies Dates		
- First Procurement		
NIA)	June 1983	Nov 1983
DOH)	"	Oct 1985
DPWH)	"	Apr 1984
DENR)	"	Aug 1983
- Last Procurement		
NIA)	June 1988	Sep 1991
DOH)	"	Dec 1990
DPWH)	"	Dec 1990
DENR)	"	Dec 1990
	<u>Date</u>	<u>Amount</u>
(f) Other Milestones		
- Date Loan Account Closed	28 Apr 1992	\$ 17.7 million
- Partial Cancellation		
First Cancellation	25 Nov 1986	\$ 21.3 million
Second "	12 Nov 1990	\$ 3.5 million
Third "	18 July 1991	\$ 1.0 million
Fourth "	14 Oct 1991	\$ 0.7 million
- Final Cancellation	28 Apr 1992	\$ 1.1 million
- First Reallocation of Loan Proceeds	29 Jul 1987	
- Second Reallocation of Loan Proceeds	6 Dec 1990	
- Third Reallocation of Loan Proceeds	30 Oct 1991	
- Final Reallocation of Loan Proceeds	28 Apr 1992	

D. DATA ON BANK MISSIONS

Name of Each Mission	Date	No. of Persons	No. of Mandays	Specialization of Members
Fact-Finding Mission	15 to 21 Feb 1982	2	14	Agronomist Engineer
Appraisal Mission	12-30 April 1982	5	95	Agronomist Engineer Economist Programs Officer Counsel
Review Mission-1 ^{a/}	09-20 May 1983	2	24	Engineer
Review Mission-2 ^{a/}	11-22 Feb 1985	2	44	Agronomist Engineer
Review Mission-3	21-25 Apr 1986	3	15	Engineer Economist Agronomist/Consultant
Review Mission-4	30 Mar - 10 Apr 1987	2	24	Engineer Sr. Clerk (PA)
Review Mission-5 ^{b/}	16-27 Nov 1987	1	12	Engineer
Review Mission-6 ^{a/}	16-18 Mar 1988	2	6	Manager Financial Analyst
Review Mission-7 ^{a/}	06-16 Nov 1988	1	11	Engineer
Review Mission-8 ^{b/}	12-19 Jun 1989	1	8	Engineer
Review Mission-9	14-29 May 1990	1	16	Engineer
Special Loan Administration	21 Nov-4 Dec 1990	1	14	Engineer
Special Loan Administration ^{a/}	21-27 Mar 1991	2	14	Manager Financial Analyst
Review Mission-10	27 Aug-10 Sep 1991	1	14	Engineer
PCR Mission	10-21 Feb 1992	3	21	Engineer Agricultural Economist/Consultant Sr. Clerk (PA)
TOTAL		15	332	
		Missions Mandays		

^{a/} Review included Second Davao del Norte Irrigation Project (Loan No. 258-PHI).

^{b/} Review included Second Davao del Norte Irrigation Project (Loan No. 258-PHI) and Irrigation Sector Project (Loan No. 667-PHI).

I. PROJECT DESCRIPTION

A. Objectives, Scope and Rationale

1. The main objectives of the Third Davao del Norte Irrigation Project (the Project) were to increase paddy production and rural incomes, create employment opportunities, and upgrade the general socioeconomic condition of the people in the Project area. To achieve these objectives, the Project was designed to include the following components: (i) construction of irrigation facilities in about 9,000 hectares (ha) for paddy cultivation; (ii) establishment of two pilot irrigation management demonstration farms of 30 ha each; (iii) installation of 1,324 rural water supply systems; (iv) establishment of 18 new Barangay Health Stations (BHSs); (v) schistosomiasis control program in endemic areas; (vi) reforestation and agroforestry pilot scheme covering 1,500 ha in the watershed areas of the Hijo and Manat Rivers; and (vii) provision for 51 man-months of consulting services for irrigation, watershed management and rural water supply.

2. The Project is located near Tagum, Davao del Norte Province in Mindanao and was originally envisaged to cover a total of 9,000 ha of irrigable land, divided into four subproject areas as follows: Libuganon (1,900 ha), Kipaliku (2,600 ha), Hijo (2,000 ha) and Manat (2,500 ha). The Libuganon and the Kipaliku subproject areas are near each other, while the Hijo and Manat subproject areas are about 30 kilometers (km) northeast of Libuganon and Kipaliku (see Map).

3. The Project objectives supported the Government's strategy for attaining self-sufficiency in the production of foodgrains, particularly rice. Moreover, the Project was designed to assist the Government in achieving balanced regional development by eliminating major constraints in water and input supply as well as by upgrading the socioeconomic and environmental conditions in the Project area.

B. Project Reformulation

4. At appraisal, it was anticipated that the Government would control the mining activities of private companies in the watersheds of Hijo and Manat rivers, and inject adequate funds to meet the local currency costs required for the Project. Furthermore, the Government's responsibilities were documented in the Loan covenants to ensure smooth Project implementation. However, considerable delays in implementation were encountered during the initial stages, mainly because of the Government's budgetary constraints and technical problems in the Hijo and Manat subproject areas that necessitated a joint review of the Project by the Executing Agencies (EAs) and the Bank in May 1986. The findings indicated that the continued mining activities in the Hijo watershed and the difficulties in sourcing suitable irrigation water supply for the Manat subproject area had considerably diminished the technical viability of the two subprojects since appraisal. Subsequently, the Government requested a change in the scope of the Project in November 1986 and the change was approved by the Bank in 1987.^{1/}

5. The deletion of irrigation systems in the Hijo and Manat subproject areas necessitated the reformulation of the soil conservation and watershed management component. Upon the recommendation of the Department of Environment and Natural

^{1/} Loan No. 580-PHI: Third Davao del Norte Irrigation Project, Request by Borrower for Change in Project Scope, Cancellation of a Portion of Loan Amount and Reallocation of Loan Proceeds, 20 August 1987.

Resources (DENR), greater emphasis was given to the Libuganon subproject area to prevent further deterioration of the watershed from extensive shifting cultivation and to ensure sustained use of the Libuganon irrigation system.

6. As substantial progress had been accomplished in the Project's rural water supply and health services components in the Hijo and Manat subproject areas, minor changes in their scope were undertaken.

7. The revised Project scope included: (i) development of irrigation facilities in the Libuganon and Kipaliku subproject areas, covering 4,500 ha; (ii) establishment of a pilot demonstration area (59 ha); (iii) implementation of a soil conservation and agroforestry program in the Libuganon watershed area consisting of reforestation of 600 ha and development of 1,200 ha for agroforestry; (iv) installation of about 1,200 units of level I, and 2 units of level II rural water supply systems; (v) construction of 10 new BHSs with provision for laboratory equipment and medicines; (vi) implementation of a schistosomiasis control program in Libuganon, Kipaliku, Hijo and Manat subareas; and (vii) provision of 78 man-months of consulting services for the irrigation, rural water supply and soil conservation and watershed management components. A comparison of original and revised Project scope is presented in Appendix 1.

II. EVALUATION OF IMPLEMENTATION

A. Project Components

1. Irrigation and Related Civil Works Component

8. As reformulated, 4,500 ha were to be provided with irrigation facilities: 1,900 ha in the Libuganon subproject area, and 2,600 ha in Kipaliku. However, because of peaty soils, about 831 ha were deleted from the Libuganon subproject area, thus reducing the total irrigation service area to about 3,669 ha.

9. The major civil works in both subproject areas have been completed. Civil works on the major irrigation facilities in Libuganon were initiated in 1984 and were completed in early 1988; remaining works are expected to be completed by mid-1993 (see para. 12). Start of construction of the irrigation system in the Kipaliku subproject area was considerably delayed because of peace-and-order problems. However, the completion of major works was accomplished in 1992 and the remaining works are expected to be completed by September 1993 (see para. 14). Implementing the Project's irrigation component took about 11 years, as compared with the 5-year implementation schedule originally envisaged (see Appendix 2).

10. A major constraint which delayed the implementation of the irrigation component was the lack of counterpart funds resulting from the Government's budgetary constraints. Because of adverse economic conditions, a ceiling was placed on public spending. The Project was particularly affected by the suspension of the Government's equity contributions to the National Irrigation Administration (NIA) in mid-1984, which led to the deferment of bids and awards of new civil works and the suspension of force account works. With the Bank approval of Special Project Implementation Assistance Loans (SPIALs)^{1/} in April 1986, the Project's counterpart funding situation eased significantly and NIA was able to resume processing new contracts.

11. Other factors that contributed to the delay were: (i) peace-and-order problems near the vicinity of the Kipaliku dam site caused a one-year delay in the construction of the Kipaliku diversion works; (ii) difficulties in acquiring rights-of-way in the Kipaliku subproject area (see para. 14); (iii) problems associated with peaty soils in the service area of the Libuganon subproject area, which necessitated detailed investigations for corrective measures (i.e., realignment and cancellation of canals) and deep excavations for draining the area (see para. 12); (iv) delay in the completion of the detailed design of the Lunga-og right bank canal system and contract packaging for bidding; and (v) unfavorable weather conditions because of a prolonged rainy season that hampered civil works activities in 1989.

(a) Libuganon Left Bank Subproject

12. As reformulated, the construction of the left bank main canal (11.5 km), undertaken through contract, and four lateral canals (5.4 km) and related civil works, undertaken by NIA under force account, have been completed (see Appendix 3). From the appraisal estimate of 30.1 km, the length of the canals was reduced by about 13.2 km because some canals were realigned and others cancelled as a consequence of the right-

^{1/} SPIAL Nos. 779/780-PHI finance the shortfall in the Government contribution to 36 Bank-assisted Projects. The special loans included a notational allocation of \$2.0 million for the Project.

of-way problem and peaty soils in the service area. Despite the substantial decrease in service area, the constructed canal capacity was as originally designed, resulting in excessive canal capacity. However, the lengths of farm-level drainage facilities and farm ditches were reduced in proportion to developed service area of the irrigation system, the drainage by about 28.2 km (54 km at appraisal vs. 25.8 km as reformulated) and the ditches by about 129.5 km (159 km at appraisal vs. 29.5 km as reformulated). Works on the afflux dikes and related protection works as well as the irrigation system's service roads (19 km) are also now complete. Provision of irrigation facilities to the designed service area is currently awaiting the completion of some remaining works, including: (i) construction of a 2 km additional drainage canal; (ii) repair works along 2 km of the main canal, to be carried out by NIA, and improvements on 300 m of the lateral B canal; and (iii) land leveling to be undertaken by farmers at the farm-level. These works are expected to be completed by the end of June 1993. Full development of the Libuganon irrigation system is expected by 1995.

(b) Kipaliku Subproject

13. The construction of the following works has been completed through contracts: (i) Kipaliku diversion dam/structure; (ii) Lunga-og check dam, left bank main canal (4.3 km) and two lateral canals (8.6 km); (iii) Lunga-og right bank main canal (9.4 km) and related structures; (iv) afflux dikes (0.9 km); and (v) an overflow bridge. Through force account, the construction of the following works have also been completed: (i) Kipaliku feeder canal (0.6 km), (ii) three right bank lateral canals (5.7 km), and (iii) improvement on the Salao Creek (9 km). The total length of the constructed main and lateral canal network is approximately 28.0 km or about 15.7 km less than that envisaged at appraisal. About 86.6 km of drainage canals and 29.8 km of service roads have also been constructed in the Kipaliku subproject area.

14. Works that have yet to be completed by NIA in the Kipaliku subproject area are the: (i) construction of 77 km of farm ditches; (ii) construction of 7 km of drainage canals; (iii) construction of 12 turnouts, 4 foot bridges and 7 canal structures; and (iv) repairs of cracks on the Lunga-og check dam caused by foundation problems resulting from the peaty soils. Land leveling has yet to be carried out by the farmers. The remaining works, together with the acquisition of rights-of-way in the submerged area of the Lunga-og check dam, are expected to be accomplished by September 1993. Full development of the Kipaliku irrigation system is expected by 1997 (see Appendix 2).

2. Agricultural Development Component

15. As reformulated, one pilot irrigation management demonstration area, consisting of about 30 farms and approximately 59, was established in the Kipaliku subproject area. The location of the demonstration area was based on (i) receptiveness of participating farmers, (ii) proximity to the source of irrigation water supply and major roadways, and (iii) susceptibility to flood damage. The area also serves as a seed multiplication center under the technical supervision of the Department of Agriculture (DA). The demonstration area has been provided with irrigation, necessary farm and training equipment and agrometeorological instruments, is being operated by qualified personnel from NIA and is headed by a farm manager.

16. Agricultural development is expected to be fully attained by 1997, five years after full completion of the Project's irrigation facilities. A comprehensive Five-Year Agri-Institutional Development Program For facilitating overall Project area development is being implemented in the Project area, and includes strategies for effective agricultural extension services, training farmer beneficiaries, and easy access to credit and other agricultural support services.

17. NIA has motivated and trained farmers for greater participation in the operation and maintenance (O&M) of the irrigation systems and collection of irrigation service fees (ISF) through Farmers Irrigators' Groups (FIGs) and Irrigators' Associations (IAs). As planned, 49 FIGs have been organized in Libuganon and 62 FIGs in Kipaliku subproject areas. FIGs have been further organized into three IAs in the Libuganon subproject area with a total membership of 714 farmer-members and four in the Kipaliku subproject area with 1,628 farmer-members. Of the seven IAs, four have been registered with the Securities and Exchange Commission as farmer cooperatives. These cooperatives provide farmer-members easy access to (i) credit at lower than prevailing interest rates; (ii) training in system management, leadership and management, and improved technologies; and (iii) marketing services. Studies conducted by NIA have indicated that ISF collection rates largely depend on the farmers' capacity to pay. In order to improve ISF collection, NIA expects to improve farmer's income by (i) encouraging them to adopt crop diversification schemes, and (ii) increasing production through increased cropping intensity and improved yields.

18. The proposed cropping pattern for the Project area was two successive irrigated rice crops a year, with cropping intensity increasing from 141 per cent ^{1/} (rainfed rice and corn) at appraisal to 200 per cent at full development. ^{2/} The current cropping intensity in the Project is only 97 per cent as repair and remaining works. Current irrigated paddy yields per hectare, however, have exceeded full development wet and dry season yields by about 20 per cent and 10 per cent, respectively, mainly because of effective extension services provided by DA on the proper application of modern rice technology. In response to farmers' request, approximately 600 ha of rice land the Kipaliku subproject area have been converted to banana production.

3. Soil Conservation and Watershed Management Component

19. The activities under the soil conservation and watershed management component were accomplished in a satisfactory manner. Reforestation of the Libuganon watershed was generally successful. The planted trees had a survival rate between 80 and 85 per cent and have not, so far, encountered serious pest or disease problems. ^{3/} DENR has likewise successfully accomplished the component's agroforestry activities and has undertaken various agroforestry support activities for increasing farmers' awareness of forest protection and management. DENR has implemented a sustained information dissemination campaign on forest conservation, appropriate upland technologies, etc., and has organized of 14 agro-cooperators' associations in 13 *barangays* (village groups) for greater farmer participation. The implementation of this Project component was envisaged to be undertaken over a period of five years, from 1983 to 1987. Actual implementation, however, did not start until 1984 and was completed in 1991, a delay of about four years (see Appendix 2).

4. Rural Water Supply Component

20. As reformulated, the installation of 1,200 level I water supply systems (consisting of 200 deep and 1,000 shallow wells) and 2 level II water supply systems as well as the rehabilitation of 403 units of level I systems, have been completed by the Department

^{1/} Cropping intensity at Appraisal was defined as the sum of the wet and dry season cultivated rainfed areas divided by the wet season cultivated rainfed area.

^{2/} Cropping intensity based on the area development schedule of the Project is defined as the sum of the wet and dry season irrigated areas divided by the total irrigable area.

^{3/} The species planted include *Acacia mangium*, *Acacia auriculiformis*, *Gmelina arborea*, *Swietenia macrophylla*, *Vitex parviflora*, and *Pterocarpus indicus*.

of Public Works and Highways (DPWH). Water quality tests conducted by DPWH in 1989 indicated that the water is potable. The installation of the water supply systems required about eight years, or a delay in implementation of about three years (see Appendix 2). About 90 per cent of the water supply systems are operational; about 10 per cent have had difficulties caused by sourcing required spare parts.

21. The DPWH is currently providing limited assistance for O&M of the rural water supply systems as well as technical assistance, i.e., training in O&M and repair of water supply units, to village water-users groups, which have been organized by DPWH into Barangay Waterworks and Sanitation Associations. About 55 Associations have been organized, involving about 24,400 households, and will be responsible for the O&M of the water supply systems, including collection of water-users fees within their respective command areas.

5. Rural Health Services Component

22. Ten new BHSs have been completed and are operational. The physical completion of the BHSs was delayed by about five years, mainly because of delays in (i) submission of bids for construction, which were not received by the Department of Health (DOH) until late 1987; and (ii) award of contracts, which were not accomplished until the first quarter of 1988. Each BHS had been provided with the necessary instruments and equipment and staffed with five qualified Barangay Health Workers. The BHSs have provided approximately 33,000 persons with medical services, which included examination and treatment of ailments such as diarrhea, malaria, leprosy, respiratory infection, etc. and have served as focal points for providing basic health services to the residents of the Project area.

6. Schistosomiasis Control Program

23. In accordance with the reformulation of the Project, the provision of drugs and medicines and the distribution of 5,000 (as compared with 7,000 at appraisal) of water-sealed toilet bowls among the residents in infected areas, has been accomplished. The implementation of the schistosomiasis control program required eight years, a delay in completion of about three years.

24. The strategy for schistosomiasis control, as implemented by DOH, involved a program that covered: (i) diagnosis, treatment, eradication and prevention of the disease; and (ii) a health education campaign in the Project area. The program has been effectively implemented since 1985 and has reduced by about 80 per cent the rate of infection among the residents in the Project area. Approximately 310,000 persons have benefited from the two training programs and 506 lectures on health care as well as on prevention and control of schistosomiasis.

7. Consulting Services

25. At appraisal, the Project provided for 51 man-months of consulting services. Subsequent to Project reformulation, an additional 27 man-months of consultant services were deemed necessary to solve technical problems relating to irrigation, soil conservation and watershed management, and rural water supply components of the Project. The 78 man-months was distributed as follows: (i) 41 man-months to review the adequacy of the proposed flood control measures for the banks of the Libuganon-Tagum River and to assist NIA in the detailed design of other diversion works and irrigation networks; (ii) 26 man-months to assist DENR to formulate a detailed plan for the agroforestry pilot development scheme on 1,200 ha in the watershed area of the Libuganon River, and provide on-the-job training to local staff; and (iii) 11 man-months to assist DPWH in planning, investigating and selecting sites for tubewells.

B. Project Implementation Arrangements

26. The arrangement among the various EAs for the implementation of the Project was satisfactory and effective in (i) monitoring progress, (ii) resolving problems encountered during implementation of the Project, and (iii) minimizing overlap of functions and responsibilities among EAs. The local government officials showed keen interest in the Project and, in preparation for the devolution of functions and responsibilities from the Central Government to the local governments, regularly attended meetings and interacted with EAs and other Government agencies on the progress of the Project.

27. The Project's principal EA was NIA. DPWH, DOH and DENR were implementing agencies. The irrigation component was implemented by NIA through the Project Office based at Carmen, Davao del Norte. The rural water supply component was implemented by the District Engineer's Office of DPWH, the public health services and schistosomiasis control program by the Integrated Provincial Health Office of DOH. All the implementing agencies are located in Tagum, Davao del Norte. A Project Manager and Assistant Project Manager appointed by NIA with the concurrence of the Bank, were responsible for the overall management (see Appendix 4).

28. An Agricultural Development Coordinating Council was established to serve as a planning body for agricultural development support services. The Council consisted of the provincial governor, representatives of NIA, DENR, DPWH, DOH, DA, the Department of Agrarian Reforms, the Philippine National Bank, the Agricultural Credit Administration, the National Food Authority, the Land Bank of the Philippines, the Davao del Norte Seed Growers Association, the Department of Local Government and the Philippine Crop Insurance Corporation. After the unification of all agricultural councils at the provincial level, pursuant to Executive Order No. 803 (May 1983), the original Council was replaced by the Provincial Food and Agricultural Council.

C. Project Schedule

29. The Project was to be implemented over a period of about five years, starting last quarter of 1982 and ending in 1987. However, some remaining works will be completed by September 1993. Thus, actual implementation will take 11 years, from 28 March 1983 (the date of loan effectiveness) to September 1993, an overrun of about six years (see Appendix 2). The delay was mainly attributed to (i) the Government's difficulty in providing counterpart funds, (ii) unresolved technical problems in the Hijo and Manat subproject areas that resulted in their deletion from the Project scope, (iii) peace-and-order problems at the Kipaliku dam site, and (iv) other problems encountered during the implementation of the irrigation component. The major civil works were completed in 1992 while minor works, such as farm ditches and drains, are expected to be completed by September 1993.

D. Project Costs and Disbursements

1. Project Costs

30. The original cost of the Project was estimated at \$76 million, consisting of \$22.0 million (29 per cent) in foreign exchange cost, \$40.7 million (53 per cent) in local currency equivalent and \$13.3 million (18 per cent) for commitment charges and interest. As of 30 April 1992, actual costs incurred amounted to approximately \$23.7 million, comprising \$6.1 million in foreign exchange, \$9.1 million in local currency cost and \$8.5 for interest. Based on NIA's cost of remaining works, the actual cost of the Project was

estimated at \$24.3 million (see Appendix 5). In nominal terms, there was an estimated cost underrun of \$51.7 million or about 68 per cent of the total Project cost. The underrun resulted mainly from the deletion of the Hijo and Manat subprojects from the irrigation component and the subsequent reduction in the provision of the other Project components. The devaluation of the peso from ₱8.47 per \$1 in July 1982 to ₱20.50 per \$1 in June 1985 likewise resulted in a reduction in Project cost in dollar terms.

2. Disbursements

31. The \$45.3 million Bank loan, from its ordinary capital resources, was to finance \$22.0 million of foreign exchange costs, \$10.0 million equivalent of local currency costs and \$13.3 million for interest. However, because of budget constraints faced by the Government, the Bank approved in April 1986 SPIAL Nos. 779/780-PHI), which included an allocation of \$2.0 million for the Third Davao del Norte Irrigation Project. Thus, the total Bank financing for the Project amounted to \$47.3 million. Following the reformulation, a \$21.3 million surplus in the loan account was cancelled in November 1986, as requested by the Government, reducing the Bank financing to \$26.0 million. Subsequently, the loan account accumulated a \$5.2 million surplus because of substantial devaluation of the pesos. At the Government's request, the surplus was cancelled, as follows: \$3.5 million in November 1990, \$1.0 million in July 1991 and \$0.7 million in October 1991. With these cancellations, the Bank financing was reduced to \$20.8 million. At loan closing on 28 April 1992, the total of disbursements from the Bank's principal and SPIAL loans was \$19.7 million and the remaining \$1.1 million was cancelled. The details of the disbursements are presented in Appendix 6.

32. The loan was expected to be totally disbursed by 30 June 1988. However, actual disbursements lagged behind the projected schedule mainly because of delays in implementing irrigation development component. By 1988 only \$1.8 million, or about 10 per cent, had been disbursed compared with \$18.8 million as provided in the reformulation of the Project.

E. Conditions and Covenants

33. The status of compliance with the loan covenants is presented in Appendix 7. Because the Government could not regulate the dumping of waste materials by mining companies in the subproject watershed, the Hijo and Manat subproject areas were deleted from the Project scope. Very slow progress in the acquisition of rights-of-way by NIA hampered and delayed Project implementation and, subsequently, delivery of irrigation services to farmer-beneficiaries. Other covenants related to Project implementation have generally been complied with, except for some deviations in the local cost funding, particularly in the provision of adequate counterpart funds during the initial three years of Project implementation.

34. The Government is still in the process of complying with covenants relating to (i) provision of credit facilities; (ii) provision of adequate funds, facilities, services and other resources necessary for effective O&M of facilities provided under the Project; (iii) the collection of irrigation service fees in accordance with existing regulations and with the assistance of the IAs; (iv) acquisition of rights-of-way, particularly in the submerged area (60 ha) of Lunga-og check dam; and (v) conduct of the final socioeconomic survey. Government compliance with the covenant [see, item (iv)] above is expected by the end of September 1993, except for the conduct of the socioeconomic survey, which will be undertaken five years after completion of Project facilities (i.e., 1998), as provided in the Loan Agreement.

F. Environmental and Social Impact

35. The Project has significantly improved the environmental and socioeconomic conditions of the people residing in the Project area. Some arable areas which were under grass and bushes have been converted into irrigated rice farms and provided with proper drainage facilities to reduce flooding and improve drainage. Soil conservation and watershed management activities have likewise been undertaken and have effectively controlled soil erosion at the upper watershed areas of the Libuganon subproject and have minimized sedimentation in its canal system. The constructed access and service roads have improved mobility of both people and agricultural commodities and have contributed significantly to increased employment opportunities and incomes in the Project area as well as access to BHSs for treatment of common ailments (i.e., malaria, tuberculosis, respiratory tract infection, etc.) that otherwise would have remained untreated. Effective implementation of the Project's schistosomiasis control program, complemented by improved rural water supply, health and sanitary conditions, has resulted in a significant decline in the incidence of schistosomiasis in the Project area. Accordingly, post-Project conditions should limit the potential for other waterborne disease carriers. However, in order to effectively sustain the improvement in the general environment and socioeconomic conditions in the Project area, it is imperative that NIA, and the other collaborating Government agencies such as DPWH, DOH, DENR and DA, through their respective provincial offices, continue to provide adequate funds for the O&M of facilities provided under the Project.

36. The application of chemical fertilizers has increased since appraisal, from 15 kg/ha to 80 kg/ha per season in the Libuganon subproject area and 26 kg/ha to 70 kg/ha per season in Kipaliku subproject area. However, the increase is not expected to cause significant adverse environmental impact. No substantial increase in the use of pesticides was observed in the Project area since appraisal. The pesticides used are those ^{1/} recommended by DA under its integrated pest management program and their continued use is being supervised and monitored by DA through its Agricultural Production Technologists for any adverse effect on the existing environment.

G. Project Benefits

37. The irrigation component of the Project will allow about 2,300 low-income farmers to increase their production and income. As rainfed paddy production areas are provided with irrigation facilities and full development of the irrigation systems is achieved, yields were envisaged at appraisal to increase from 2.7 mt/ha to 4.4 mt/ha in the wet season and 2.1 mt/ha to 4.6 mt/ha in the dry season, while overall cropping intensity was expected to increase from 141 per cent ^{2/} to 200 per cent. ^{3/} The projected annual paddy production at full development, based on appraisal estimates, was 28,000 mt or a net increment of about 18,000 mt.

38. Current average yields of irrigated paddy are approximately 5.2 mt/ha in the wet season and 5.0 mt/ha in the dry season and are 120 per cent and 110 per cent, respectively, of expected wet and dry season paddy yields at full development. The high

^{1/} The pesticides recommended by DA are: (i) insecticides-Cymbush, Nuvacron, Azodrin 202R, Indusulfax, Thiodan, Folidol M50, Hopcin and Parapest; (ii) herbicides-Machete and Rilof H; and (iii) fungicides-Kocide 101.

^{2/} Cropping intensity at appraisal was defined as the sum of wet and dry season cultivated rainfed areas divided by the wet season cultivated rainfed area.

^{3/} Cropping intensity as computed from the area development schedule of the Project is defined as wet and dry season irrigated areas divided by the total irrigable area.

yields may be attributed to the adoption of higher yielding varieties of paddy and proper application of fertilizer and chemicals. Total annual paddy production, based on current yields and a cropping intensity of 200 per cent, at full development is estimated at about 31,000 mt (see Appendix 8).

39. Banana production, mainly concentrated in the Kipaliku subproject area, is projected to contribute approximately 30,000 mt to the Project's total annual agricultural production. Total production of paddy and banana is estimated at 61,000 mt at full development, or an increment of about 45,000 mt per year (see Appendix 8).

40. Based on estimates of projected crop yields (i.e., paddy and banana), agricultural commodity prices (see Appendix 9), economic returns per hectare (see Appendix 10) and irrigated area development (see Appendix 11), the average annual income of a typical 2.0-ha farm was estimated to increase from about \$1,023 to \$2,445 at full Project development (see Appendix 12), or about 8 per cent higher than the 1985 poverty threshold of \$2,255, expressed in 1992 real terms. Approximately 75 per cent of the income is projected to be derived from paddy and 25 per cent from banana production.

41. Based on the NIA-operated irrigation systems within the Davao Provinces during 1983-1992, the average cropping intensity is estimated at 164 per cent. With the assumption that NIA funds for O&M of the irrigation systems under the Project are just adequate for attaining a cropping intensity of 164 per cent at full development, the economic internal rate of return (EIRR) for the irrigation component is estimated at 4 per cent. However, the Mission believes that 200 per cent cropping intensity will be achieved at full development in 1997. At a 200 per cent cropping intensity, the EIRR ^{1/} for the irrigation component is estimated at 7 per cent, compared with appraisal estimate of 14 per cent. ^{2/} Aside from considerable delay in Project implementation and subsequent delay in the attainment of full development, the decreased EIRR may be attributed to a considerable decline in the world market price of paddy since appraisal in 1982. In 1992 real terms, paddy price at appraisal was more than twice of that in 1992 (see Appendix 9). The estimated EIRR based on real paddy (as well as on corn and fertilizer) prices, in 1992 real terms, was about 13 per cent, which is comparable to the estimate at appraisal.

42. The benefits derived from the successful implementation of the health care, schistosomiasis control and rural water supply components were mainly reflected by improvement in the quality of life of the residents in the Project area. For example, the incidence of schistosomiasis has significantly declined from 9.6 per cent in 1985 to 1.9 per cent in 1990. About 80 per cent of the 250,300 persons in the Project area have been examined for schistosomiasis infection, and approximately 310,000 persons have benefited from the regular training programs and lectures on health care as well as prevention and control of schistosomiasis. The incidence of other waterborne diseases and common ailments that would have gone untreated without the Project, has likewise declined substantially as more people (about 33,000 persons) have availed of the services provided by the BHSs. Sanitary conditions have also appreciably improved as potable water is available to approximately 24,400 households through the rural water supply systems installed under the Project (see Appendix 13).

^{1/} The assumptions used in the economic analysis are discussed in Appendix 13.

^{2/} The cost of irrigation per hectare at completion is about \$4,300 compared with \$6,200 at appraisal. The actual irrigation cost per hectare under the Project is comparable with the national average of about \$4,000.

43. Significant benefits derived from the reforestation and agroforestry program under the soil conservation and water management component were: (i) the stabilization of the severely eroded areas in the Libuganon watershed, and (ii) the subsequent protection of the irrigation facilities in the Libuganon subproject area. About 4,700 persons in the Project area have been trained in forest protection and management and have been deriving income from the fruit trees established under the agroforestry program (see Appendix 13).

44. A substantial income was generated by employment of approximately 3,900 man-years of skilled and unskilled labor during the implementation of all of the components of the Project which, in turn, has increased economic activities and income within the Project area. In the longer term, an increase in the annual agricultural employment of about 1,200 man-years will be generated from the increase in agricultural productivity at full Project development.

45. At present, there are no alternative uses for the irrigation water because Libuganon and Kipaliku subprojects are remote from the main centers of economic activity. The opportunity cost of water, therefore, is the cost of utilizing capital in the best alternative investment. In this case, the best alternative investment is in irrigation and the opportunity cost of water is reflected by the computed EIRR, which is about 7 per cent.

46. Farmer beneficiaries of the irrigation component expect significant improvement in income from increases in wet and dry season paddy and banana yields as well as improvement in cropping intensity. Farmers have indicated that the provision of rural water supply and health services has substantially improved sanitation and health conditions in the Project area, which, in turn, have increased their capacity to undertake various income generating activities.

H. Engagement and Performance of Consultants, Contractors and Suppliers

1. Consultants

47. As reformulated, 78 man-months of consulting services have been completed. These were distributed as follows: (i) 41 man-months for NIA, (ii) 26 man-months for DENR, and (iii) 11 man-months for DPWH. The individual Consultants were engaged in accordance with the Bank's Guidelines on the Use of Consultants.

2. Contractors and Suppliers

48. Procurement of vehicles, equipment and materials required for irrigation, rural water supply, rural health services and soil conservation and watershed management components was carried out by NIA, DENR, DOH and DPWH, following the Bank Guidelines for Procurement. As planned, most of the civil works were carried out through prequalified contractors selected in accordance with the standard procedures acceptable to the Bank. Construction materials were procured from local suppliers also following the standard procedures followed by the EAs. About 55 per cent of civil works were carried out by contracts and 45 per cent by force account. The list of equipment, vehicles and supplies procured under the Project is presented in Appendix 14.

3. Performance of Consultants, Contractors and Suppliers

(a) Consultants

49. The engineering Consultant for the irrigation component satisfactorily performed his duties within the scope of the specified terms of reference and provided

valuable assistance to NIA in the redesign of structures. The Consultant's field services and supervision of contract works were reasonably satisfactory. Monthly status reports on the progress of construction with necessary comments and recommendations were regularly submitted to NIA and the Bank. These reports were useful in identifying on-site problems and remedial measures.

50. The groundwater Consultant also performed satisfactorily and assisted the DPWH in (i) sorting out the complex hydro-geological problems encountered during implementation, and (ii) the proper survey and investigation of the groundwater quality within the Project area.

51. The services of the Consultant for the soil conservation and watershed management component were terminated by DENR after 26 of the contracted 30 man-months of consultant services, mainly because of unsatisfactory performance. The Consultant was unable to comply with the terms of reference of his contract, as well as perform his duties within the expected technical standards.

(b) Contractors and Suppliers

52. The performance of the contractors for civil works on the whole was generally satisfactory. Some contracts, however, were extended mainly because of problems in the acquisition of rights-of-way and the deteriorating peace-and-order condition in the Project area. The peace-and-order situation discouraged contractors from undertaking some of the irrigation works. As a result, NIA eventually had to carry out these works, under force account and after some delays. The performance of the suppliers of equipment and materials was generally satisfactory.

I. Performance of the Borrower and Executing Agencies

1. Performance of the Borrower

53. The overall performance of the Borrower was quite satisfactory, except for its inability to (i) meet local currency cost requirements for local cost financing, and (ii) regulate dumping of waste materials by mining companies operating in the watershed of the Hijo subproject area. These problems delayed the implementation and necessitated reformulation of the Project scope and revision of the Bank's financing plan.

2. Performance of the Executing Agencies

54. The EAs, i.e., NIA, DPWH, DOH and DENR, implemented their respective components of the Project in line with the provisions of the Loan Agreement, albeit with delay. However, NIA was particularly slow in releasing urgently needed funds for the acquisition of rights-of-way, and repairing the Lunga-og check dam, thus substantially delaying delivery of irrigation services to the Libuganon and Kipaliku subproject areas. Cracks on the Lunga-og check dam developed shortly after its completion in early 1991. Heavy embankment loading had caused the settlement of the dam. NIA has yet to take the appropriate action for the necessary repair works. No major problem was encountered by the other EAs in meeting the technical requirements of reformulated Project. The EAs promptly established appropriate Project offices and staffed them with qualified personnel.

J. Performance of the Bank

55. The overall performance of the Bank in administering the implementation of the Project was satisfactory. The Project's integrated development approach, with emphasis

on intensified irrigation development for increasing paddy production, was formulated when self-sufficiency in foodgrains was accorded the highest priority by the Government; this reflected the Bank's awareness of and responsiveness to prevailing Government policy objectives. Because the Project was initiated when the Government faced severe economic problems, the Bank provided the Government special assistance to overcome budgetary constraints and enabled the EAs to implement the Project.

56. The Bank responded favorably and promptly to the EAs' requests for approval of procurement of additional construction equipment, spare parts and construction materials; drugs and medicines; equipment and vehicles; and extension of consultant's and contractors' contract periods. The Government's requests for reallocation of loan proceeds were likewise approved without delay by the Bank. The Bank also approved two extensions of the loan closing date: first, for 30 months, from June 1988 to December 1990; and second, for 12 months, from December 1990 to December 1991. Regular monitoring of the physical and financial progress of the Project was undertaken by periodic Review Missions. However, considering the magnitude of civil works required, and the experience of earlier projects, the envisaged completion period of about five years was not realistic. It was noted that in Project preparation wherein lessons learned from earlier Davao Irrigation Projects had not been adequately covered in the Project design.

III. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

57. The impact of the irrigation component, although full development has yet to be achieved, is evidenced by the farmer-beneficiaries' extensive adoption of modern varieties of paddy, higher use of fertilizer, higher crop yields and improvement in farm incomes. But the delays in implementation and considerable decline in the real economic price of paddy have decreased the EIRR to 7 per cent from the 14 per cent projected at appraisal. However, taking into consideration the social and environmental benefits derived from the rural health services, rural water supply, and soil and watershed management components of the Project, the overall performance of the Project is considered generally satisfactory.

58. Project implementation was delayed by about six years. The quality of the completed civil works was generally satisfactory, but some remaining works still have to be completed to bring the irrigation facilities up to a sustainable operational level.

59. Although some of the major causes of the delay in Project implementation were unavoidable, adequate supervision and proper management of the civil works during the detailed design and construction period could have substantially reduced the delays.

B. Recommendations

1. Project-specific

(a) Project Viability

60. As real paddy prices are projected to remain low until the year 2000, further expansion of area for the production of high value crops such as banana would certainly improve the Project's economic viability. NIA, in collaboration with DA and farmer-beneficiaries, should also determine the technical and economic viability of producing other high value crops (e.g., vegetables) in the subproject areas, and encourage farmer-beneficiaries to grow them. A study funded by the Bank indicated that, aside from banana, other high value crops such as pineapple, ginger, cotton and soybeans may be grown viably in the Project area.^{1/} DA should help determine alternative market outlets for these agricultural commodities. NIA should complete the remaining works under the Libuganon and Kipaliku subprojects and should repair the Lunga-og check dam by sealing the crack with watertight flexible sealant. DENR should monitor the survival rate of the trees planted under the reforestation program.

(b) Project Monitoring

61. Post-Project monitoring should focus on the (i) progress of irrigated area development, particularly the completion of remaining works on the irrigation systems and the acquisition of rights-of-way in order to ensure full delivery of irrigation services within the planned time frame; and (ii) Government's O&M of the completed facilities.

62. The final socioeconomic survey should address three major concerns, specifically: (i) the sustained viability of the farmers' cooperatives organized within the Project area and their contribution to the management and O&M of the irrigation systems; (ii) the

^{1/} Price and Investment Policies for Food Crop Sector Growth in the Philippines, International Food Policy Research Institute, Washington, D.C., 20 January 1987.

impact of farmers' continuous and intensive application of inorganic fertilizers and chemicals on the environment, and measures undertaken for preventing their potential adverse effects on the soil and environment; and (iii) the recurrence of waterborne diseases under post-Project conditions.

63. The Project Performance Audit Report may be prepared in early 1996 assuming completion of remaining works and substantial operation of Project facilities by the end of 1993.

2. General

(a) Project Preparation

64. The implementation of projects with considerable investment in civil works should be preceded by thorough project preparation in order to avoid significant modifications in design and additional works arising from unexpected and unavoidable technical problems. As project-specific and external factors are often difficult to assess during project preparation, project design should be flexible in order to respond to changes in technical as well as socioeconomic circumstances during Project implementation.

(b) Project Implementation

65. Given the likelihood of similar Bank assistance to the irrigation sector, NIA should recommend updating the Government's criteria for assessing land values so that they are applicable to current conditions. Land values based on these were considerably lower than current market value and consequently contributed to the long and tedious negotiation process involved in the acquisition of land. In most irrigation projects financed by the Bank in the Philippines timely land acquisition was a major problem for the Government mainly because of the costs involved. Delays in timely acquisition of rights-of-way have caused considerable Project implementation delays. It is, therefore, necessary to take appropriate action to expedite the acquisition of land in future Projects. The Bank should examine the issue of whether land acquisition costs should be eligible for Bank financing, thereby ensuring that land is acquired in a fair and timely manner and that the necessary funds are available as and when required.

(c) Project Evaluation

66. The evaluation of Projects with several components that address economic, social and environmental concerns should be based on the benefits derived from the Projects as a whole. Aside from quantifiable economic benefits derived by the beneficiaries from the Project, social and environmental benefits should also be taken into account although these are less tangible but are equally important. This is of particular interest now because of the Bank's strategic concerns and priority of operations for the future.

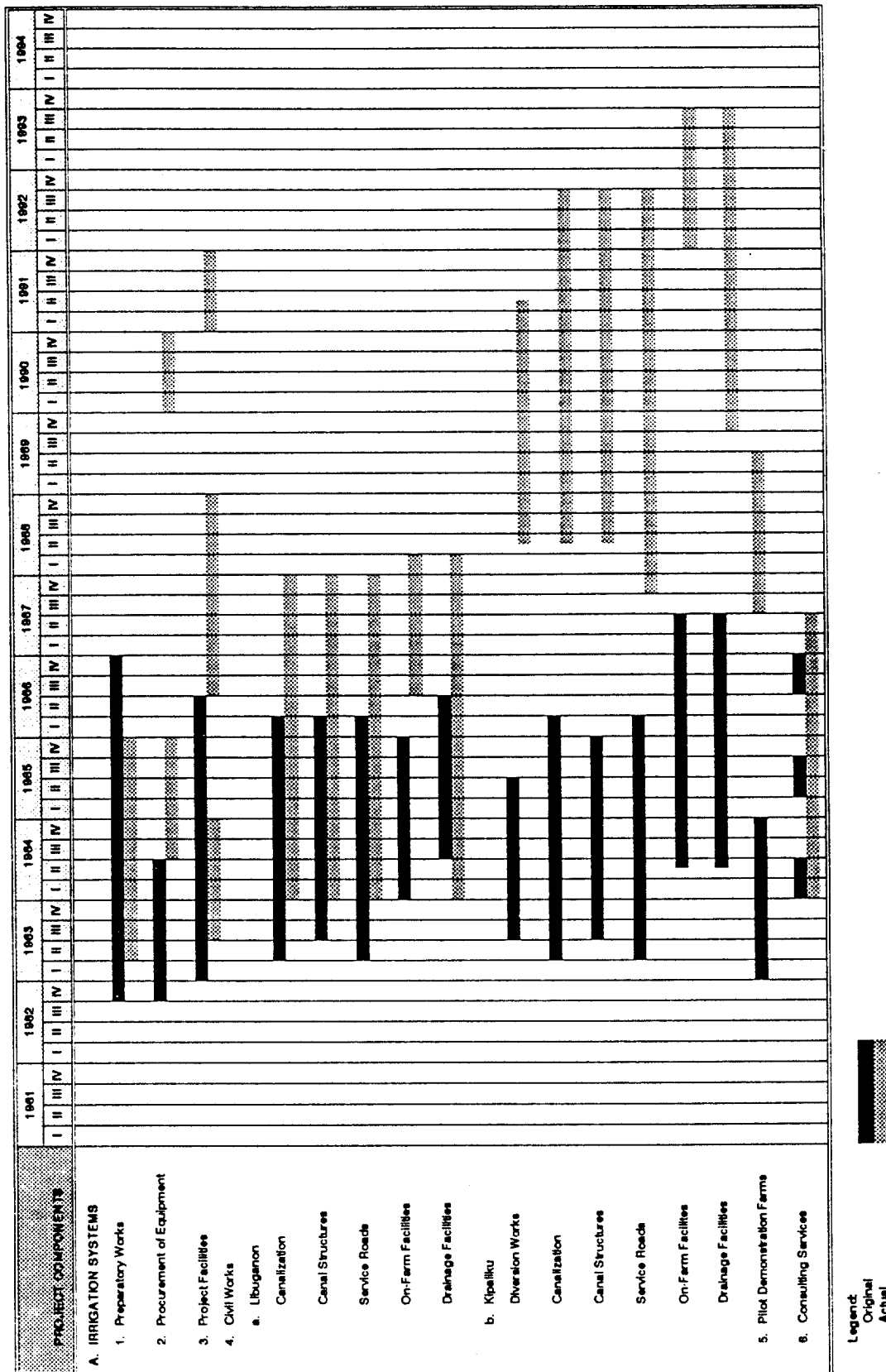
APPENDIXES

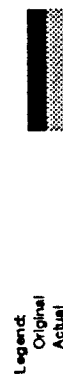
<u>Appendix</u>		<u>Page</u>
1	Project Components and their Scope	17
2	Implementation Schedule, Projected and Actual	18
3	Comparative Summary of Major Project Features	20
4	Organization Chart (National Irrigation Administration)	22
5	Comparison of Estimated and Actual Project Costs	23
6	Status of Loan Utilization	24
7	Compliance with Loan Covenants	25
8	Estimated Crop Yields	32
9	Computation of Economic Prices of Internationally Traded Commodities	33
10	Economic Returns per Hectare With and Without Project	34
11	Service Area and Plan of Irrigation Development	35
12	Typical Economic Returns per Farm	36
13	Major Assumptions Used for Economic Analysis	37
14	Equipment Proposed at Appraisal and as Procured	40

PROJECT COMPONENTS AND THEIR SCOPE

Components	Original Scope	Revised Scope
I. Irrigation	Development of irrigation facilities in four subprojects of Libuganon Kipaliku, Hijo and Manat with a total service area of 9,000 ha.	Development of irrigation facilities in two subprojects of Libuganon and Kipaliku with a total service area of 4,500 ha.
II. Agricultural Development	Establishment of two Irrigation Management Pilot Demonstration farms, one covering Libuganon and Kipaliku subprojects and the other covering Hijo and Manat subprojects.	Establishment of one Irrigation Management farm covering Libuganon and Kipaliku subprojects.
III. Soil Conservation and Watershed Management	Implementation of a soil conservation and watershed management pilot program covering about 1,500 ha in Hijo and Manat watershed.	Implementation of a comprehensive soil conservation and watershed management program in the Libuganon watershed. The program includes reforestation of 600 ha, development of agroforestry on 1,200 ha presently under shifting cultivation, and rehabilitation and control of gullies, slides, and road cuts in prime problem areas.
IV. Rural Water Supply	Construction of 274 level I and 2 level II deep tubewells and 1,050 shallow tubewells.	Construction of about 200 level I and level II deep tubewells and 1,000 shallow tubewells, including rehabilitation of installed tubewells that are yielding nonpotable water.
V. Rural Health Services	Construction of 18 Barangay Health Stations (BHS) with provisions for equipment and medicines.	Construction of 10 BHS with provision for equipment and medicines.
VI. Schistosomiasis Control Program	Provision of drugs and medicines and distribution of 7,000 water-sealed toilet bowls.	Provision of drugs and medicines and distribution of 5,000 water-sealed toilet bowls.
VII. Consulting Services	Provision of 51 man-months of individual foreign consultants as follows: (i) irrigation engineering - 18 man-months; (ii) soil conservation - 30 man-months; and (iii) water supply engineering - 3 man-months.	Provision of 78 man-months of consultants in irrigation engineering (41 man-months), soil conservation (26 man-months) and water supply (11 man-months).

IMPLEMENTATION SCHEDULE, PROJECTED AND ACTUAL



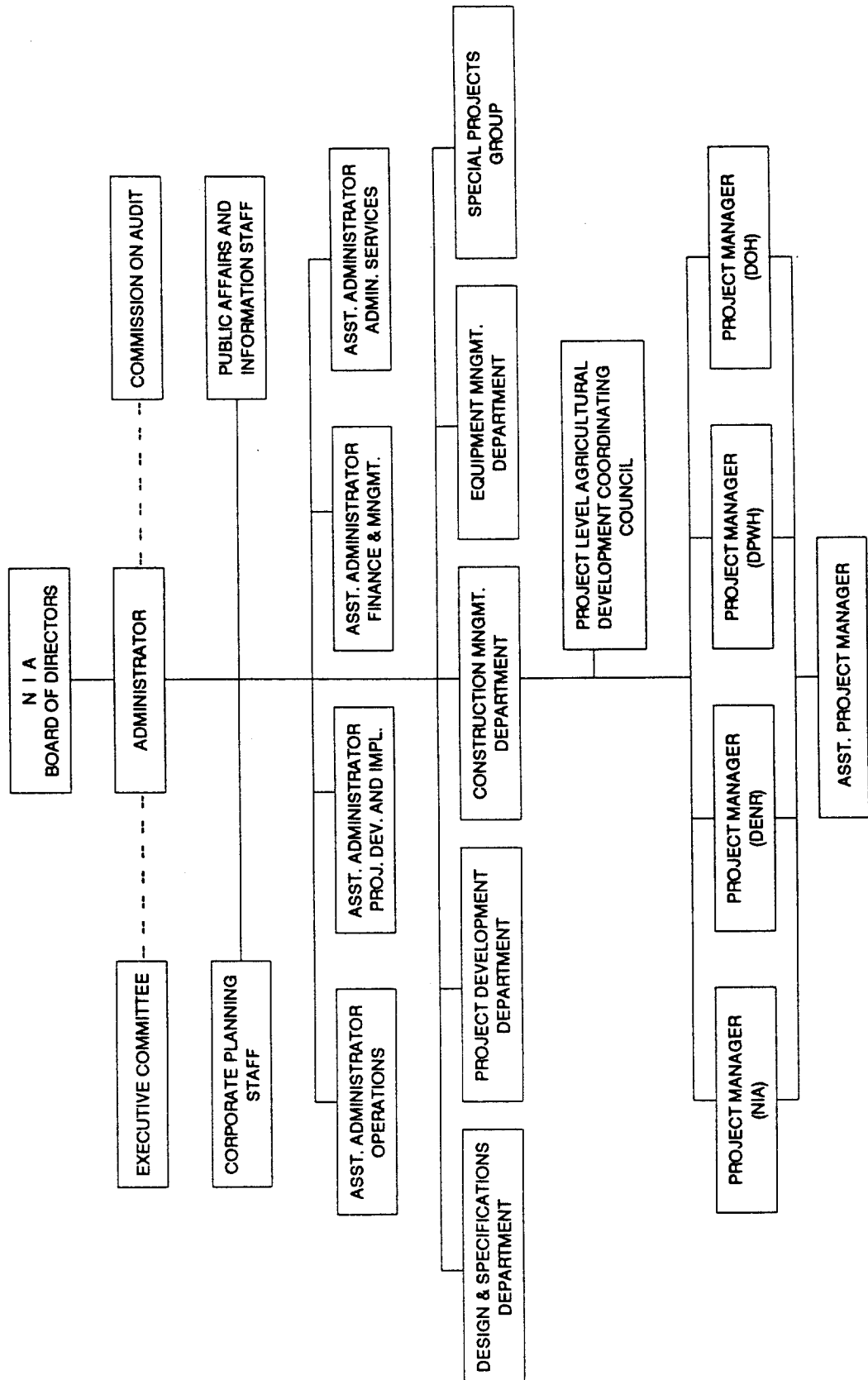


COMPARATIVE SUMMARY OF MAJOR PROJECT FEATURES

Items	Unit	At Appraisal	As Reformulated	Actual	Remarks
I. IRRIGATION					
A. Libuganon Subproject					
1. Service Area	Ha	1,900	1,069	1,069	831 ha consisting of peaty soil has been deleted from the service area as this area is not suitable for rice cultivation.
2. Diversion Works	Unit	-	-	-	
3. Main Canal					
a) Left Bank					
- Earthen	Km	12.0	11.5	11.5	
- Concrete Lined	Km	1.6	-	-	
4. Lateral/Sublaterals					
a) Left Bank					
- Earthen	Km	16.5	5.4	5.4	
5. Irrigation & Drainage Structures	Unit	76	51	51	
6. Road Structures	Unit	8	11	11	
7. Turnouts	Unit	48	38	38	
8. Drainage Facilities					
a) Improvement	Km	35.0	21.7	21.7	
b) New Construction	Km	19.0	4.2	4.2	
9. On-Farm Facilities					
a) Main Farmditch	Km	159.0	29.5	29.5	
b) Farm Drain	Km	48.0	7.5	-	
B. Kipailku Subproject					
1. Service Area	Ha	2,800	2,800	2,800	To be done by farmers.
2. Diversion Works	Unit	1	1	1	
3. Feeder Cum Canal	Km	Not Indicated	0.8	0.8	
4. Tunnel	Unit	Not Indicated	1	1	
5. Improvement of Salao Creek	Km	Not Indicated	10.0	10.0	
6. Lunga-og Check Dam	Unit	1	1	1	
7. Afflux Dike					
a) Left	Km	Not Indicated	0.8	0.8	
b) Right	Km	Not Indicated	0.3	0.3	
8. Main Canal					
a) Left Bank	Km	10.7	4.3	4.3	
- Earthen	Km	Not Indicated	0.7	0.7	
- Concrete Lined	Km	Not Indicated	3.7	3.7	
b) Right Bank	Km	Not Indicated	9.4	9.4	
- Earthen	Km	Not Indicated	-	-	

Items	Unit	At Appraisal	As Reformulated	Actual	Remarks
9. Lateral/Sublateral					
a) Left Bank	Km	33.0	8.8	8.8	
- Earthen	Km	Not indicated	8.8	8.8	
- Concrete Lined	Km	Not indicated	-	-	
b) Right Bank	Km	Not indicated	8.1	5.8	Adequate as per site condition. Work to be done - excavation only (2.5 km)
- Earthen	Km	Not indicated	8.1	3.8	
- Concrete Lined	Km	-	2.0	2.0	
10. Irrigation & Drainage Structures	Unit	122	81	70	To be constructed by administration - 11 units
11. Road Structures	Unit	8	38	38	12 units to be constructed by Admin.
12. Turnouts	Unit	90	72	60	
13. Drainage Facilities					
a) Improvement	Km	41.0	83.8	88.8	7 km to be completed
b) New Construction	Km	14.0	-	-	
14. On-Farm Facilities					
a) Main Farmditch	Km	217.0	77	-	To be constructed by administration.
b) Farm Drain	Km	72.0	16	-	To be constructed by farmers.
C. Hilo Subproject		-	Deleted from the original Project scope.	-	The subproject was found nonfeasible because of continued degradation of watershed due to mining works.
D. Manat Subproject		-	- do -	-	- do -
II. AGRICULTURAL DEVELOPMENT					
III. SOIL CONSERVATION & WATERSHED MANAGEMENT					
IV. RURAL WATER SUPPLY					
V. RURAL HEALTH SERVICES					
VI. SCHISTOSOMIASIS CONTROL PROGRAM					
VII. CONSULTING SERVICES					
1 pilot demo farms	2 pilot demo farms	Establishment of soil conservation and watershed management measures for about 1,500 ha.	Reforestation of 800 ha; development of agroforestry on 1,200 ha; rehabilitation and control of gullies and construction of access roads.	Reforestation of 800 ha; development of agroforestry on 1,200 ha; rehabilitation and control of gullies and construction of access roads.	143 checkdams for control of gullies and hillside slopes were constructed.
200 Level I and 2 Level II deep tubewells; 1,000 shallow tubewells, including rehabilitation of installed tubewells not yielding potable water.	274 Level I and 2 Level II deep wells; 1,050 shallow tubewells.	18 Barangay Health Stations (BHS); equipment & medicine	200 Level I and 2 Level II deep tubewells; 1,000 shallow tubewells, including rehabilitation of installed tubewells not yielding potable water.	200 Level I and 2 Level II deep tubewells; 1,000 shallow tubewells, including rehabilitation of installed tubewells not yielding potable water.	403 Level I tubewells were rehabilitated.
16 BHS; equipment & medicine	18 BHS; equipment & medicine	10 BHS; equipment & medicine	16 BHS; equipment & medicine	16 BHS; equipment & medicine	Additional 6 BHS were constructed for the health care of the people in the communities within the Project area. Cost of the BHS was within the provision of the Loan proceeds.
Drugs, medicines, distribution of 7,000 water-sealed toilet bowls	Drugs, medicines, distribution of 7,000 water-sealed toilet bowls	Drugs, medicines, distribution of 5,000 water-sealed toilet bowls	Drugs, medicines, distribution of 5,000 water-sealed toilet bowls	Completed as per reformulated Project scope.	
51 man-months of individual foreign consultants.	51 man-months of individual foreign consultants.	78 man-months.	78 man-months.	78 man-months.	

ORGANIZATION CHART
(NATIONAL IRRIGATION ADMINISTRATION)



COMPARISON OF ESTIMATED AND ACTUAL PROJECT COSTS
(\$ 000)

Component	At Appraisal			Actual		
	FX	LC	Total	FX	LC	Total
I. <u>Civil Works</u>						
a. Irrigation	8,727	20,445	29,172	1,485	2,805	4,290
b. Rural Water Supply	142	406	548	303	451	754
c. Rural Health Services	94	311	405	29	106	135
d. Schistosomiasis Control	10	27	37	3	14	17
e. Watershed Rehabilitation	79	157	236	146	1,304	1,450
II. <u>Equipment and Supplies</u>						
a. Construction and maintenance equipment for irrigation	4,271	202	4,473	1,890	45	1,935
b. Drilling equipment and T/W materials for rural water supply	1,305	56	1,361	488	8	496
c. Laboratory equipment, vehicle and medicines for schistosomiasis and health services	333	339	672	1,050	184	1,234
d. Equipment vehicles and supplies for watershed rehabilitation	193	524	717	250	455	705
III. <u>Agricultural Department</u>	259	778	1,037	29	180	209
IV. <u>Consulting Services</u>						
a. Irrigation	395	90	485	142	23	165
b. Watershed Management	344	73	417	200	80	280
c. Rural Water Supply	34	8	42	76	143	219
V. <u>Project Design and Administration</u>	481	4,743	5,224	-	3,878	3,878
Total Base Cost	<u>16,467</u>	<u>28,159</u>	<u>44,626</u>	<u>6,091</u>	<u>9,676</u>	<u>15,767</u>
VI. <u>Physical Contingencies</u>	<u>1,772</u>	<u>2,935</u>	<u>4,707</u>	-	-	-
VII. <u>Price Escalation</u>	<u>3,561</u>	<u>9,606</u>	<u>13,167</u>	-	-	-
Total cost	<u>22,000</u>	<u>40,700</u>	<u>62,700</u>	<u>6,091</u>	<u>9,676</u>	<u>15,767</u>
Interest	13,300	-	13,300	8,500	-	8,500
TOTAL	35,300	40,700	76,000	14,591	9,676 ^{a/}	24,267 ^{a/}

FX - Foreign exchange; LC - local currency

^{a/} This included \$0.532 million being the cost of remaining works.

STATUS OF LOAN UTILIZATION
(\$)

	Original Allocation	Revised Allocation (1991)	Actual Disbursement as of 28 April 1992
I. <u>Civil Works</u>			
a. Steel bars, major gates steel casings pipes and pumps	3,200,000	821,000	384,000
b. Contract works	5,220,000	1,060,000	719,000
c. Force account works	2,250,000	608,000	828,000
II. <u>Equipment, Vehicles and Medical Supplies</u>	5,182,000	3,675,000	3,677,000
III. <u>Survey and Investigation</u>	42,000	41,000	41,000
IV. <u>Consulting Services</u>	573,000	417,000	417,000
V. <u>Local Expenditures for:</u>			
a. All civil works	10,000,000	2,788,000	2,274,000
b. Planting materials, supplies and incremental staff cost for soil conservation and watershed management	-	820,000	778,000
VI. <u>Detailed Design</u>	200,000	70,000	70,000
VII. <u>Interest and Commitment Charge During Construction</u>	13,300,000	8,500,000	8,500,000
VIII. <u>Unallocated</u>	5,333,000	-	-
Total	45,300,000	18,800,000	17,688,000

Note: The loan balance of \$ (18.8 - 17.1) million
\$1.1 million was cancelled effective 28 April 1992.

COMPLIANCE WITH LOAN COVENANTS

Covenants	Status
<u>Use of Proceeds of the Loan</u>	
1. The Borrower shall make the proceeds of the Loan available to the Executing Agencies in such amount as shall be required by each of them to carry out its respective part of the Project, upon terms and conditions satisfactory to the Bank. (L.A., Article III, Section 3.01)	Partly complied with. Due to budget constraint, initially the Project implementation has been delayed by the lack of counterpart funds. In this connection the Bank released \$2.0 million under SPIAL (Loan Nos. 778/780).
2. The Borrower shall make, or cause to be made, available, promptly as needed, and in accordance with an implementation schedule acceptable to the Bank, the funds facilities, services, lands and other resources which are required, in addition to the proceeds of the Loan, for the carrying out of the Project and for the operation and maintenance of the Project facilities. (L.A., Article IV, Section 4.02)	Complied with.
<u>Responsibility for the Project</u>	
3. NIA shall be responsible for the implementation of Part A and Part B of the Project as well as the administration of part of the consulting services. It shall be responsible for all designs and civil works for the diversion dams, irrigation and drainage canals and their related control structures and the pilot demonstration farms. (L.A., Schedule 6, para. 1)	Complied with.
4. DPWH shall be responsible for the implementation of Part C of the Project and the recruitment and administration of the consulting services required for the implementation of this Part of the Project. (L.A., Schedule 6, para. 2)	Complied with.
5. DOH, through its Health Office and the Schistosomiasis Control Team both located at Tagum in the Project area shall be the Executing Agency for Part D and Part E of the Project. The Regional Director of DOH for Region XI will coordinate the implementation of these Parts of the Project. (L.A., Schedule 6, para. 3).	Complied with.
6. DENR through Bureau of Forestry Development (BFD) shall be responsible for the carrying out of Part F of the Project under the supervision of the Regional Director and shall be responsible for the administration of the consultancy services relating to its Part of the Project. (L.A., Schedule 6, para. 4).	Complied with.

(Reference in text: page 8, para. 33)

Covenants	Status
<u>Project Office</u>	
7. NIA shall take necessary steps to establish a Central Project Office (CPO) at Tagum and two suboffices at Mawab and Sto. Tomas prior to the effective date. These offices shall be adequately staffed with experienced personnel. The CPO shall be headed by a Project Manager who shall be appointed by NIA in consultation with the Bank within three months of the effective date. (L.A., Schedule 6, para. 5)	One CPO - complied with; two suboffices deleted because of the cancellation of Hijo and Manat subprojects.
8. DPWH and DENR through BFD shall also each establish a suitably staffed Project Office at Tagum within three months of the effective. Each of these Project Offices shall be headed by an Officer-in-charge. These Officers in-charge shall coordinate with the Project Manager on matters concerning the Project. (L.A., Schedule 6, para. 6)	Complied with.
<u>Coordination of the Project</u>	
9. At the national level, responsibility for the overall coordination of the Project shall rest with the National Agricultural Development Coordinating Committee. (L.A., Schedule 6, para. 7)	Initially complied with. Presently, coordination is being carried out through municipal and provincial agriculture and fisheries council.
10. At the provincial level, a Project Agricultural Development Coordinating Committee (PADCC) shall be establish within three months of the effective date. The PADCC shall be comprised of the senior representatives of the regional and/or provincial offices of concerned ministries and agencies and shall be responsible for coordination at the Project implementation level. The Project Manager shall chair the PADCC and NIA shall provide the Secretariat. (L.A., Schedule 6, para. 8)	Complied with.
<u>Agricultural Development Program</u>	
11. In order to strengthen the agricultural extension activities, the borrower shall appoint 23 additional Agricultural Production Technologists (APTs) in order to attain the APT/Farm Family ratio of 1:150 for double cropped irrigated rice production areas. These APTs shall be appointed by 31 December 1985. (L.A., Schedule 6, para. 9)	Complied with.
<u>Agricultural Development Program</u>	
12. The Borrower shall cause NIA, in cooperation with other concerned agencies, to formulate a five-year comprehensive agricultural development program (1990-1995) for the Project area by 31 December 1988 and shall cause the program to be submitted promptly to the Bank for its approval. (L.A., Schedule 6, para. 10)	Complied with.

Covenants	Status
<u>Irrigator's Associations</u>	
13. Irrigator's Associations shall be established in the Project Area with the assistance of NIA in accordance with a timetable to be agreed between the borrower and the Bank. These Associations shall be entrusted with activities, such as, the operation and maintenance of the terminal facilities, collection of irrigation fees and water management of the irrigation systems under the technical guidance of NIA. (L.A., Schedule 6, para. 11)	Complied with.
<u>Marketing Cooperatives and Storage Facilities</u>	
14. The Borrower shall take appropriate steps to strengthen existing marketing cooperatives in the Project area and marketing arms of Samahang Nayon not later than 31 December 1986. The Borrower shall also ensure that sufficient post harvest facilities including storage facilities shall be available on a timely basis throughout the Project area. (L.A., Schedule 6, para. 12)	Being complied with. The Government marketing policy has now been changed in Davao del Norte. Instead of the National Food Authority, the farmers' cooperatives procure the paddy from the farmers and the cooperatives sell the paddy to the private traders. This arrangement has enabled the farmers to get higher prices.
<u>Rural Water Supply</u>	
16. The Borrower shall cause DPWH to submit to the Bank for approval within three months of the Effective Date a detailed implementation plan, including site selection, construction schedules and schedules for procurement of necessary equipment for the implementation of Part C of the Project. (L.A., Schedule 6, para. 14)	Complied with.
<u>Rural Health Service</u>	
17. The Borrower shall cause DOH to submit to the Bank for approval within three months of the effective date, a detailed implementation schedule for procurement of necessary facilities and materials for the construction of 18 barangay health stations. The Borrower shall ensure that these barangay health stations shall, upon completion, be adequately staffed and supplied with vaccines, drugs and other materials and equipment. (L.A., Schedule 6, para 15[a]).	Complied with.

Covenants	Status
18. As part of the Schistosomiasis Control Program provided for the Project, the Borrower shall cause DOH to provide a fully staffed, trained and equipped schistosomiasis control team for the Project area. A detailed implementation plan and procurement schedule for instruments and equipment shall be prepared by DOH and submitted to the Bank for approval within three months of effective date. (L.A., Schedule 6, para. 15[b]).	Complied with.
<u>Soil Conservation and Watershed Management</u>	
19. The Borrower shall cause DENR through BFD to submit to the Bank for approval, within three months of the effective date, a detailed implementation plan, including site selection, construction schedules and schedules for procurement of necessary equipment for the implementation of Part F of the Project. (L.A. Schedule 6, para. 16)	Complied with.
<u>Water User's Groups</u>	
20. The Borrower shall cause DPWH, through its Provincial Office and Rural Water Works Development Corporation, to organize water user's groups in the Project area and to provide assistance to these groups in the operation and maintenance of the rural water supply systems in the Project Area. (L.A. Schedule 6, para. 17).	Complied with.
<u>Land Acquisition</u>	
21. The Borrower shall cause to be acquired lands, rights-of-way, easements, licenses and other rights and privileges, including water rights, which are required for the implementation of the Project and the operation of the Project facilities in sufficient time to avoid delay in the implementation of the project. (L.A., Schedule 6, para. 18).	Partly complied with. The acquisition of the submerged area of Lunga-og has yet to be completed.
<u>Land Reform</u>	
22. The Borrower shall accord high priority to the completion of its land reform program in the Project area. Except as the Bank may otherwise agree, the Borrower shall ensure that the tenants in the Project area who are, under the present land reform law, eligible to own the land they till will have received a Land Transfer Certificate by 31 December 1987 and that all other tenants shall have become leaseholders under written leasehold contracts by the same date so as to enable them to have fixed rentals and security of tenure. (L.A., Schedule 6, para. 19).	Complied with.

Covenants	Status
<u>Pollution Control</u>	
23. The Borrower shall cause its Bureau of Mines and Geosciences and its National Pollution Control Commission to enforce effectively all applicable pollution control laws and regulations so as to ensure that the implementation and operation of mines or mining contractors in the catchment area of the rivers contributing to the irrigation systems developed under the Project. (L.A., Schedule 6, para. 20).	Not complied with. Government noncompliance with the covenant has led to deletion of the two subprojects from the irrigation component.
<u>Credit Facilities</u>	
24. The Borrower shall ensure that the short-term production credit facilities of Masagana 99 and other credit institutions of the Borrower operating within the Project area shall be strengthened. (L.A., Schedule 6, para. 21)	Being complied with. Credit facilities are being obtained through Land Bank of the Philippines and rural banks.
<u>Revolving Fund</u>	
25. The Borrower shall establish, or cause to be established, a Revolving Fund for the purpose of assisting in making adequate amounts of local currency available on a timely basis for the purposes of Parts A and B of the Project. The Revolving Fund shall be established with an authorized depository bank of the Borrower within the Philippines. (L.A., Schedule 6, para. 22[a])	Complied with.
26. The Revolving Fund shall be operated and maintained in accordance with terms and conditions mutually agreed upon between the Borrower and the Bank. In particular, each contribution by the Bank to the Revolving Fund shall be subject to the prior deposit into the Revolving Fund of the corresponding contribution by the Borrower. (L.A., Schedule 6, para. 22[b])	Complied with.
<u>Project Benefit, Monitoring and Evaluation</u>	
27. (a) The Borrower shall conduct, or cause to be conducted, a series of socioeconomic surveys in the Project area for the purpose of monitoring the benefits of the Project. One such survey shall be carried out by the benefit, monitoring and evaluation unit of NIA at the end of the construction phase of the Project.	(a) Complied with.
(b) A final survey shall be carried out not later than five years after completion of the Project facilities by the agency to be determined by the Borrower.	(b) To be complied with.

Covenants	Status
<u>Operation and Maintenance</u>	
<p>28. The Borrower shall adequately maintain the irrigation and drainage systems, building and other facilities provided under the Project, and shall make necessary repairs thereto after completion of the Project. The Borrower shall also provide the funds, facilities, services and other resources necessary to effect such maintenance. Upon completion of the Project, responsibility for the operation and maintenance of the irrigation and drainage facilities of the Project shall be transferred to the NIA Regional Office in Davao with an appropriate transition period of about one year. Responsibility for the operation and maintenance of the other facilities to be provided under the Project including the social services and soil conservation and watershed management program shall be transferred to the appropriate ministry or agency of the Borrower upon completion of these facilities. (L.A. Schedule, 6, para. 24)</p>	Being complied with.
<u>Irrigation Service Fees</u>	
<p>29. NIA shall collect irrigation service fees from the Project beneficiaries in accordance with its existing regulations and with the assistance of the Irrigators Associations. In this connection, the Borrower shall promptly complete its ongoing review of the Consultants' study on appropriate levels of irrigation service fees, which was carried out for NIA in 1981. Following completion of this review, the Borrower and NIA shall consult with the Bank regarding the implementation of recommendations in accordance with an agreed schedule. (L.A., Schedule 6, para. 25).</p>	Being complied with.
<u>Transfer of Equipment</u>	
<p>30. The Borrower shall cause NIA to transfer the construction equipment which is no longer required for the Second Davao del Norte Irrigation Project by January 1983. (L. A., Schedule 6, para. 26)</p>	Complied with.

Covenants	Status
<u>Accounts, Audits and Reports</u>	
31. The Borrower shall maintain records and accounts adequate to identify the goods and services financed out of the proceeds of the Loan, to disclose the use thereof in the Project, to record the progress of the Project (including the cost thereof) and, to the extent relevant to the Project, to reflect in accordance with consistently maintained sound accounting practices the operations and financial condition of NIA and the other agencies of the Borrower responsible for the carrying out of the Project and the operation of the Project facilities, or any part thereof. (L.A., Article IV, Section 4.06[a]).	Complied with.
32. The Borrower shall cause each Project Executing Agency to establish and maintain separate Project accounts in respect of their parts of the Project for which each agency is responsible for the preparation and maintenance of consolidated Project accounts. (L.A., Article IV, Section 4.06[b]).	Complied with.
33. These accounts shall be audited annually, in accordance with sound auditing principles, by auditors acceptable to the Bank. The reports of the auditors, including certified financial statements shall be submitted to the Bank for review within six months after the end of each fiscal year. NIA with the cooperation and assistance of DOH, DENR and DPWH, shall prepare and submit to the Bank semi-annual reports on Project implementaiton. (L.A., Article IV, Section 4.07[b])	Complied with.
34. Promptly after completion of the Project, but in any event not later than six (6) months after the closing date for withdrawals from the Loan account or such later date as may be agreed for this purpose between the Borrower and the Bank, the Borrower shall prepare and furnish to the Bank a report in such form and in such detail as the Bank shall reasonably request, on the execution and initial operation of the Project, its cost and the benefits derived and to be derived from it, the performance by the Borrower of its obligations under the Loan Agreement and the accomplishment of the purposes of the Loan. (L.A., Article IV, Section 4.07[c]).	Being complied with.

ESTIMATED CROP YIELDS

Future Without Project				With Project			
Crop	Area (ha)	Yield (mt/ha)	Production (mt)	Crop	Area (ha)	Yield (mt/ha)	Production (mt)
Libuganon:				Libuganon:			
Wet Season				Wet Season			
Rainfed Paddy	1,239	4.0	4,956	Irrigated Paddy ^{a/}	1,069	5.2	5,559
Rainfed Corn	236	0.7	165				
Subtotal Wet Season	1,475		5,121	Subtotal Wet Season	1,069		5,559
Dry Season				Dry Season			
Rainfed Paddy	160	3.5	560	Irrigated Paddy	1,069	5.0	5,345
Rainfed Corn	452	0.8	362				
Subtotal Dry Season	612		922	Subtotal Dry Season	1,069		5,345
Kipaliku:				Kipaliku:			
Wet Season				Wet Season			
Rainfed Paddy	1,712	4.0	6,848	Irrigated Paddy	2,000	5.2	10,400
Rainfed Corn	326	0.7	228	Banana	600	25.0	15,000
Banana							
Subtotal Wet Season	2,038		7,076	Subtotal Wet Season	2,600		25,400
Dry Season				Dry Season			
Rainfed Paddy	222	3.5	777	Irrigated Paddy	2,000	5.0	10,000
Rainfed Corn	624	0.8	499	Banana	600	25.0	15,000
Banana							
Subtotal Dry Season	846		1,276	Subtotal Dry Season	2,600		25,000
Total Wet Season	3,513		12,197	Total Wet Season	3,669		30,959
Total Dry Season	1,458		2,198	Total Dry Season	3,669		30,345
Annual Total	4,971		14,395	Annual Total	7,338		61,304
Total paddy			13,141	Total paddy			31,304
Total corn			1,254	Total banana			30,000
Total paddy and corn			14,395	Total paddy and banana			61,304
Cropping Intensity (%)	141			Cropping Intensity (%)	200		

^{a/} The service area under Libuganon was reduced to 1,069 ha after the exclusion of 831 ha with peaty soils.

**COMPUTATION OF ECONOMIC PRICES OF
INTERNATIONALLY TRADED COMMODITIES**

Item	Paddy	Corn	Urea	TSP	MP
1992 Commodity prices					
World market value FOB (\$/mt) ^{a/}	290	105	143	121	112
Quality factor adjustment	0.80	1.00	1.00	1.00	1.00
Adjusted FOB value (\$)	232	105	143	121	112
Freight/Insurance (\$)	39	44	50	50	50
Value CIF Manila port (\$)	271	149	193	171	162
Port dues/handling/etc. (\$) ^{b/}	10	10	10	10	10
Value CIF Davao (Pesos) ^{c/}	7,025	3,975	5,075	4,525	4,300
Handling/transportation/storage ^{d/}	116	116	116	116	116
Value ex-store/market	7,141	4,091	5,191	4,641	4,416
Less: transport/handling to market ^{e/}	129	129	129	129	129
Processing ratio	0.67	0.90			
Farmgate price	4,698	3,566	5,062	4,512	4,287
Farmgate price (P/kg 1992 real value) ^{f/}	4.70	3.57	5.06	4.51	4.29
Price per kg nutrient (Pesos) ^{g/}	-	-	11.00	9.40	7.15
1982 Commodity prices, 1992 real terms					
Farmgate price (P/kg 1992 real value) ^{g/}	9.72	7.87	11.66	9.78	5.61
Price per kg nutrient (Pesos) ^{g/}	-	-	25.35	20.37	9.36

TSP - triplesuper phosphate; MP - muriate of potash

^{a/} World Bank: Revised Commodity Price Projections, November 9, 1992.

Price bases:

Rice: Thai, milled, 5% broken, FOB Bangkok.

Yellow Corn: FOB Gulf ports.

Urea: FOB NW Europe.

TSP: FOB US Gulf

MP: FOB Vancouver

^{b/} Includes wharfage dues, storage, arrastre and stevedoring charges.

^{c/} Exchange rate: \$1:P25

^{d/} Average of 90 km at P1.50/mt/km converted to border values by SCF=0.86.

^{e/} Average of 30 km at P5.00/mt/km converted to border values by SCF=0.86.

^{f/} Economic value in 1992 peso value.

^{g/} Computed economic value based on FOB prices used in the economic analysis of the Appraisal Report (1982), Appendix 20, which were converted to 1992 constant prices using the World Bank Index of International inflation.

ECONOMIC RETURNS PER HECTARE, WITH AND WITHOUT PROJECT
(\\$)

Item	Without Project				With Project			
	Paddy Wet Season	Paddy Dry Season	Corn Wet Season	Corn Dry Season	Paddy Wet Season	Paddy Dry Season	Banana Wet Season ^{a/}	Banana Dry Season ^{a/}
Yield/ha (mt/ha)	4.0	3.5	0.7	0.8	5.2	5.0	25.0	25.0
Value of Production	752	658	100	114	977	940	1,700	1,700
Cost of Production:								
Materials:								
Seeds	20	17	2	3	29	33	-	-
Fertilizer	9	8	14	17	33	29	-	-
Chemicals	12	10	3	3	19	21	-	-
Fuel and Oil	3	3	3	4	4	5	-	-
Irrigation					18	27	-	-
Subtotal	44	38	22	27	103	115	-	-
Labor:								
Land Preparation	28	24	16	17	48	48	-	-
Cultivation, etc.	175	147	27	29	210	220	-	-
Subtotal	203	171	43	46	258	268	-	-
Total Production Cost	247	209	65	73	361	383	1,000	1,000
Net Farm Income	505	448	35	41	616	557	700	700

a/ Data provided by Timog Agricultural Corporation.

(Ha)

DS - Dry Season
WS - Wet Season
Pd - Paddy
Bn - Banana

a/ As reformulated, the service area under Libuganon is 1,060 ha.

b/ Upon completion of the repair to Lunga-og Dam and completion of remaining works.

TYPICAL ECONOMIC RETURNS PER 2-HA FARM
(\\$)

Item	"Without" Project	"With" Project ^{a/}
Cropped Area (ha)		
Wet Season		
Paddy	1.75	1.70
Corn	0.25	
Banana		0.30
Dry Season		
Paddy	0.20	1.70
Corn	0.60	
Banana		0.30
Cropping Intensity	140	200
Yield per ha (mt)		
Wet Season		
Paddy	4.0	5.2
Corn	0.7	
Banana		25.0
Dry Season		
Paddy	3.5	5.0
Corn	0.8	
Banana		25.0
Total Farm Production (mt)		
Wet Season		
Paddy	7.00	8.84
Corn	0.18	
Banana		7.50
Dry Season		
Paddy	0.70	8.50
Corn	0.48	
Banana		7.50
Gross Production Value		
Wet Season		
Paddy	1,316	1,662
Corn	25	
Banana		525
Dry Season		
Paddy	132	1,598
Corn	69	
Banana		525
<i>Total Gross Production Value</i>	1,541	4,310
Production Cost		
Wet Season		
Paddy	432	614
Corn	16	
Banana		300
Dry Season		
Paddy	42	651
Corn	44	
Banana		300
<i>Total Production Cost</i>	518	1,865
Annual Net Farm Income	1,023	2,445 ^{b/}

^{a/} At full development.

^{b/} Distribution of net farm income: Paddy--75%; Banana--25%.

MAJOR ASSUMPTIONS USED FOR ECONOMIC ANALYSIS

A. Economic Impact

1. Economic Life of the Project and Development Period

1. The economic life of the Project was assumed to be 30 years from its completion in 1993. Full development was assumed to be attained about five years after the completion of Project construction.

2. Economic Costs

2. The economic investment costs include all capital O&M costs expressed in 1992 constant prices. An O&M cost of about \$20 per ha was estimated for maintenance, cleaning, clearing, etc. of irrigation canals and other field-level facilities.

3. Economic Benefits

3. Only direct quantifiable benefits were considered in the calculation of the EIRR. These were represented by the value of incremental production of paddy and banana resulting from (i) an increase in cropping intensity from 141 per cent ^{1/} to 200 per cent; ^{2/} (ii) an increase in paddy yields from 4.0 mt/ha to 5.2 mt/ha and 3.5 mt/ha to 5.0 mt/ha, respectively, during the wet and dry seasons; and (iii) conversion of 600 ha of paddy area into banana production with an average annual yield of 50 mt/ha.

4. At appraisal, paddy yields (under rainfed condition) were estimated at about 2.7 mt/ha and 2.1 mt/ha for the wet season and dry season, respectively. Rainfed paddy yields, within the Project area, have increased since then to 4.0 mt/ha in the wet season and 3.5 mt/ha in the dry season as farmers' adopted improved varieties and cultural practices, (i.e., applied fertilizer and chemicals), and gained access to improved extension services. These paddy yields were used as the base yields ("without" Project situation) in the computation of the EIRR. Irrigated paddy yields at full Project development were projected at 4.4 mt/ha and 4.6 mt/ha for the wet and dry seasons, respectively, at appraisal. Current irrigated paddy yields, however, have increased to 5.2 mt/ha in the wet season and 5.0 mt/ha in the dry season; these have exceeded wet and dry season projected yields at full development by about 20 per cent and 10 per cent, respectively. Given the (i) continuing assistance provided by the Department of Agriculture to farmer-beneficiaries regarding the proper application of new rice technology, (ii) provision of adequate irrigation water under the Project, and (iii) availability of fertilizer and chemicals through credit services provided by farmers' cooperatives, it was assumed that full development yields will be at least within current irrigated paddy yield levels. The computation of the incremental paddy yields was based on the following information:

^{1/} At Appraisal, cropping intensity was defined as the sum of the wet and dry season cultivated rainfed areas divided by the wet season cultivated rainfed area.

^{2/} Cropping intensity based on the area development schedule of the Project is the sum of the wet and dry season irrigated areas divided by the total irrigable area.

Season	Rainfed Paddy Yields "Without" Project	Irrigated Paddy Yields "With" Project
Wet Season	4.0 mt/ha	5.2 mt/ha
Dry Season	3.5 mt/ha	5.0 mt/ha

5. Based on estimates of project crop yields, i.e., paddy and banana, (Appendix 8), agricultural prices (Appendix 9), economic returns per ha (Appendix 10), and irrigated area development (Appendix 11), the average annual income, in 1992 peso value, of a typical 2.0 ha farm was projected to increase from about \$1,023 to about \$2,445 per year at full Project development, which is about 8 per cent higher than the 1985 poverty income threshold of \$2,255, expressed in 1992 real terms.

4. Prices of Inputs and Outputs

6. For all commodities, 1992 prices were used in the economic analysis after adjustment was made to arrive at the price at farmgate level. Paddy and corn prices as well as prices of fertilizers were derived from the Revised Commodity Price Projections (9 November 1992) of the World Bank. The economic prices of these commodities are presented in Appendix 9. Since banana is grown by farmers on a contract basis, an average "contract price" of ₱1.70/kg banana (as provided by the Timog Agricultural Corporation) was used in the computation of the value of banana production.

5. Economic Internal Rate of Return

7. On the basis of the directly quantified benefits and costs described above, the Project is expected to yield an EIRR of about 7 per cent. Using the same prices of all commodities at appraisal and converting these to 1992 constant prices, an EIRR of about 13 per cent was estimated which was comparable with that computed at appraisal of 14 per cent. The deviation in EIRR is a consequence of the considerable (i) delay in Project implementation, and the subsequent delay in the attainment of full development; and (ii) decline in the world market price of paddy since appraisal in 1982. Paddy price at Appraisal, in 1992 real terms, was more than twice than that in 1992. Assuming that NIA funds for O&M of the irrigation systems are just adequate for attaining a cropping intensity of 164 per cent, further analysis resulted in an EIRR of about 4 per cent.

B. Social Impact

8. The benefits derived from the successful implementation of the health care, schistosomiasis control and rural water supply components were mainly reflected by improvement in the quality of life of the residents in the Project area. For example, the provision of rural water supply systems to about 24,400 households has considerably improved sanitary conditions in the Project area. Moreover, the incidence of schistosomiasis has significantly declined from 9.6 per cent in 1985 to 1.9 per cent in 1990, largely because of the effective implementation of the schistosomiasis prevention and control program. About 80 per cent of the 250,300 persons within the Project area have been examined for schistosomiasis infection, and approximately 310,800 persons have benefited from the regular training programs and lectures on health care as well as prevention and control of schistosomiasis. The incidence of other waterborne diseases and common ailments such

as diarrhea, malaria, leprosy, respiratory infection, etc., which otherwise would have gone untreated without the Project, has likewise declined substantially as more people (about 33,000 persons) have availed of the services provided by the BHSs. Farmer-beneficiaries have indicated that, resulting from improved sanitation and health conditions in the Project area, their capacity to undertake various income-generating activities has substantially increased.

9. A substantial amount of income was generated by employment of approximately 3,900 man-years of skilled and unskilled labor during the implementation of all of the components of the Project which, in turn, has increased economic activities and income within the Project area. In the longer term, an increase in the annual agricultural employment of about 1,200 man-years would be generated from the increase in agricultural productivity at full Project development.

C. Environmental Impact

10. The Project has also significantly improved the environmental conditions in the Project area. Some arable areas that were under grass and bushes have been converted into irrigated rice farms and provided with proper drainage facilities in order to reduce flooding and improve drainage. Soil conservation and watershed management activities have effectively controlled soil erosion at the upper watershed areas of the Libuganon subproject area and have minimized sedimentation in its canal system. The reforestation and agroforestry program has stabilized severely eroded areas in the Libuganon watershed and thus has protected the irrigation facilities at the Libuganon subproject area. About 4,700 persons within the Project area have been trained on forest protection and management and have been deriving income from the fruit trees established under the agroforestry program.

EQUIPMENT PROPOSED AT APPRAISAL AND AS PROCURED

Items	Appraisal No. of Units	Actual No. of Units
I. <u>Irrigation and Drainage (NIA)</u>		
A. <u>Construction Equipment</u>		
Dozer, 180 HP angle	2	0
Dozer, 140 HP tilt angle	2	0
Dozer, 90 HP swampy	2	0
Dozer, 90 angle	4	0
Backhoe, 0.8 m ³ crawler	4	5
Backhoe, 0.38 m ³ crawler	8	2
Backhoe, 0.35 m ³ truck mounted	7	10
Crane, 18 T crawler	1	0
Crane, 18 T truck mounted	1	1
Motor Grader, 135 HP	2	1
Pneumatic roller, 25 T	1	0
Vibratory roller	3	1
Front end loader, 1.4 m ³	4	0
Truck trailer, 20 T	1	0
Dump truck, 6 m ³	20	5
Mobile workshop	1	0
Fuel tanker, 8000 liters	1	0
Fuel tanker, 6000 liters	1	1
Stake truck, 6 T		0
Boom Truck, 6 T	1	0
Lubrication truck	2	0
Jeep	4	0
Pick-up truck	2	2
Washing and screening plant, 20 T	1	0
Forklift	2	0
Plate compactor	3	3
Concrete mixer, 0.3 m ³	6	0
Concrete mixer, 0.16 m ³	2	0
Centrifugal pump, 10" Ø	1	0
Centrifugal pump, 50 mm Ø	4	2
Centrifugal pump, 250 mm Ø	3	2
Concrete vibrator, 2" Ø	1	0

(Reference in text: page 11, para. 48)

Items	Appraisal No. of Units	Actual No. of Units
B. <u>Survey Equipment</u>		
Distance meter (Electronic Total Station)	1	1 set
Level	6	2
Transit, Engineers	0	2
C. <u>Hydrological Equipment</u>		
Suspended load sampler	2	0
Bed load sampler	2	0
D. <u>Project Facilities Equipment</u>		
Communication System	Lump sum	0
Workshop equipment	Lump sum	0
Generator, 50 KVA	2	0
Micro-computer	1	2
E. <u>Laboratory Equipment</u>		
Material testing equipment	Lump sum	lot
F. <u>Pilot Demonstration Farms</u>		
Single Axle tiller 4-6 HP	6	0
Thresher, 1 ton/hr	4	0
Drier	2	0
Water pump and accessories	2	0
Knapsack sprayer	10	0
Service jeep	2	0
Service pick-up	2	0
Motorcycle	4	13
Audio-visual equipment	2 sets	0
Meteorological instruments	2 sets	2 sets
Office equipment and supplies	Lump sum	0
G. <u>Others</u>		
Office equipment copier) Equipment not	2
Air compressor) specified and	2
Bench shaper machine) number of units	2
Various shop tools) not indicated	lot
Reinforcing steel bars - Weiser		lot

Items	Appraisal No. of Units	Actual No. of Units
II. <u>Rural Water Supply (DPWH)</u>		
Percussion drilling rig	1	0
Mounted Percussion drilling rig	0	2
Portable Rotary drilling rig	3	0
Water level indicator	1	0
Water analysis kit	1	0
Workshop equipment	Lump sum	0
Air compressor	1	0
Jeep	1	2
Pick-up	1	2
Stake truck	1	1
Maintenance Truck	0	1
Rehabilitation existing equipment	Lump sum	0
III. <u>Rural Health Services (DOH)</u>		
Motorcycles	0	2
Medical equipment and supplies	Lump sum	lots
Minor Office Equipment	0	lot
IV. <u>Schistosomiasis Control (DOH)</u>		
A. <u>Equipment</u>		
Microscope	5	7
Centrifuge, electrical	1	0
Centrifuge, manual	1	0
Refrigerator	1	3
Audio-visual mobile unit	1	0
Jeep (diesel)	2	5
Water pump, electrical	1	0
Minor Office equipment/Supplies	Lump sum	lots
Motorcycles	0	1
Power Sprayer	0	2
Overhead Projector	0	1
Portable Generator	0	1
B. <u>Medical Supplies and Chemicals</u>		
Drugs	10,333 ds	lots
Molluscicide	200 kg	lots
Cercariacide	1950 kg	lots

Items	Appraisal No. of Units	Actual No. of Units
V. <u>Soil Conservation (DENR)</u>		
Two-wheeled Tractor	0	1
Cargo Truck	0	1
4 WD Toyota Hilux	0	5
Motorcycles	0	9
Dump Truck	0	1
Survey instruments and equipment	Lump sum	lot
Transportation equipment	Lump sum	lots
Office equipment and supplies	Lump sum	lot
Miscellaneous equipment	Lump sum	lots
VI. <u>Transferrable Construction Equipment</u>		
Dozer, 140 HP angle	1	0
Dozer, 160 HP tilt swampy	4	16
Dozer, 160 HP tilt crawler	7	12
Dozer, 140 HP tilt angle	4	0
Dozer, 180 HP crawler	0	6
Dozer, 90 HP swampy	2	2
Dozer, 90 HP angle	2	3
Backhoe, 0.35 m ³ truck mounted	1	0
Backhoe, 0.35 m ³ crawler	0	3
Backhoe, 0.80 m ³ crawler	0	8
Crawler crane, 18 T	1	1
Truck mounted crane, 18 T	1	1
Motor Grader, 135 HP	2	1
Pneumatic roller	4	1
Vibratory roller	3	2
Front end loader, 1.75 m ³	2	2
Front end loader, 1.4 m ³	1	1
Crawler Excavator, 1.5m ³	1	22
Truck Trailer, 20 T	1	1
Dump Truck, 6 m ³	5	0
Dump Truck, 4 m ³	3	0
Mobile Workshop	1	0
Fuel Tanker, 6,000 liters	1	1
Fuel Tanker, 8,000 liters	1	1
Stake Truck, 6 T	3	1

Items	Appraisal No. of Units	Actual No. of Units
Boom truck, 6 T	2	1
Lubrication Truck	1	1
Jeep	5	9
Pick-up truck	8	6
Motorcycles	25	13
Washing and Screening plant	1	0
Concrete Mixer, 0.30 m ³	2	0
Concrete Mixer, 0.16 m ³	6	4
Centrifugal Pump, 10" Ø	2	0
Centrifugal Pump, 3" Ø	3	0
Centrifugal Pump, 50 mm Ø	6	10
Centrifugal Pump, 250 mm Ø	2	1
Concrete vibrator, 2" Ø	3	3
Concrete vibrator, 38 mm Ø	16	5
Plate compactor	1	1
Water tanker, 8,000 liters	0	2