

RESTRICTED

PCR:PHI 16115

**ASIAN DEVELOPMENT BANK**

*This Report has been prepared for  
the exclusive use of the Bank.*

**PROJECT COMPLETION REPORT**

**OF THE**

**HIGHLAND AGRICULTURE DEVELOPMENT PROJECT  
(LOAN NO. 802-PHI/196-PH)**

**IN THE**

**PHILIPPINES**

**July 1994**

## CURRENCY EQUIVALENTS

Currency Unit - Philippine Peso (P)

### Appraisal Report (October 1986)

P1.00 = \$0.049

\$1.00 = P20.38

### Project Completion Report (April 1994)

P1.00 = \$0.036

\$1.00 = P27.60

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

BAS	-	Bureau of Agricultural Statistics
BES	-	Buguis Experiment Station
BPI	-	Bureau of Plant Industry
BOS	-	Bureau of Soils
BSU	-	Benguet State University
CAR	-	Cordillera Administrative Region
CIS	-	Communal Irrigation System
DA	-	Department of Agriculture
DENR	-	Department of Environment and Natural Resources
DPWH	-	Department of Public Works and Highways
EIRR	-	Economic Internal Rate of Return
FO	-	Farmer Organization
HARRDEC	-	Highland Agriculture Resources and Research Development Consortium
IA	-	Irrigators' Association
IFAD	-	International Fund for Agricultural Development
IPM	-	Integrated Pest Management
NIA	-	National Irrigation Administration
O&M	-	Operation and Maintenance
PBME	-	Project Benefit Monitoring and Evaluation
PMO	-	Project Management Office
RFK	-	Revolving Fund-in-Kind
SPS	-	Seed Potato Storage
TA	-	Technical Assistance
TFP	-	Timpuyog Farm Program
TRB	-	Technical Review Board
YIP	-	Youth Involvement Program

## 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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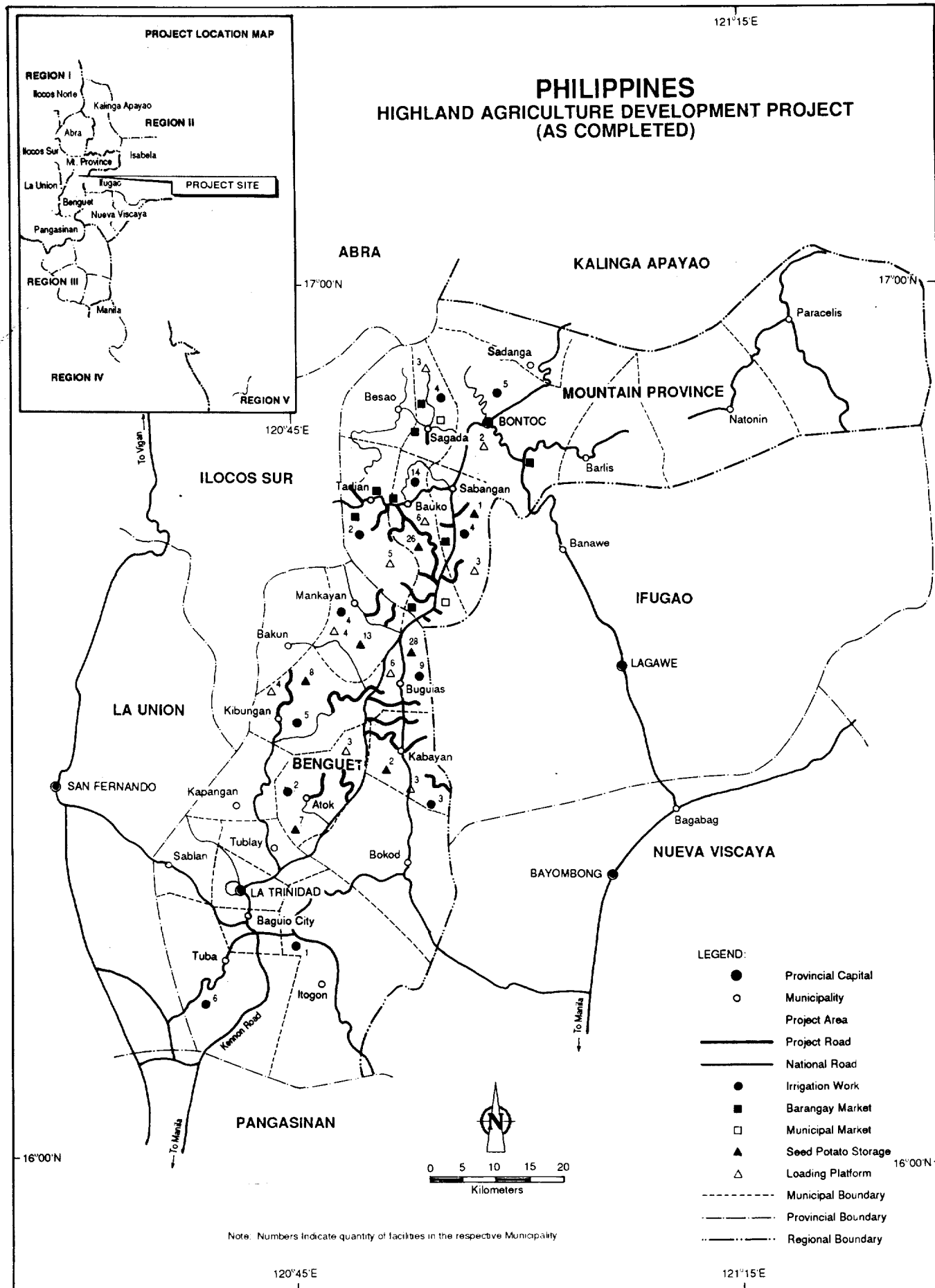
IN THE

PHILIPPINES

Note: This Report was prepared by a Bank Mission that visited the Project areas and offices of the executing agencies and other implementing agencies from 16 March to 3 April 1994. The Mission comprised Messrs. Suntraporn R. na Phuket (Livestock Specialist/Mission Leader), T. Matsuo (Economist), R. McKillop (Rural Development Expert/Consultant), A. Alam (Engineer Economist/IFAD Consultant), and Ms. V. Ignacio (Senior Clerk).

## Table of Contents

	<u>Page</u>
Map - Project Location	ii
Basic Data	iii
<b>I. Project Description</b>	<b>1</b>
Objectives, Scope and Rationale	1
<b>II. Evaluation of Implementation</b>	<b>1</b>
A. Project Components	1
B. Implementation Arrangements	9
C. Project Costs	10
D. Project Schedule	10
E. Engagement of Consultants, and Procurement of Goods and Services	11
F. Performance of Consultants, Contractors and Suppliers	11
G. Conditions and Covenants	11
H. Disbursements	12
I. Environmental Impact	12
J. Project Benefits	13
K. Performance of Borrower and Executing Agencies	14
L. Performance of the Bank	15
<b>III. Conclusions and Recommendations</b>	<b>15</b>
A. Conclusions	15
B. Recommendations	16
<b>Appendixes</b>	<b>18</b>



**BASIC DATA****A. *Loan Identification***

- |    |                    |   |  |
|----|--------------------|---|--|
| 1. | Country            | – | Philippines  |
| 2. | Loan Number        | – | Bank: 802–PHI<br>IFAD: 196PH   |
| 3. | Project Title      | – | Highland Agriculture Development Project   |
| 4. | Borrower           | – | Republic of the Philippines  |
| 5. | Executing Agencies | – | Department of Agriculture (DA)<br>Department of Public Works and Highways (DPWH) |
| 6. | Amount of Loan     |   |  |
|    | Bank               |   |  |
|    | Original           | – | \$18.80 million  |
|    | Actual             | – | \$18.43 million  |
|    | IFAD               |   |  |
|    | Original           | – | \$4.60 million   |
|    | Actual             | – | \$4.15 million   |

**B. *Loan Data***

- |    |                            |   |                   |
|----|----------------------------|---|-------------------|
| 1. | Appraisal                  |   |                   |
|    | – Date Started             | – | 25 August 1986    |
|    | – Date Completed           | – | 18 September 1986 |
| 2. | Loan Negotiations          |   |                   |
|    | – Date Started             | – | 22 October 1986   |
|    | – Date Completed           | – | 27 October 1986   |
| 3. | Date of Board Approval     |   |                   |
|    | Bank                       | – | 25 November 1986  |
|    | IFAD                       | – | 3 December 1986   |
| 4. | Date of Loan Agreement     |   |                   |
|    | Bank                       | – | 23 December 1986  |
|    | IFAD                       | – | 22 January 1987   |
| 5. | Date of Loan Effectiveness |   |                   |
|    | Bank                       |   |                   |
|    | In Loan Agreement          | – | 23 March 1987     |
|    | Actual                     | – | 22 June 1987      |
|    | No. of Extensions          | – | 2                 |
|    | IFAD                       |   |                   |
|    | In Loan Agreement          | – | 22 April 1987     |
|    | Actual                     | – | 21 August 1987    |
|    | No. of Extensions          | – | 1                 |

6. Closing Date <sup>a</sup>**Bank**

In Loan Agreement	–	30 September 1992
Actual	–	31 December 1993
Number of Extensions	–	1

**IFAD**

In Loan Agreement	–	30 September 1992
Actual	–	31 December 1993
Number of Extensions	–	1

## 7. Terms of Loan

**Bank**

Interest Rate	–	interest rate determined in accordance with the pool-based variable lending rate system, and with a commitment charge of 0.75 per cent per annum.
Maturity	–	30 years
Grace Period	–	5 years

**IFAD**

Interest Rate	–	4 per cent per annum on the amount of the Loan withdrawn and outstanding from time to time and special commitment at the rate of 0.5 per cent per annum.
Maturity	–	15 years

## 8. Disbursements

## (a) Dates

	<u>Initial Disbursement</u>	<u>Final Disbursement</u>	<u>Time Interval</u>
Bank	30 December 1987	11 May 1994	6 years, 5 months
IFAD	1 August 1988	11 May 1994	5 years, 9 months
	<u>Effective Date</u>	<u>Original Closing Date</u>	<u>Time Interval</u>
Bank	23 March 1987	30 September 1992	5 years, 6 months
IFAD	22 April 1987	30 September 1992	5 years, 5 months

- a The loan accounts have been kept open until 11 May 1994 to accommodate pending withdrawal applications for civil works, equipment and services contracted prior to the loan closing date of 31 December 1993.

(v)

(b) Amount (\$)

		Original Allocation	Revised Allocation	Net Amount Disbursed	Undisbursed Balance
Category					
<b>Bank</b>					
I.	Civil Works				
	A. Rural Roads	1,996,000	2,245,127	2,066,623	178,504
	B. Soil Conservation	7,000	5,361	4,619	742
II.	Construction Materials				
	A. Communal Irrigation Systems	1,060,000	1,541,741	1,650,353	(108,612)
	B. Footbridges	72,000	72,000	322,267	(250,267)
III.	Equipment and Vehicles	1,238,000	1,366,751	1,360,549	6,202
IV.	Consulting Services	465,000	121,600	124,188	(2,588)
V.	Overseas Training	40,000	27,306	27,306	—
VI.	Operational Costs (Project Management)	37,000	60,874	60,643	231
VII.	Local Currency Expenditures				
	A. Civil Works (Irrigation)	1,261,000	1,628,190	1,377,948	250,242
	B. Civil Works (Rural Roads)	5,578,000	6,287,055	5,881,928	405,127
	C. Civil Works (Soil Conservation)	42,000	32,930	28,371	4,559
	D. Construction Materials (Irrigation)	147,000	218,984	246,605	(27,621)
	E. Construction Materials (Footbridges)	17,000	17,000	48,155	(31,155)
	F. Equipment and Vehicles	163,000	7,896	4,515	3,381
	G. International Consulting Services	80,000	1,664	1,664	—
	H. Local Consulting Services incl. PBME	1,736,000	1,345,428	1,428,553	(83,125)
	I. Local Training (Irrigation)	64,000	28,294	4,119	24,175
	J. Operational Costs (Project Management)	512,000	804,314	805,684	(1,370)
VIII.	Interest and Commitment Charges During Construction	2,958,000	2,958,000	2,958,000	—
IX.	Prior Technical Assistance Cost	75,000	29,485	29,485	—
X.	Unallocated	1,252,000	—	—	—
	<b>TOTAL</b>	<b>18,800,000</b>	<b>18,800,000</b>	<b>18,431,575</b>	<b>368,425</b>



(vi)

		Original Allocation	Last Revised Allocation <sup>a</sup>	Net Amount Disbursed	Undisbursed Balance
Category					
<b>IFAD</b>					
I.	Civil Works				
	A. Agricultural Research and Extension	345,000	435,282	417,147	18,135
	B. Agricultural Marketing	469,000	1,810,056	1,715,929	94,127
II.	Construction Materials				
	A. Agricultural Extension	41,000	70,732	6,212	64,520
	B. Agricultural Marketing	1,095,000	491,657	306,355	185,301
III.	Equipment, Vehicles, Tools, Materials and Farm Inputs				
	A. Agricultural Extension	593,000	852,012	692,330	159,681
	B. Agricultural Marketing	73,000	224,269	73,298	150,970
IV.	International Consulting Services	720,000	1,040,143	519,235	520,907
V.	Training	321,000	468,249	417,366	50,884
VI.	Unallocated	943,000	—	—	—
	<b>TOTAL</b>	<b>4,600,000</b>	<b>5,392,399</b>	<b>4,147,873</b>	<b>1,244,526</b>
9.	Local Costs (Financed)		<b>Bank</b>	<b>IFAD</b>	
	— Amount (\$)	—	9,827,542	2,653,262	
	— Percentage of Local Costs	—	65%	18%	
	— Percentage of Total Costs	—	39%	10%	

C. *Project Data (\$'000)*

	Appraisal Estimate	Actual
1. <i>Project Cost</i>		
(a) Foreign Exchange	12,400,000	10,463,262
(b) Local	14,500,000	15,021,089
(c) Total Cost	<u>26,900,000</u>	<u>25,484,351</u>

a The difference in the total amounts between the original and revised allocation is due to the increase in SDR/US Dollars exchange rate.

2. *Financing Plan*(i) *Implementation Costs*

	Appraisal Estimate			Revised			Actual		
	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
(a) Borrower Financed	3,000	—	3,000	3,000	—	3,000	2,540	—	2,540
(b) Bank—Financed	9,600	6,242	15,842	10,372	5,470	15,842	9,827	5,646	15,473
(c) IFAD—Financed	1,900	2,700	4,600	2,998	2,395	5,393	2,653	1,495	4,148
(d) Total	<u>14,500</u>	<u>8,942</u>	<u>23,442</u>	<u>16,370</u>	<u>7,865</u>	<u>24,235</u>	<u>15,020</u>	<u>7,141</u>	<u>22,161</u>

(ii) *IDC Costs*

	Appraisal Estimate			Revised			Actual		
	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
(a) Borrower Financed	—	500	500	—	500	500	—	365	365
(b) Bank—Financed	—	2,958	2,958	—	2,958	2,958	—	2,958	2,958
(c) IFAD—Financed	—	—	—	—	—	—	—	—	—
(d) Total	<u>—</u>	<u>3,458</u>	<u>3,458</u>	<u>—</u>	<u>3,458</u>	<u>3,458</u>	<u>—</u>	<u>3,323</u>	<u>3,323</u>

3. *Cost Breakdown by Project Components*

	Appraisal Estimate			Revised			Actual		
	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
(a) Irrigation	1,344	1,500	2,844	2,221	1,976	4,197	1,906	2,082	3,988
(b) Roads	5,231	2,946	8,177	7,728	3,273	11,001	7,182	3,343	10,525
(c) Agricultural Support Services									
Marketing	807	1,330	2,137	2,136	1,100	3,236	1,988	449	2,437
Research and Extension	1,777	927	2,704	2,435	1,301	3,736	2,751	1,050	3,801
(d) Project Management	767	452	1,219	983	187	1,170	988	187	1,175
(e) Taxes and Duties	866	—	866	866	—	866	206	—	206
(f) Contingencies	3,708	1,712	5,420	—	—	—	—	—	—
(g) Prior TA Cost	—	75	75	—	29	29	—	29	29
(h) IDC									
Bank	—	2,958	2,958	—	2,958	2,958	—	2,958	2,958
IFAD	—	500	500	—	500	500	—	365	365
(i) Total	<u>14,500</u>	<u>12,400</u>	<u>26,900</u>	<u>16,369</u>	<u>11,324</u>	<u>27,693</u>	<u>15,021</u>	<u>10,463</u>	<u>25,484</u>

4. *Project Schedule*

	Appraisal Estimate	Actual
(a) Date of contract with consultants		
(i) Road Consultants	January 1987	October 1987
(ii) Road Specialist	January 1987	October 1987
(iii) Irrigation Specialist	May 1987	October 1987
(iv) Marketing Specialist	January 1987	June 1988
(v) Research and Extension Specialist	July 1987	April 1988
(vi) Project Management Specialist	January 1987	July 1988
(vii) Further Project Preparation	March 1989	January 1990
(viii) PBME	not mentioned	June 1989
(b) Completion of Engineering Designs		
(i) Irrigation	April 1990	December 1992
(ii) Roads	July 1990	September 1989
(iii) Marketing Facilities	not mentioned	December 1987
(iv) Seed Potato Storage	not mentioned	February 1988

	Appraisal Estimate	Actual
(c) Civil Works Contract		
– Date of Award		
(i) Roads	August 1987	December 1988
(ii) Marketing Facilities	May 1987	April 1988
(iii) Seed Potato Storage	July 1987	April 1988
– Completion of Work		
(i) Roads	June 1991	June 1994
(ii) Marketing Facilities	June 1991	March 1993
(iii) Seed Potato Storage	June 1991	February 1994
(d) Equipment and Supplies Date		
– First Procurement	January 1987	May 1988
– Last Procurement	December 1988	December 1993
(e) Other Milestone		
– Reallocation of Loan Proceeds	–	March 1992
– Cancellation of Loan Savings	–	May 1994

#### D. *Data on Bank Missions*

Name of Each Mission	Date	No. of Persons	No. of Mandays	Specialization of Members <sup>1</sup>
Appraisal	25 August–18 September 1986	6	150	c, d, e, f, j, k
Inception	24–27 August 1987	2	6	f, n
Review	20–27 May 1988	2	14	h, f
Review	17–26 January 1989	2	20	h, n
Special Proj. Adm.	9–12 October 1989	2	8	h, d
Review	22–31 January 1990	2	18	h, n
Review	10–19 December 1990	3	20	h, b, l <sup>2</sup>
Review	24–31 May 1991	1	7	f
Review	27 January – 6 February 1992	4	44	f, k, l, n
Special Proj. Adm.	21–25 June 1992	1	4	f
Special Proj. Adm.	6–8 October 1992	1	3	i
Special Proj. Adm.	24–25 February 1993	2	4	a, b
Review <sup>3</sup>	13–19 April 1993	2	14	i, m
Special Proj. Adm.	22–29 November 1993	2	14	i, n
Project Completion Review	16–30 March 1993	5	62 <sup>4</sup>	i, g, k, l, n

<sup>1</sup> a – Deputy Director, AGD, b – Manager, AG1, c – Senior Project Engineer, d – Senior Economist, e – Senior Country Officer, f – Engineer, g – Economist, h – Financial Analyst, i – Livestock Specialist, j – Counsel, k – Consultant, l – IFAD representative, m – Senior Assistant, n – Senior Clerk, Project Administration.

<sup>2</sup> The Manager, AG1 participated during 12–14 December 1990.

<sup>3</sup> The Mission was held concurrent with the Fact-Finding Mission for T.A. 1915–PHI: Second Highland Agriculture Development Project.

<sup>4</sup> The Consultant participated in the Mission from 27 March to 2 April 1994.

## I. PROJECT DESCRIPTION

### Objectives, Scope and Rationale

1. The main objective of the Highland Agriculture Development Project (HADP) was to increase the production of already established crops including vegetables and rice in the Project area, which comprised 13 municipalities located in Benguet and Mountain provinces of the Cordillera Administrative Region (CAR) and covered an area of 252,000 hectares (ha) of which only about 15,000 ha was permanently cultivated. To achieve this objective, the Project was to expand the area served by communal irrigation systems, improve access to markets, and strengthen agricultural support services.
2. The scope of the Project included: **Part A** - construction of 32 new communal irrigation systems (CISs) serving about 1,640 ha of vegetable lands and rehabilitation of 24 existing CISs covering about 580 ha of traditional subsistence rice areas; **Part B** - construction of 88 kilometers (km) of new barangay<sup>1</sup> roads and rehabilitation of 125 km of existing national, provincial and barangay roads; **Part C** - (i) strengthening of agricultural support services including research, extension, marketing information, seed production, and soil conservation; and (ii) construction of marketing facilities and loading platforms at various locations; and **Part D** - (i) establishment of a Project Management Office (PMO); and (ii) provision of consulting services and training. The Project was financed jointly by the Bank and the International Fund for Agricultural Development (IFAD).
3. The Project objectives supported the Government's development goal of revitalizing the agriculture sector by simultaneously addressing the problems of depressed incomes, low productivity, and underemployment among the poorest segments of the farming communities. The Project was expected to increase production, improve farmers' incomes, and, at the same time, reduce the development gap between highland and lowland agriculture in the Philippines.

## II. EVALUATION OF IMPLEMENTATION

### A. Project Components

4. The Project began in 1987, but experienced delays because of the difficulties encountered in operating in rugged terrain, the slow release of funds, and cost overruns. A review in January 1990 found that the original scope of the Project was too large, particularly the length of the rural roads and the size of the CISs, and the scope was reduced. More revisions were made in May 1991 and March 1992 in response to the impact of the earthquakes in July 1990 and the damage caused by typhoons.
5. These three revisions changed most of the components. The CIS service area was reduced from 2,215 ha to 1,901 ha, but the number of CISs increased from 56 to 59. The length of rural roads was reduced from 213 km to 152 km. The major changes in the agricultural support services component included a reduction in the number of seed potato storage (SPS) units from 180 to 85 and the substitution of fourteen 1 ha soil conservation demonstration plots for three 10 ha plots. The loan proceeds were also reallocated, and the allocation for the rural

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<sup>1</sup> The smallest local government unit.

roads and CIS components was increased. In 1993, the Bank also approved additional facilities to raise *Diadegma* (a parasitic wasp) for the integrated pest management (IPM) program to control diamond-back moths in crucifer vegetables (common cabbage, Chinese cabbage and brocolli) and support for eight special studies. The appraisal and revised targets, and the actual achievements are summarized in Table 1.

**Table 1: Physical Achievements of HADP**

Components	Unit	As Appraised (1986)	Jan 90	As Revised May 91	Feb 92	As Completed 31 Mar 94
<b>A. Communal Irrigation System</b>						
CIS	No.	56	64	59	59	59
Area Irrigated	ha	2,215	2,136	1,886	1,901	1,966
<b>B. Rural Roads</b>						
(a) Roads	km	213	195	195	152	156.7 <sup>a</sup>
(b) Road Bridges	No.	10	10	9	9	6 <sup>b</sup>
(c) Foot Bridges	No.	13	12	12	9	9
<b>C. Agricultural Support Services</b>						
(a) Research						
On-station	No.	6	6	4	4	4
On-farm:						
PMO Coordinated	No.	64	39	39	31	31
PMO Conducted	No.	-	-	-	34	142
Diadegma house	No.	-	-	-	-	1
(b) Extension						
Nurseries	No.	26	26	25	26	26 <sup>c</sup>
Soil Conservation Demo farms	No.	3 (10 ha each)	13 (1 ha each)	17 (1 ha each)	16 (1 ha each)	14 (1 ha each)
(c) Marketing						
Barangay Markets	No.	8	8	7	8	8
Municipal Markets	No.	2	2	1	2	2
Seed Potato Storage	No.	180	90	70	85	85
Metric tons (mt)		(9,000 mt)	(3,500 mt)	(2,520 mt)	(2,600 mt)	(2,603 mt)
Loading Platforms	No.	60	60	40	40	40
<b>D. Project Management Office</b>						
Bureau of Plant Industry (BPI) Building Extension	No.	-	1	1	1	1

<sup>a</sup> Out of which 28.9 km was estimated to be 90 per cent complete; the remaining works will be completed by July 1994.

<sup>b</sup> One bridge was completed in May 1994 and the remaining two will be completed in July 1994.

<sup>c</sup> One nursery was washed away by Typhoon Goring in 1989.

## Part A - Communal Irrigation Systems

6. As revised, the component included improvements to 59 CISs consisting of the construction of 40 new CIS covering 1,379 ha of vegetables and other commercial crops, and the rehabilitation of 19 CIS servicing about 520 ha of traditional subsistence rice production areas.

7. In all, 59 CISs with a total service area of 1,966 ha were improved, which included the construction of 42 new CISs with a service area of 1,561 ha and the rehabilitation of 17 CISs with a service area of 405 ha (see Appendix 1). The design and the quality of work executed by National Irrigation Administration (NIA) with farmers' participation was satisfactory. All CISs have been turned over to irrigators' associations (IAs) for operation and maintenance (O&M). Training has been provided for 295 IA members in: (i) financial management; (ii) basic leadership; (iii) bookkeeping; and (iv) systems management. The training has been effective and useful and has improved the O&M of most CISs. However, the training should have been reinforced by providing additional extension services as envisaged at appraisal.

8. The vegetable farmers have rapidly adopted the low-pressure sprinkler irrigation systems using light, flexible polyvinyl chloride pipes. These irrigation practices are appropriate for the conditions in the Project areas. In the rice growing areas, the farmer-managed water rotations are working well in the lined channels. However, 28 of the CISs (47 per cent) were damaged by typhoons in 1990, 1991, and 1993, and required major repairs. Fourteen of the damaged CISs have been repaired with funds (₱1.2 million) from the Project.<sup>1</sup>

9. The Project established sprinkler and drip irrigation systems to demonstrate modern and efficient irrigation techniques. However, the demonstration area was only 10 ha (5.5 ha during the dry season) for the sprinkler system and 5.6 ha for the drip irrigation compared with the 20 ha each envisioned at appraisal. The concept and objectives of the two demonstrations were not clear, their design was inadequate, and their locations inappropriate. Neither of the demonstrations covered its designed service area fully because of insufficient water supplies. The sprinkler demonstration was not successful because the farmers found the pipes were too heavy and rigid to shift in rugged terrain compared with the existing systems.<sup>2</sup> From the farmers' perspective, the drip irrigation were high-cost operations with limited application to their situation. Therefore, both demonstrations did not achieve the desired impact.

## Part B - Road Construction and Rehabilitation

10. The component was revised to include 152 km of rural roads, nine road bridges, and nine foot-bridges because of right-of-way problems and cost overruns. The construction program was divided into 15 contract packages.

11. Of the 15 awarded contract packages, 10 contract packages had difficulties because of the poor performance of the contractors. Six contract packages were rescinded, three were terminated and one was forfeited. Subsequently, these 10 contract packages were reduced to nine because part of contract package I was transferred to contract package X and the other part was cancelled because of environmental problems. Three of the nine contract

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<sup>1</sup> The estimated cost to repair the remaining 14 CISs is ₱3.1 million.

<sup>2</sup> Reported in "Project Completion Report for the Highland Agriculture Development Project," HADP Project Management Office, February 1994, p. 55.

packages were retendered and awarded to contractors and six were carried out under force account by the Department of Public Works and Highways (DPWH). One of the three retendered contract packages was terminated later and completed under force account.

12. Twenty-four roads with a total length of 156.7 km were improved under the 14 contract packages, which covered the construction of 41.4 km of new barangay roads and the rehabilitation of 98.5 km of barangay roads and 16.8 km of provincial roads. Ten of the roads (49.5 km) were completed and turned over to local government units, while ten roads (75.1 km) were completed, but still under the required one-year maintenance period. The remaining four roads (32.1 km) were substantially completed, but required some improvements, which will be completed by July 1994. In Mountain Province, the Provincial Office will be responsible for maintenance of the Project roads after the turn over, while in Benguet Province the five recipient municipalities will be responsible. These municipalities have formed a consortium and contributed a sum of ₱100,000 for the O & M of the Project's road construction equipment and vehicles transferred to them. The ability of the local government units to maintain Project roads will be assessed by DPWH and the report will be submitted to the Bank by 31 December 1994. The current status of the roads is shown in Appendix 2.

13. Of the nine road-bridges, seven were completed, and the remaining two will be completed by July 1994.<sup>1</sup> The approach road to a bridge on Road No. 29 was washed away by high floods in 1993. An additional four span, 42 meter (m) concrete slab single-lane bridge will be constructed and anchored to the existing bridge to replace the damaged road approach. All nine foot bridges were constructed and turned over to local government units.

14. In general, the designs for the roads and the construction methods used were satisfactory, but the construction quality of some specific sections of the roads was not satisfactory. The unpaved road gradients were too steep, which preclude the use of conventional vehicles; the slope protection was inadequate; and the drainage was poor. Subsequently, DPWH has rectified the defects in construction.<sup>2</sup> As of June 1994, the improvement work was substantially completed, and the remaining work will be completed in July 1994.

## **Part C - Agricultural Support Services**

### **1. Agricultural Research**

15. Under the Project, funds were provided to upgrade the physical facilities and to expand the seed production capability of the Buguias Experiment Station (BES),<sup>3</sup> of the Bureau of Plant Industry (BPI), so it could be the foundation seed production center for the CAR. A 50 metric ton (mt) capacity seed potato storage, a tube-well, and 5.5 km access road were constructed. During 1991-1993, BES produced about 75 mt of potato seeds as well as some other vegetable seeds, including 800 kilograms (kg) of radish and Chinese cabbage seeds during 1991-1993. Only about six ha of the 36 ha farm are regularly used because of the lack

<sup>1</sup> As of June 1994, the DPWH reported that the main frame of the two prefabricated bridges were launched and the remaining works will be completed by July 1994.

<sup>2</sup> Based on detailed Mission's recommendations for road improvement, which was recorded in the memorandum of understanding between DPWH and the Mission.

<sup>3</sup> Subsequent to appraisal, the station was renamed the Buguias Seed Farm and its function was changed as envisaged at appraisal.

of resources and related facilities. Therefore, the facilities provided under the Project has not been useful to BES as intended. The station needs to be strengthened to enable it to carry out the applied research (i.e., variety screening, soil and water management, and pest management) necessary to support vegetable production in the temperate highland area of CAR. Its seed multiplication function could be accomplished through contract with farmers.

16. In addition to the components envisaged at appraisal, the Project also provided a greenhouse and expanded the facilities used to raise *Diadegma* for the IPM program at Benguet State University (BSU).<sup>1</sup> A research outreach station was also established in Sagada by the Department of Agriculture (DA)-CAR with financial support from the Project. The station carried out studies on multistoried agro-forestry crop-livestock integration, rice-based fish farming and sloping agricultural land technology.

17. The agricultural research trials were initially coordinated by the Highland Agriculture Resources and Research Development Consortium (HARRDEC). However, the PMO found this arrangement unsatisfactory and it took a more active role in the implementation of research activities. Four on-station and 147 outreach research activities were undertaken.<sup>2</sup> Several of the outreach research activities generated results that have been adopted by farmers in the Project areas including: (i) the use of *Diadegma* for the biological control of diamond-back moth in crucifers as part of the IPM program; (ii) the introduction of gladiolus varieties with new colors and other improved flower varieties; and (iii) the use of wild sunflower compost to prevent zinc deficiency in rice. A recent finding of the study on the use of upright soil columns for growing strawberries is now ready for farmers' adoption. Moreover, the research on microtuber multiplication of potatoes generated promising improvements in propagation techniques. A private company is establishing facilities at La Trinidad to multiply foundation stock using the microtuber technology developed with support from the Project. This development offers the potential to overcome the lack of certified potato seed in the country.

## 2. Extension Services

18. The Project was to strengthen agricultural extension services through area teams (ATs) approach initiated by DA prior to the beginning of the Project. An AT was established in each of the 13 municipalities. The Project hired an agronomist and a sociologist for each AT to work with three existing DA extension staff who were seconded to the AT. However, instead of establishing 13 more ATs in year three to reach the target at appraisal of 26 ATs, an additional agriculturalist was hired for each existing team. The ATs assisted in the formation of farmer organizations (FOs), established demonstration plot, conducted outreach research, and provided other extension services.

19. A total of 191 FOs were formed with about 8,330 members. The FOs provided an institutional base and focal point for the extension programs. As an entry point for research and extension activities, farm inputs were supplied to cooperating farmers of selected FOs under a revolving fund-in-kind (RFK) program. In 1990, a modified model of the RFK program, the Timpuyog Farm Program (TFP), which provide extension services to about 15-25 clustered farms was introduced. Ninety-three FOs were provided with funds amounting to ₱6.23 million compared with the appraisal estimate of ₱5.4 million to finance farm inputs. The Project supported 3,493 farmers who have to repay their loans to the FOs so credit can be extended to

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<sup>1</sup> Approved by the Bank in 1993.

<sup>2</sup> In addition to the 35 outreach researches coordinated by HARRDEC.



the other members of the FOs. The repayment rate of RFK and TFP loans is about 76 per cent, which is satisfactory, because the primary function of the programs is to provide a linkage between extension services and farmers and to facilitate demonstrations. Because of the loan program, several FOs were able to expand their capital base and have been diversifying their activities in the general interest of their members and their communities. As of 31 March 1994, 4,413 farmers had benefited from the RFK/TFP. While this program demonstrated effective approaches to farmer involvement in research and extension programs, there is scope for improving the guidelines for their implementation, especially in determining the optimal number of loan recipients in a particular area for a cost-effective demonstration.

20. In addition, 26 barangay nurseries and worksheds envisaged at appraisal were established to provide a base for ATs' extension activities. However, one nursery was washed away by Typhoon Goring in 1989. About 23,700 seedlings of fruit bearing trees were produced and distributed to farmers or planted in soil conservation demonstration plots. The management of nurseries was turned over to FOs or cooperatives for operation. The performance of nurseries was mixed, depending on market demand, farmers' interest, water availability at the sites, and farmers' management skills. Successful nurseries made profits and continued to produce seedlings. Four FOs gave up their nursery operation and these were transferred to local government units.

21. Fourteen soil conservation demonstration farms of 1-ha each were established in 13 municipalities instead of three 10-ha plots as envisaged at appraisal. Soil conservation techniques and the use of sloping agricultural land technology packages were demonstrated. However, the demonstration would have had more impact if they had been conducted on farms located in a microwatershed and had involved the communities.

22. Although the IPM program was introduced in the latter stages of the Project (see para. 16), it was successful in demonstrating the control of diamond-back moth, a major pest of crucifer vegetables, and in reducing pesticide use. With the expansion of the facilities to raise *Diadegma* at BSU, cocoon production increased from 500 to 1,000 cocoons per day. Under the 1993 pilot program, eight farmer field schools were held with 243 participants to provide practical field training in IPM techniques throughout the vegetable season. *Diadegma* cocoon distribution was directed to those trained in IPM techniques to ensure their effective use. Radio programs, flip charts and comics were produced to support the IPM program. Participating farmers are now enthusiastic supporters of the IPM approach and claim that it has brought significant increases in the profitability of crucifer crops through reduced expenditure on pesticides. They also recognize the health benefits from reduced exposure to toxic pesticides.

23. The agricultural support services component included farmer training activities. In total, 322 training courses, field trips, and study tours were conducted for 11,315 farmers between 1987 and 1993. The training topics included institution-building for FOs and cooperatives, IPM for rice and vegetables, soil fertility, fertilizer applications, nursery management, and food processing. An objective assessment of the impact of training activities is lacking, although there is evidence of a strong demand by farmers to learn new skills and of their willingness to pay for the training. It is also noted that the capability of the ATs to meet this demand was constrained by funding problems, transport, and poor quality of the trainers, particularly their ability to relate the topics to the farmer's needs.

### 3. Agricultural Marketing and Storage

24. As envisaged at appraisal, two municipal markets and eight barangay markets were constructed and turned over to local agencies (the municipality, cooperatives, FOs or vendors associations) for operation and maintenance. Although, the purpose of the markets was to improve the collection and marketing of farm outputs, they are mostly used by vendors selling trade goods, including farm tools, with some farm produce also being traded. Vendors pay a small fee to use the market, but the collections are not sufficient to meet the maintenance cost. The deficit is covered by the operating agencies whose members are also beneficiaries of the facilities. The markets have generated benefits for local communities by reducing the travel times and expenses incurred in purchasing goods or selling produce.

25. The number of loading platforms and waiting sheds was reduced from 60 to 40 following a review of the actual requirements. At appraisal, it was recognized that the platforms should be located in areas where farm produce is still transported by bus. However, because of dynamic changes in the mode of transport in the Project area, a shift from buses to cargo jeepneys and trucks, most of the platforms are underutilized or used for other purposes.

26. As envisaged at appraisal, the Project strengthened the ongoing marketing assistance program of the Bureau of Agricultural Statistics (BAS)<sup>1</sup> by covering the incremental operating costs and providing equipment and training. Under that program the daily wholesale prices at the Baguio City Hanger Market and at the La Trinidad Vegetable Trading Post as well as farm gate prices were collected and the farmers were informed about the prices through radio broadcasts and price bulletin boards. This information was used by most vegetable farmers to make decisions<sup>2</sup> about when to harvest and market, and has helped farmers improve their bargaining positions. Unfortunately, the radio program was terminated when the Project was completed because of the lack of funds. This highlights the need to design such activities on a sustainable basis, with either cost-recovery provisions (e.g., sale of information leaflets through commercial channels) or assured long-term funding sources (e.g., sponsorship of radio programs).

27. The Project was also to strengthen the crop programming system introduced by BAS to prevent the oversupply of vegetables and a decline in prices. A pilot program was implemented by 40 cooperating farmers in five barangays. The results showed that although off-season production involved higher costs, it was profitable because prices were higher. Efforts to extend the system to more farmers were not successful because of the high risks of crop failure, difficulties in access to markets in the wet season, and the limited capability of local institutions to service and support specialized production patterns.

28. The capacity of SPS was scaled down from 9,000 mt to 2,603 mt, consisting of 50 units of 42 mt, 24 units of 17.5 mt and 11 units of 7.5 mt. All the SPS constructed were turned over to FOs. The SPSs are used by potato growers who pay a rental charge of ₱1 to ₱2 per kg, which will be used for amortization payments.

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<sup>1</sup> Formerly the Bureau of Agricultural Economics (BAECON).

<sup>2</sup> According to the special study, "Changes in Marketing Behavior as a Result of Road Construction and Marketing Assistance Program" (HADP, December 1993), nearly 97 per cent of farmers obtained price information through radio broadcasts.

## **Part D - Project Management**

### **1. Project Management Office (PMO)**

29. At appraisal, it was expected that a small PMO would be established within the DA Provincial Office at La Trinidad. The PMO would be headed by a Project Director from DA who would coordinate and supervise the activities of the full-time technical coordinators from the line agencies associated with Project implementation. However, during implementation, the PMO was established at the BPI Complex in Baguio City, the composition of the PMO staff was changed, and the functions of the PMO were expanded. The DA appointed technical coordinators for PMO and provided the required administrative and supporting staff under contractual arrangements. In addition, field staff appointed through the PMO were assigned to strengthen the ATs and to supplement the existing line agency staff. The number of PMO staff reached 154, of whom about 114 were contractual staff. Upon completion of the Project, all the PMO staff were retrenched, except for the 52 staff who were retained to assist with the ongoing TAs.<sup>1</sup>

30. As envisaged at appraisal, the PMO was responsible for the implementation of all the monitoring activities, including a project benefit monitoring and evaluation (PBME) system to provide timely information on the progress of the Project. Funds were also provided to PMO to undertake three special studies to help overcome specific implementation problems. The three special studies covered: (i) sociocultural behavior and its effect on crop diversification strategies; (ii) changes in marketing behavior as a result of the road construction and the marketing assistance program; and (iii) a comparison of traditional irrigators associations with those formed by NIA.

31. The benchmark survey of beneficiaries of the Project for PBME was undertaken through a contract with a local firm in 1989, about 18 months behind schedule. The three studies were conducted in late 1993 and the reports were submitted to the Bank in February 1994. The information in the studies was not objective and the analysis of the issues was not comprehensive. Also, the reports were submitted after the Project was completed, thus the studies did not help the management of the Project overcome specific implementation problems. Four additional special studies - commodity flow for highland vegetables, farming systems/TFP, area specific profiles, and the Mt. Data Gardens research project - were subsequently approved and funded under the IFAD loan. The report on the TFP was very professional and was used to highlight the Project's achievements. The other studies did not contain any analyses related to the Project.

### **2. Feasibility Study**

32. The Project included funds for consulting services to prepare another development project in the highlands of Northern Luzon during the last three years of the Project. A contract with a local consulting firm was awarded for 67.5 man-months of services to prepare the feasibility study. However, the feasibility study report did not meet the Bank's requirements. Subsequently, the Bank provided technical assistance to prepare a new feasibility study.<sup>2</sup>

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<sup>1</sup> TA No. 1915-PHI: Second Highland Agriculture Development Project, for \$550,000, approved on 26 July 1993 and TA No. 2019-PHI: Integrated Pest Management for Highland Vegetables, for \$600,000, approved on 15 December 1993.

<sup>2</sup> TA No. 1915-PHI.

### 3. Consulting Services and Training

33. A list of the consulting services provided under the Project is in Appendix 3. Only 52 person-months of the service of the international recruited consultants were used instead of the total 80 person-months planned. The service of the agricultural research-extension expert was reduced from 24 to 12 person-months and service of the project management specialist was terminated after four person-months instead of the planned 20 person-months because of unsatisfactory performance. On the other hand, the services of local experts were increased by 20 person-months because two additional PBME experts were engaged to assist the PMO in PBME work. A local consulting firm was contracted to assist DPWH the survey, design and construction supervision of the rural roads component. A total of 895 person-months consultant services were provided instead of the 420 person-months envisaged at appraisal because of the delays in civil works construction and the additional design work resulting from the 1990 earthquake and subsequent typhoons. Except for the services of the agricultural research-extension expert and the project management specialist, the consulting services were satisfactory and useful to the executing agencies.

34. Overseas training was provided for 38 Government officials. Ten officers from NIA received training in pressurized irrigation systems in the United States, rather than in other developing member countries as envisaged at appraisal. Twenty-eight DA staff participated in training workshops and study tours overseas (see Appendix 4). Local training was provided to 225 staff of DA and 96 staff of other related agencies and local government units. The staff of PMO, BAS and DA-CAR were trained in management, community organization, economics and marketing, nursery management, and IPM techniques throughout the Project period. The staff of DPWH, BAS and PMO received PBME training. The staff of BOS received training in microwatershed management, while NIA staff received in-service training in the design and operation of drip and sprinkler irrigation. The HARRDEC personnel were trained in research methodologies. All this training has helped build up the skills required for the activities under the Project among the staff concerned. An intensive, field-orientated training-of-trainers program in IPM for 36 agricultural technicians from the PMO, DA-CAR and local government units was particularly effective. However, some of the recipients of the overseas training programs left the Project before it was completed.

### B. Implementation Arrangements

35. The Project was implemented by two executing agencies: DPWH, which was responsible for rural roads component, Part B, and DA, which was responsible for Parts A, C, and D with Part A being implemented by NIA under special agreement between DA and NIA.

36. The Project management and coordination arrangements differed from those at appraisal. Then, it was envisaged that the PMO would be responsible for overall management and coordination of the Project at the working level with line agency coordinators (seconded from DA, DPWH, NIA and BAS) liaising with working groups within the concerned agencies. Instead, the PMO has its own coordinators who supervised the implementation of field programs under the agricultural support services component, which originally was the function of DA-CAR. This approach hindered the institutional strengthening objective and resulted in difficulties in sustaining the field programs once the Project was completed. Agricultural research and extension activities in the field increased as these capabilities were built up in PMO. However, this approach did not strengthen the research and extension capabilities of the agencies in CAR as planned at appraisal. When the agricultural extension functions were devolved to local government units in 1993, these weaknesses were compounded by budget constraints. The

experience of the Project indicates that existing institutions, with appropriate institutional strengthening, should have been used to implement the Project and such an institutional arrangement would have improved ongoing implementation, operation and maintenance capacity and facilitated the sustainability of the Project's activities.

37. A technical review board (TRB) was established under the chairmanship of the Undersecretary of the Department of Agriculture (Policy and Planning), with members as specified at appraisal.<sup>1</sup> However, when CAR was formed as a separate region, the members of the TRB included the Chairman of Cordillera Regional Assembly and the Cordillera Executive Board. The President of BSU and regional representatives of the Department of Budget and Management were also represented in the TRB. The TRB held regular meetings to supervise, monitor, and approve guidelines and procedures related to implementation of the Project and to find solutions to specific issues. Because the TRB also covered the coordination function at regional level, the Project Area Coordination Committee (PACC) envisaged at appraisal was not established. Instead, the TRB assigned an area coordinator to Benguet Province and one to Mountain Province to help implement the components of the Project. This arrangement was considered effective by the agencies concerned.

### **C. Project Costs**

38. The actual total expenditure was \$25.48 million or 95 per cent of the total estimated cost of \$26.90 million at appraisal. The foreign exchange cost was \$10.46 million and the local currency cost was \$15.02 million (see Appendix 5). Of the total Project cost, \$3.32 million was interest during construction (IDC) and \$0.21 million was taxes and duties paid by the Borrower.

39. The actual amount financed by the Bank was \$18.43 million (98 per cent of the loan amount), consisting of \$8.6 million in foreign exchange and \$9.83 million in local currency. It also included \$2.96 million for IDC. The financing from the Bank was primarily used for the CISs, roads, design and construction supervision, consulting services, and training. The actual amount financed by IFAD was \$4.15 million (90 per cent of the loan), consisting of \$1.50 million foreign exchange and \$2.65 million in local currency. The financing from IFAD was mainly used for agricultural support services and the civil works, equipment, training, and consulting services associated with the services. In addition, IFAD also financed four additional special studies carried out under the Project. The financing from the Borrower amounted to \$2.91 million and consisted of \$0.37 million in foreign exchange (mainly for IDC on the IFAD Loan) and \$2.54 million in local currency (mainly for administrative costs).

### **D. Project Schedule**

40. The planned and actual implementation schedule is in Appendix 6. The Project was to be implemented over five years, beginning in December 1987. The actual implementation took six years until 31 December 1993, but some sections of the rural roads still need to be completed. The implementation delays were caused by: (i) the slow release of funds; (ii) the difficulties in carrying out the construction work in the rugged terrain of the Project area, which were underestimated at appraisal; (iii) the effect of natural calamities; (iv) the institutional

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<sup>1</sup> The Regional Directors of DA, DPWH, DENR, NIA, NEDA; the Chairpersons of the Regional Food and Agricultural Council and HARRDEC as members; and the Project Director of PMO as a member and executive secretary.

constraints in the form of bureaucratic procedures; and (v) the poor performance of the contractors for the rural roads component.

#### **E. Engagement of Consultants and Procurement of Goods and Services**

41. All the consultants were engaged on individual basis in accordance with the Bank's *Guidelines for the Use of Consultants*. Local contractors were used for the civil works. All irrigation works were constructed under force account. Civil works for road construction were initially carried out by the contractors under local competitive bidding; but later some of the civil works were undertaken by the DPWH under force account. Other civil works were carried out under force account employing labor intensive methods. The equipment was procured under international competitive bidding/international shopping procedures. A list of equipment and vehicles procured under the Project is in Appendix 7.

42. The Project experienced delays in the recruitment of consultants as well as in the procurement of goods and services. The Executing Agencies considered that the timeframe for these activities was inadequate. The Mission noted and the Executing Agencies agreed that the construction under force account should be counterchecked to ensure the quality of the civil works.

#### **F. Performance of Consultants, Contractors and Suppliers**

43. The internationally recruited consulting services provided under the Project had mixed results. The services of the marketing specialist were assessed by the DA/PMO to be effective, but the project management and agricultural research/extension specialists were terminated early because of their unsatisfactory performance.

44. The inadequate designs for several of the Project roads could have been rectified if the rural road specialist had undertaken more extensive field visits to verify location specific designs. The locally recruited road consulting firm was helpful to the DPWH, although it could have been more effective in ensuring quality in the design, planning, and construction supervision of the road component.

45. The difficulties experienced in the implementation of the rural roads component are due primarily to the poor performance of contractors. The performance of some of the subcontractors under force account has not been satisfactory either with the result that some of the roads were poorly constructed. The performance of the suppliers of equipment and vehicles was satisfactory.

#### **G. Conditions and Covenants**

46. The loan covenants sought to ensure effective management of implementation, provide for transparency in Project administration, avoid negative environmental impacts, and recover the cost of the physical facilities provided from the beneficiaries. All major covenants under the loan were complied with (see Appendix 8), although there have been delays in collecting amortization payments for the SPSs and NIA has used the 70:30 scheme for the

amortization of CISs.<sup>1</sup> The requirements for stewardship contracts with farmers has not been complied because the farmers claim the lands they occupy are ancestral lands. At present, the enforcement of this covenant is not possible because a law that could legitimize the farmers' ancestral rights is being debated in the Congress of the Philippines.

## **H. Disbursements**

47. A total of \$18.43 million from the Bank loan of \$18.80 million and \$4.15 million from the IFAD loan of \$5.40 million<sup>2</sup> were disbursed as of 11 May 1994. The first disbursement from the Bank loan was made on 30 December 1987 (6 months after the Bank loan became effective) and from the IFAD loan on 1 August 1988 (11 months after the IFAD loan became effective). These delays were due mainly to the difficulties encountered in the recruitment of consultants and in the award of the contracts for the civil works. In addition, NIA's delay in liquidating the advances received from the DA and in resolving its dispute with DA about the administrative charges for CIS construction works have contributed to the slow rate of disbursement.

48. Although the loan provided for an imprest account, it was only opened in July 1992. An initial amount of \$834,000 from the Bank loan and \$192,300 from the IFAD loan were deposited in the account to cover the expenditures related to the construction of CISs and marketing facilities, and the operating costs of the PMO. Initially, the Executing Agencies did not use the imprest account because it did not help them overcome the delays in release of funds by the Government. Although the imprest account was used later, the Executing Agencies did not consider it useful because they did not have direct access to it.

## **I. Environmental Impact**

49. The Project's major environmental impacts were those associated with road construction and the sustainability of intensive vegetable production under conditions in the CAR. Most of the road improvements involved the rehabilitation of existing earth roads and did not damage the environment. However, several of the new road alignments passed through geologically fragile areas, and some communities objected because potential landslides and siltation could disrupt their gardens and water supplies. The DPWH implemented measures to protect the slopes and to control the soil erosion.

50. Four roads under the Project that would pass through forest reserves and protected watersheds were canceled by DPWH. Although provision was made for the road alignments to be cleared with the Department of Environment and Natural Resources (DENR), these roads were cancelled only after the designs were completed, which involved substantial costs.

51. The use of agrochemicals (e.g. fertilizers and pesticides) is increasing in the highland vegetable production areas, which is causing pollution in the water downstream. The

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<sup>1</sup> NIA uses two financing schemes to obtain contributions from the beneficiaries for the CISs based on the capacity and willingness of IAs to contribute: under 70:30 scheme, the IA pays 30 per cent of direct capital cost as their equity payment, either in cash or in the form of labor; while under the 90:10 scheme, the IA pays 10 per cent of the direct capital cost and the balance in equal annual, interest-free installments.

<sup>2</sup> US dollar equivalent of SDR 3.90 million.

high level of pesticide use by vegetable farmers was evident in the Project area, but this practice is also common among vegetable farmers in other parts of the country.<sup>1</sup> The increasing demand for pesticide-free vegetables by consumers provides an incentive for IPM. The Project's pilot IPM program has established a model approach to promote the use of the technology and to reduce the use of pesticides in highland vegetable production. This approach and the increased use of chicken manure and compost have the potential to reduce the environmental damage from the pollution of downstream water systems and to maintain the fertility of the soils.

52. The sprinkler system used to irrigate vegetables increased water use efficiency compared with flow or furrow irrigation practice and facilitated the equitable distribution of scarce water resources. However, in the CAR, the competition for scarce water has different impacts downstream and upstream. The water users downstream may experience reduced and/or polluted supplies, while rainfed farmers and landowners upstream in the microwatershed catchments lack incentives to protect the watersheds. The increased pressure on scarce water resources in the CAR within the Project area highlights the importance of developing efficient and fair measures for water users, particularly for those outside the traditional community institutions. These measures may require that a price be established for water or that the water rights also cover the responsibility for watershed management. The transfer of responsibility for CISs to local government units and the high incidence of private investment in sprinkler irrigation systems provides an opportunity to apply demand-side management (DSM) measures to water resources in future. The ongoing study<sup>2</sup> is investigating the application of DSM approaches to conserve water and is expected to include recommendations on measures to strengthen water resources management on a sustainable basis.

## **J. Project Benefits**

53. At appraisal, the quantified benefits of the Project included an annual incremental production of 53,000 mt of vegetables and 4,600 mt of paddy at full production in 1997 as a result of the increase in cropping intensities and higher yields. Despite the delays in the implementation of the Project, production has already exceeded the appraisal target for several vegetable crops and almost reached targets for most others (see Appendix 9, Table 3). The incremental vegetable production "with" the Project was 49,000 mt in 1993. The production increase, however, is not exclusively attributed to the Project. Other factors such as investments under other projects and unexpected area expansion also contributed to the increase. The production of rice has stagnated at a level lower than the "without" Project forecast because the actual paddy yields have been lower than the appraisal estimates<sup>3</sup> and some of the rice fields have been converted to vegetables in response to more attractive returns.

54. The economic internal rate of return (EIRR) has been recalculated at 12 per cent compared with the appraisal estimate of 18 per cent. The reduction in the EIRR despite the

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<sup>1</sup> Consultant's Report on PHI: Crop Protection in Highland Agriculture Development Project (HADP) Area of Northern Luzon, November 1992. ADB.

<sup>2</sup> TA No. 1915-PHI.

<sup>3</sup> At appraisal, it was projected the rice yield would be 2.7 mt per ha "without" the Project and 3.6 mt per ha "with" the Project, but the average yield was 2.1 mt per ha in 1993 according to BAS/CAR.



higher product prices<sup>1</sup> is a result of: (i) the substantial increase in production costs; (ii) the delay in the accrual of the benefits; (iii) the decrease in beneficiary area caused by a reduction in the length of the roads; (iv) the lower than designed irrigation intensities; and (v) the additional investment by farmers for land development, pipes and sprinklers, which were not taken into account at appraisal.

55. At appraisal, it was estimated that about 6,600 farm families would directly benefit from the Project including the 3,445 families that would be provided with irrigation. When the Project was completed, it was found that about 8,300 farm families had benefited. The beneficiaries of the irrigation component were 3,300 families, slightly lower than the appraisal estimate. The indirect beneficiaries from the roads and marketing facilities increased by 10 per cent from 7,000 families at appraisal to 7,700 families. The farm budget analysis in Appendix 9 demonstrates that the annual farm incomes of the beneficiaries increased by 10 per cent to 111 per cent depending on the farm enterprises selected.

56. The expectations at appraisal for employment generation have been exceeded. Direct employment during construction is estimated at 6,100 person-years compared with the 5,500 person-years estimated at appraisal. The onfarm employment generated by the Project is estimated at 3,300 person-years, 10 per cent more than the appraisal estimate. Indications are that indirect employment benefits are also higher because of migration to vegetable production areas from neighboring barangay and poverty areas in Abra, Kalinga-Apayao, and Ifugao provinces. Through this migration, the Project has made a positive contribution to reducing poverty over a much wider area than just the Project area.

#### **K. Performance of Borrower and Executing Agencies**

57. The performance of the Borrower and the Executing Agencies was generally satisfactory. They complied with all the major loan conditions and implementation arrangements for the Project. However, the Department of Budget and Management could have speeded up the release of funds to the Executing Agencies. The dispute between DA and NIA over the administration charges of CIS works should have been resolved earlier. NIA should have also been more alert in liquidating advances (para. 47). This would have prevented unnecessary delays in loan disbursement and in the construction of CISs. The lack of location specific designs for some sections of the roads, the inadequate scrutiny of the selected contractors, the delay in the PBME survey, and the unsatisfactory reports of the special studies (paras. 30, 31 and 45) are noted because they could have been avoided. In addition, the role and functions of the PMO were expanded beyond the scope proposed at appraisal and this hindered institutional development, particularly in the delivery of agricultural support services (para. 36). Generally, the focus within the Executing Agencies on achieving the targets for the construction of physical infrastructure facilities resulted in less than adequate attention to the ongoing operation and maintenance issues. In the case of NIA, a detailed database on the operations and the benefits generated by all the CISs completed under the Project would be valuable in designing future projects and in making the required modifications in designs and cost estimates.

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The farm gate prices in real term are higher than the appraisal estimates by 49 per cent for snap bean, 35 per cent for chinese cabbage, 28 per cent for irish potato, 24 per cent for cabbage, and 3 per cent for local variety rice.

## **L. Performance of the Bank**

58. Agricultural development in the CAR, especially in terms of infrastructure support facilities and extension services, had been neglected in the past. The interventions through the Project were appropriate and timely. The potential for developing temperate vegetable production was properly judged and the farmers responded rapidly to investments under the Project. The Bank closely supervised the implementation of the Project through 13 Missions between 1987 and 1993. The Missions assisted in the resolution of some of the issues that arose during implementation, particularly the need to revise the scope of the Project, and adopted a flexible approach to implementation because of the conditions in the CAR. The new initiatives under the Project, notably the IPM program, has improved its development impact.

59. Notwithstanding the Project's implementation achievements in a difficult environment, the experience provides lessons that should be incorporated in the design and implementation of similar projects. The most important is that building an institutional capacity to deliver agricultural services should be supported by appropriate implementation arrangements. At appraisal, appropriate provisions should have been made for institution strengthening, while Review Missions should assess the implications of any departure from design in terms of institutional sustainability. For example, the support under the Project for the market information service without a provision for its sustainability, either through a cost-recovery mechanism or an assurance from the Government of long-term funding, greatly reduced the effectiveness of the inputs.

60. The Executing Agencies' complaints about unsatisfactory performance by consultants suggest a need to define clearly the consultant's role in project implementation and to improve the selection procedures for consultants. The Appraisal Mission should assess the Executing Agencies capabilities to establish the need for consulting services and should clearly specify the consultants' tasks. Bank Missions should assist the Executing Agencies select consultants with the professional skills and experience needed to perform the specific tasks and ensure that executing agencies closely supervise the consultants work.

61. The constraints of the terrain and climate in the CAR require more in-depth assessment of the conditions for future projects. Detailed surveys and investigations and improved location-specific designs, including slope protection and improved cross-drainage works are needed for road building programs in the CAR. The benefits of the CISs were reduced by the damage from the typhoons and required additional funds for repairs. Typhoons are prevalent in the CAR and, therefore, the Appraisal Mission could have ensured that appropriate technical standards, cost estimates and mechanisms for repairs, including adequate levels of Government funding and participation by the beneficiary farmers, were incorporated in the design of civil works. Bank Missions should ensure that the executing agencies pay attention to the quality of infrastructure construction just as much as the accomplishment of physical targets.

## **III. CONCLUSIONS AND RECOMMENDATIONS**

### **A. Conclusions**

62. The Project was implemented essentially as conceived, although there were changes in the scope of some components, particularly the rural roads. These changes

reflected the high cost and construction difficulties experienced in the rugged terrain of the CAR, the poor performance of contractors, and the effects of natural calamities on implementation of the Project. The infrastructure facilities provided under the Project have improved access to markets and services for the beneficiaries. However, the objective of institution building and strengthening the agricultural support services was hindered by the implementation of field programs through the expanded PMO.

63. Despite the reduction in the scope of the Project and the implementation delays, the production targets at appraisal have been achieved for most crops. The comparative advantage of the farmers in the highlands in the production of temperate vegetables for markets in Baguio and Manila was one reason the farmers responded rapidly to the investments under the Project. The recalculated EIRR is 12 per cent and the Project can be categorized as generally successful. The EIRR is lower than the 18 per cent estimated at appraisal because of the changes in basic parameters (see para. 54).

64. The Project which was accorded high priority by the Government has contributed to: (i) increasing agricultural production; (ii) creating employment opportunities; (iii) reducing income disparities in the Project area; and (iv) reducing the development imbalances between upland and lowland agriculture in the Project area.

## **B. Recommendations**

### **1. Project Related**

#### **(a) Further Actions and Follow-up**

65. The operation and maintenance of the Project roads and facilities require action and follow-up by the Government specifically: complete the improvements on the substandard roads, complete two bridges, construct new bridge spans to replace the damaged approach to the bridge on CP XIII, and provide adequate funds for maintenance of the completed facilities. The DPWH has agreed to complete the remaining civil works by July 1994 and the new bridge spans by December 1994. It will assess the maintenance of the completed roads and facilities by local government units and report to the Bank by December 1994 (see para. 12).

66. A number of CISs damaged by typhoons are to be repaired by NIA using Government funds. In addition, NIA has agreed to carry out a comprehensive survey of all completed CISs to assess the status of service area covered, water availability, and farmers problems, by 31 December 1994. To improve water use efficiency, NIA will, in close collaboration with DA, conduct an in-depth study of the operational efficiency of farmer-managed sprinklers by 31 December 1994. Objective assessment of farmer training programs should be carried out by the DA so that improvement can be made in developing such programs in the future.

#### **(b) Additional Assistance**

67. Additional support is required for the IPM program to fund farmer training activities and to establish the *Diadegma* cocoon production on a commercial basis. The Bank-

financed TA<sup>1</sup> will provide support for 1994 and 1995. Because the IPM program has a significant potential for economic and environmental impact, it is important that any follow-on project<sup>2</sup> address the requirements to establish IPM on a sustainable basis.

### (c) Timing of PPAR Preparation

68. The Project Performance Audit Report (PPAR) should be prepared in early 1996 to allow for one year O&M of the roads by contractors following the completion of the remaining works.

## 2. General

69. Based on the lessons learned under the Project, the following general recommendations are made about the preparation and implementation of projects in a fragile highland ecology similar to the CAR. The cost estimates for road construction should take into consideration location specific designs and improvement works, such as slope protection and cross-drainage (see paras. 14 and 61). In planning new roads, prior consultation with DENR and with local communities should be undertaken to ensure compliance with environmental guidelines, eliminate delays, and avoid undesirable investments (see paras. 49 and 50). Infrastructure investment under agricultural development projects for improved farm-to-market access in the CAR should assess the potential of alternative transport modes besides rural roads and focus on the linkage of farm areas to the nearest existing transport modes and priority should be given to rehabilitation of the existing roads instead of the construction of new roads (see para. 50).

70. The cost estimates for irrigation projects should include provision for at least four to five years of operation and maintenance. New approaches to increase beneficiary participation, including equity contributions to construction works, and to improve water resource management, including watershed protection and water pricing, should be developed (see para. 52). Additionally, sustainable mechanisms for the Government to make funds available for repairs to typhoon damaged irrigation structures should be incorporated in the project design.

71. Project implementation arrangements should make use of existing institutional structures, with a provision for institutional strengthening, if necessary, to enhance the sustainability of the activities and benefits (see para. 36). The role of a PMO should be restricted to temporary tasks which are completed within the implementation period.

72. More in-depth specification of consultant tasks should be made at appraisal and the process of consultants selection by the executing agencies should be strengthened (see para. 60). A longer period for consultants selection process should be allowed (see para. 42), and if consultant inputs are required during the early stages of project implementation, a list of qualified consultants should be provided to the executing agencies (i.e., at appraisal).

73. If the imprest fund facility is used, at least one of the executing agencies for the project, and preferably the project manager should be a signatory to the account to facilitate its use (see para. 48).

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<sup>1</sup> TA No. 2019-PHI.

<sup>2</sup> TA No. 1915-PHI.

## APPENDIXES

Appendix	Page
1 - List of Irrigation Works Completed Under the Project (As of March 1994)	19
2 - Completion Status of Rural Roads Component (As of March 1994)	21
3 - Consulting Services	22
4 - List of Overseas Training Undertaken Under the Project	23
5 - Comparison of Estimated and Actual Project Costs	24
6 - Planned and Actual Implementation Schedule	26
7 - List of Equipment Procured	27
8 - Compliance With Loan Covenants	28
9 - Economic Evaluation	31

**LIST OF IRRIGATION WORKS COMPLETED UNDER THE PROJECT**  
(As of March 1994)

Name of the CIS	Area New (ha)	Area Rehab. (ha)	No. of Farmers	Crop
<b>BENGUET PROVINCE</b>				
Atok Municipality:				
Taludan	28	-	21	Vegetables
Salat	<u>18</u>	-	<u>25</u>	Vegetables
Subtotal	46		46	
Buguias Municipality:				
Tonglo	37	-	46	Vegetables
Nabanan Petpetlaan	25	-	19	Vegetables
Modayan	42	-	40	Vegetables
Labayan Centro	27	-	38	Vegetables
Nagawa Sayatan	18	-	20	Vegetables
Akipan	11	-	20	Vegetables
Pulaw	18	-	17	Vegetables
Buas Nabusukan	9	29	29	Vegetables
Amlimay	144	-	51	Vegetables
Labney	<u>28</u>	-	<u>38</u>	Vegetables
Subtotal	359	29	318	
Kabayan Municipality:				
Soysoyan	-	51	65	Rice/Vege
Ambeg-ok Kabayan Bo	-	62	80	Rice/Vege
Bectey	-	<u>18</u>	<u>65</u>	Rice/Vege
Subtotal		131	210	
Kibungan Municipality:				
Masala	31	-	30	Vegetables
Tunguey	48	-	53	Vegetables
Nangayangan Talibuy	28	-	31	Vegetables
Coog	17	-	17	Vegetables
Cabutotan	43	-	32	Vegetables
Gasal Amsilweng	<u>35</u>	<u>31</u>	<u>68</u>	Vegetables
Subtotal	202	31	231	
Mankayan Municipality:				
Cabitin	-	11	19	Rice
Pasnaan	18	-	25	Vegetables
Abbao Taneg	-	14	17	Vegetables
Baguyos	<u>14</u>	-	<u>17</u>	Vegetables
Subtotal	32	25	78	
Tuba Municipality:				
Bayascan-Bayadjeng	30	-	56	Vegetables
Mangga Antamok	20	-	15	Vegetables
Ligay	-	28	31	Vegetables
Andolor Indaoac	60	-	60	Rice/Vege
Umesbeg Cauclan	<u>36</u>	-	<u>29</u>	Vegetables
Subtotal	146	28	191	
<b>Total</b>	<u>785</u>	<u>244</u>	<u>1,074</u>	

Name of the CIS	Area New (ha)	Area Rehab. (ha)	No. of Farmers	Crop
<b>MT. PROVINCE</b>				
Bauko Municipality:				
Banata	35	-	42	Vegetables
Pangao Pitpitan	71	-	74	Vegetables
Moling	48	-	42	Vegetables
Inkadang Bago	-	14	107	Rice/Vege
Kada	147	-	83	Vegetables
Suyo Bungan	-	12	50	Rice/Vege
Ganga	29	-	30	Vegetables
Monamon Sur	42	-	65	Vegetables
Kipkip Apawan	-	11	108	Rice
Dodoan	14	-	20	Vegetables
Tapapan Pagang	20	-	20	Vegetables
Manomon Sur II	61	10	68	Vegetables
Lower Bansa	-	13	44	Rice
Pasbol Saskaap	<u>20</u>	<u>-</u>	<u>34</u>	Vegetables
Subtotal	487	60	787	
Bontoc Municipality:				
Awa Dagdag	8	20	130	Rice
Pamasao	26	-	65	Vegetables
Chagchag	17	-	50	Rice
Sinanga Gatti	10	-	37	Rice/Vege
Maligong	<u>11</u>	<u>53</u>	<u>260</u>	Rice
Subtotal	72	73	542	
Sabangan Municipality:				
Tinongdan	11	6	120	Rice
Dageodeo	-	22	180	Rice
Aledomeng	-	16	108	Rice
Camatagan	<u>12</u>	<u>10</u>	<u>93</u>	Rice
Subtotal	23	54	501	
Sagada Municipality:				
Data Guillom	5	16	300	Rice
Apat Pakil	9	20	79	Rice/Vege
Ladladdegan	21	-	38	Vegetables
Latipan	<u>47</u>	<u>-</u>	<u>47</u>	Rice/Vege
Subtotal	82	36	464	
Tadian Municipality:				
Danas Gawaan	-	16	55	Rice
Sumendal	<u>8</u>	<u>38</u>	<u>85</u>	Rice
Subtotal	8	54	140	
<b>Total</b>	<u>672</u>	<u>277</u>	<u>2,434</u>	

**COMPLETION STATUS OF RURAL ROADS COMPONENT**  
(As of March 1994)

Contract Package No.	Road No.	Name of Road	Road Length (km)				Present Status
			Planned		Actual		
			Rehab.	New	Rehab.	New	
I  (deleted)	9	JNR Ballay Pasco	2.00				Moved to CP X
	13	Access Road to Bangao CIP		3.17			Deleted
	14	Access Road to Nanchupit CIP	4.02				Deleted
II	1	Geweng Salat Bookong	3.82	8.18	3.82	2.03	Completed and turned over
III	2	Naguey Pokkong Pasdang		4.48	0.04	3.18	To be completed
IV	8	Access Road to Bakana Tonglo CIP		2.99	1.60		Completed and turned over
	12	JNR Soysoyan Magining	11.07		5.60		Completed and turned over
V	3	Access Road to Tulodan		2.00			Deleted
	10	JNR Kabayan Libang	0.66	6.18	0.66	6.18	To be completed
	11	JNR Libang	6.62		6.62		To be completed
VI	15	JNR Madaymen Masala Amsuling	15.57		17.57		Completed and under maintenance
VII	16	Kibingan Palina	4.18	11.30	4.20	11.30	To be completed
VIII	18	Tram Upper Balili	8.34		5.84		Completed and turned over
	19	Balulacao Caew	3.23	0.30			Deleted (constructed by Gov. funds)
IX	5	Sinipsip Akiki	3.86		3.92		Completed and under maintenance
	6/7	Sinipsip Maalad	3.98		3.70		Completed and under maintenance
	15A	JNR Madaymen	5.61		5.61		Completed and under maintenance
X	4	Natubleng Kabuguiasan Pasco	6.62	8.62	6.62	8.62	Completed and under maintenance
	9	JNR Ballay Pasco	2.00		2.04		Completed and under maintenance
XI	23	Boga Sengyew		3.28		3.28	Completed and turned over
	31	Mt.Data Pactil Poa	6.82		6.82		Completed and turned over
	33	Sinto Cabacab	5.03		5.03		Completed and turned over
XII	32	Mabaay Abatan	11.82		11.78		Completed and turned over
XIII	24	Sadsadan bato Sumey-ang	9.63		9.68		Completed and under maintenance
	27	Longen Dalipan Cuba	4.02		4.02		Completed and under maintenance
	29	Mt.Data Tipunan Pitpitan	5.75		5.75		Completed and under maintenance
	33A	Access Road to Salin	2.26				Deleted
XIV	26/34	JNR Gayang	2.12		1.30		Completed and turned over
	28	Ambasing Bugan	2.37		2.37		Completed and turned over
	30	Pingad Pandey Lagawa	1.10	4.09			Deleted
XV	21	Kayan Bunga National Road	3.02				Deleted
	22	Cabunugan Tue	5.08				Replaced by Rd.No.22/25
	25	Tue Cagubatan	4.12				Replaced by Rd.No.22/25
	22/25	Guinzadan Cagubatan			0.70	6.90	Completed and under maintenance
Total Length			142.72	54.59	115.29	41.49	



## CONSULTING SERVICES

Consultant	Position	Person-months	
		As Appraised	Actual
A. <u>Internationally Recruited</u>		<u>80</u>	<u>53.3</u>
Isaac Shina	Rural Roads Specialist	5	6.3
Wilfredo F. Montes	Irrigation Specialist	3	6
Moises Sardido	Marketing Specialist	24	25
William Jessup Florentino Libero	Research & Extension Specialist	24	12
Romeo Obedoza	Project Mgt. Specialist	24	4
B. <u>Locally Recruited</u>		<u>468</u>	<u>707.5</u>
Multi-sectoral Group	Further Project Preparation	48	67.5
United Technologies, Inc.	Road Consultant	420	895
Sycip, Gorres & Velayo	PBME	n/s	20

(Reference in text: page 9, para. 33)

## LIST OF OVERSEAS TRAINING UNDERTAKEN UNDER THE PROJECT

Title of Training	Location	Duration	Number of Participants
<b>National Irrigation Administration</b>			
Pressurized Irrigation Systems	Colorado, USA	2–20 May 1988 (first batch)	4
– do –	– do –	23 May – 4 June 1988 (second batch)	6
<b>Department of Agriculture</b>			
World Congress of the International Rural Sociology Association	Italy	24 June – 3 July 1988	1
Educational Tour at Chiang Mai University and Nepal Agricultural Research and Production Project of Winrock International	Thailand and Nepal	28 May – 9 June 1990	16
International Symposium on Strategies for Sustainable Mountain Agriculture	Nepal	10–14 September 1990	1
IFAD sponsored Project Implementation Workshop	China	22 October – 2 November 1990	1 <sup>a</sup>
1990 Asian Farming Systems Research and Extension Symposium	Thailand	19–22 November 1990	1
Educational/Observation Tour on	China	19–28 July 1992	7
Study Meeting on Group Farming	Japan	20–30 July 1993	1 <sup>a</sup>

a Only pre-travel expenses, such as clothing and representation allowances and other incidental travel expenses were financed under the Loan.

**Comparison of Estimated and Actual Project Costs  
(US\$)**

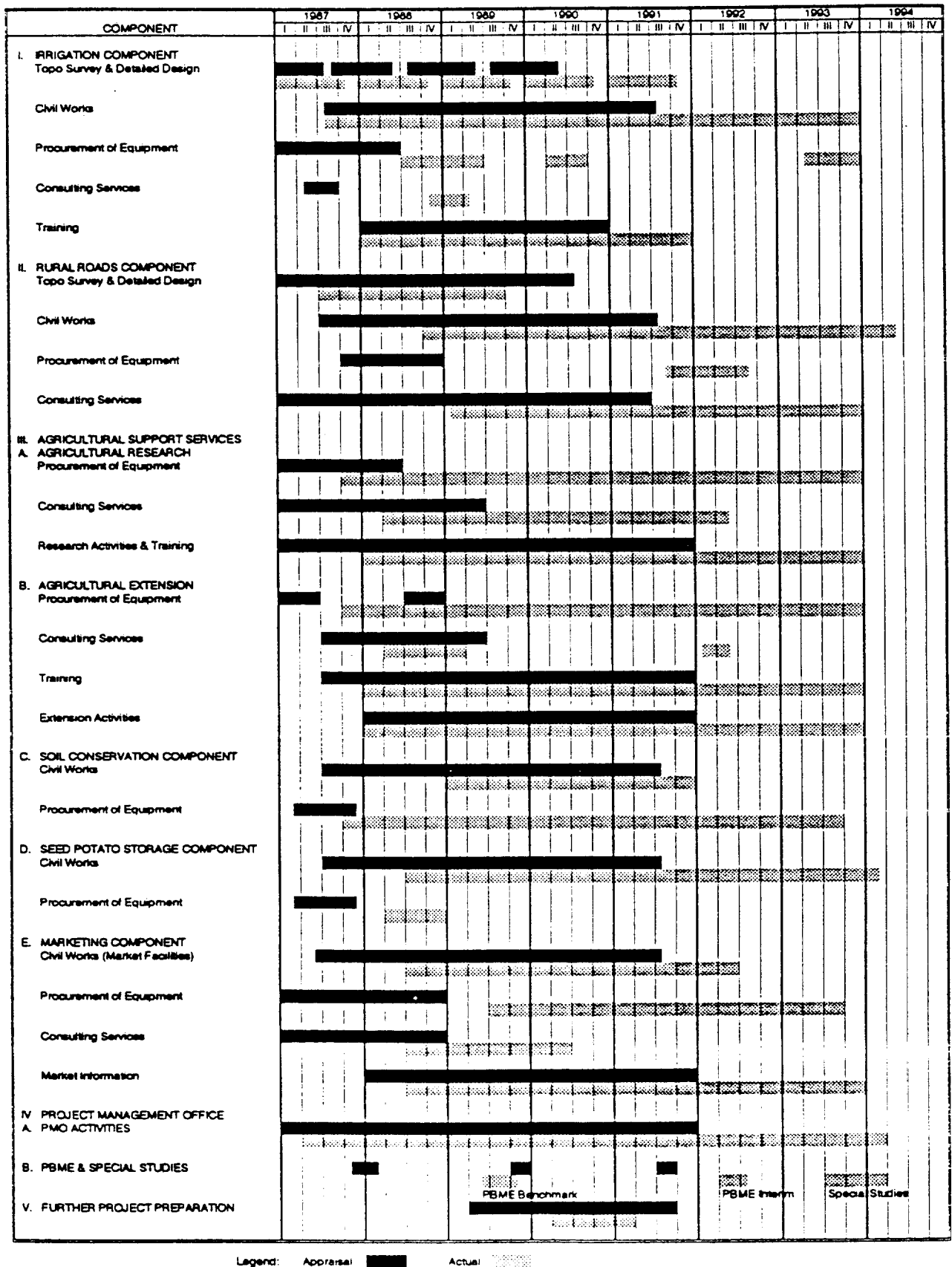
	As Appraised			As Revised			Actual Expenditures		
	FX	LC	Total	FX	LC	Total	FX	LC	Total
<b>A. Irrigation</b>									
Civil Works	—	877,000	877,000		1,628,190	1,628,190	—	1,377,948	1,377,948
Construction Materials	1,060,000	102,000	1,162,000	1,541,741	218,984	1,760,725	1,650,353	246,605	1,896,958
Equipment & Vehicles	360,000	40,000	400,000	392,550	—	392,550	389,767	—	389,767
Consulting Services	40,000	4,000	44,000	14,000	—	14,000	14,216	—	14,216
Training	40,000	50,000	90,000	27,306	28,294	55,600	27,306	4,119	31,425
Administrative Cost	—	271,000	271,000	—	345,000	345,000	—	277,226	277,226
Sub-total	1,500,000	1,344,000	2,844,000	1,975,597	2,220,468	4,196,065	2,081,642	1,905,898	3,987,540
<b>B. Rural Roads</b>									
Civil Works	1,996,000	3,876,000	5,872,000	2,245,127	6,287,055	8,532,182	2,066,623	5,881,928	7,948,551
Construction Materials	72,000	12,000	84,000	72,000	17,000	89,000	322,267	48,155	370,422
Equipment & Vehicles	810,000	90,000	900,000	900,000	—	900,000	896,065	—	896,065
Consulting Services	68,000	1,057,000	1,125,000	56,000	1,175,878	1,231,878	58,245	1,252,151	1,310,396
Administrative Cost	—	196,000	196,000	—	248,000	248,000	—	—	—
Sub-total	2,946,000	5,231,000	8,177,000	3,273,127	7,727,933	11,001,060	3,343,200	7,182,234	10,525,434
<b>C. Agricultural Support Services</b>									
1. Marketing									
Civil Works	—	469,000	469,000	—	1,810,056	1,810,056	—	1,715,929	1,715,929
Construction Materials	938,000	157,000	1,095,000	422,825	68,832	491,657	263,465	42,890	306,355
Equipment & Vehicles	68,000	5,000	73,000	208,570	15,699	224,269	68,167	5,131	73,298
Consulting Services & Research Studies	324,000	36,000	360,000	468,065	52,007	520,072	117,520	13,058	130,578
Training	—	104,000	104,000	—	149,814	149,814	—	117,508	117,508
Administrative Costs	—	36,000	36,000	—	40,000	40,000	—	93,782	93,782
Sub-total	1,330,000	807,000	2,137,000	1,099,460	2,136,408	3,235,868	449,152	1,988,298	2,437,450

FX: Foreign Exchange Cost, LC: Local Cost

2. Research & Extension

	As Appraised		As Revised		Actual Expenditures		
	FC	LC	Total	FC	LC	Total	
2. <u>Research &amp; Extension</u>							
Civil Works	120,000	262,000	382,000	149,004	324,569	473,573	
Construction Materials	-	41,000	41,000	-	70,732	70,732	
Equipment & Vehicles	470,000	134,000	604,000	664,569	187,443	852,012	
including farm inputs							
Consulting Services &							
Research Studies	324,000	36,000	360,000	468,064	52,007	520,071	
Training	13,000	204,000	217,000	19,106	299,329	318,435	
Administrative Cost	-	1,100,000	1,100,000	-	1,501,000	1,501,000	
Subtotal	927,000	1,777,000	2,704,000	1,300,743	2,435,080	3,735,823	
PMO							
Equipment & Vehicles	58,000	6,000	64,000	74,200	7,897	82,097	
Consulting Services	357,000	337,000	694,000	51,600	171,214	222,814	
Administrative Cost	37,000	424,000	461,000	60,874	804,314	865,188	
Subtotal	452,000	767,000	1,219,000	186,674	983,425	1,170,099	
Taxes and Duties	--	866,000	866,000	-	866,000	866,000	
TOTAL BASE COST	7,155,000	10,792,000	17,947,000	7,835,601	16,369,314	24,204,915	
Physical Contingency	772,000	1,076,000	1,848,000	-	-	-	
Price Escalation	940,000	2,632,000	3,572,000	-	-	-	
Prior TA Cost	75,000	-	75,000	29,485	-	29,485	
IDC (Bank)	2,958,000	-	2,958,000	2,958,000	-	2,958,000	
IDC (IFAD)	500,000	-	500,000	500,000	-	500,000	
TOTAL COST	12,400,000	14,500,000	26,900,000	11,323,086	16,369,314	27,692,400	

## IMPLEMENTATION SCHEDULE, PLANNED AND ACTUAL



(Reference in text: page 10, para. 40)

## LIST OF EQUIPMENT AND VEHICLES PROCURED AND THEIR ALLOCATIONS

	As Appraised	Actual	Allocations
<b>A. For the National Irrigation Administration</b>			
Dumptruck	2	4	Benguet, 2 Mt Province,
Front End Loader	2	2	Benguet, 1 Mt. Province,
Concrete Mixer	1	1	Benguet, 1
4 WD Vehicle	3	4	Benguet, 2 Mt. Province,
Pickup Truck	3	4	Benguet, 2 Mt. Province,
Office/Survey Equipment	3 lots	3 lots	Benguet, 1 Mt. Province, Central Office, 1
Drip Irrigation Equipment	1 lot	1 lot	Benguet
Sprinkler Irrigation Equipment	1 lot	1 lot	Mt. Province
<b>B. For the Department of Public Works and Highways</b>			
Dumptruck	5	4	Benguet, 2 Mt. Province,
Motorgrader	2	2	Benguet, 1 Mt. Province,
Front End Loader	2	1	Benguet
Road Roller	2	—	
Water Tanker	2	—	
Pickup Truck	4	—	
4 WD Vehicle	2	15	Benguet, 5 Mt. Province, CAR, 3 PMO, 1 BOC,
Bulldozer	2	2	Benguet, 1 Mt. Province,
Vibratory Roller	5	2	Benguet, 1 Mt. Province,
Light Drilling Equipment	4	—	
Motorcycle	4	—	
Hand Tools	2 lots	—	
Office/Survey Equipment	2 lots	—	
Spare Parts/Tools	2 lots	—	
<b>C. For the Department of Agriculture (Project Management Office)</b>			
4 WD Jeep Type Vehicle	3	3	PMO, 2 Central Office, 1
Office Furnitures and Equipment	1 lot	1 lot	PMO, 1
<b>D. For the Department of Agriculture (Soil Conservation)</b>			
4 WD Jeep Type Vehicle	2	1	PMO, 1
Survey Equipment	2 lots	2 lots	PMO, 1 DA-CAR, 1
Soil Survey Equipment	2 lots	2 lot	PMO, 1 DA-CAR, 1
<b>E. For the Department of Agriculture (Marketing, Research and Extension)</b>			
4 WD Jeep Type Vehicle	9	9	TA Consultants, 5 PMO
Pickup	2	2	PMO
Motorcycles	19	42	LGUs and DA technicians for IPM TA
Bicycles	2	—	
Farm Tools	27 sets	27 sets	Farmers Associations
Extension Kits	26 sets	26 sets	Farmers Associations
Office Equipment	2 lots	2 lots	PMO
Radio (SSB)	6	6	PMO
Weighing Scales	10	4	PMO
Bulletin Boards	4	20	PMO
Miscellaneous Research Equipment	1 lot	1 lot	PMO

**LOAN NO. 802 – PHI/196PH: HIGHLAND AGRICULTURE DEVELOPMENT PROJECT**  
**Compliance with Loan Covenants**

Covenant	Reference	Status
1. Each Executing Agency (EA) shall maintain separate accounts for their respective parts of the Project, have them audited annually and furnish to the Bank not later than six months after the end of each related fiscal year.	L.A., Article Iv Section 4.06(b)	Complied but delayed. EAs have maintained separate accounts but submission to the Bank of audited statements were delayed.
2. The Borrower shall furnish to the Bank quarterly reports on the carrying out of the Project and on the operation and management of Project facilities.	L.A. Article IV Section 4.07(b)	Complied.
3. After physical completion of the Project but not later than 3 months thereafter or such a later date as may be agreed for this purpose between the Borrower and the Bank, the Borrower shall furnish to the Bank a report on the execution and initial operation of the Project.	L.A. Article IV Section 4.07(c)	Complied. Project Completion Report was submitted to the Bank on 24 February 1994.
4. Under the implementation agreement between DA and NIA, NIA is to repay DA on each collection from the IAs, but shall retain an appropriate percentage for collection expenses.	L.A. Schedule 6 para 2 (vii)	To be complied with. Under the 30–70 formula adopted for Project CISs, NIA should have refunded 30 per cent of the cost to DA. Agreement has been reached between the Executing Agencies that these funds will be used by NIA to repair damaged CISs. This agreement requires formal ratification.
5. Certain Project facilities made available under the Project shall be subject to direct capital cost recovery from beneficiaries.		
(a) commercial irrigation facilities	L.A. Schedule 6 para 22(a)	Complied. NIA, however, has implemented a 30–70 scheme.
(b) agricultural inputs	L.A. Schedule 6 para 22(b)	Complied with 72% recovery rate
(c) seed potato storage	L.A. Schedule 6 para 22(c)	Complied but delayed. Collection will start in 1994 based on a Memorandum of Agreement between the municipal government and farmers. Amortization will be for a period of 20 years without interest.
6. A Technical Board (TB) and a Project Area Coordination Committee (PACC) shall be established for effective Project coordination.	L.A. Schedule 6 paras 3, 4, 5 and 6	Complied as per Special Order No. 437, Series of 1987. The TB and PACC met quarterly to discuss issues on policies and Project implementation.
7. Prior to effective date, a fully staffed Project Management Office (PMO) shall be established at La Trinidad who will be responsible for overall management and coordination of the Project.	L.A. Schedule 6 paras 7 and 8	Complied. However, the PMO was set at Baguio City, within the Bureau of Plant Industry Complex.

(Reference in text: page 11, para. 46)

Covenant	Reference	Status
8. EAs concerned shall establish working groups responsible for the implementation of Project components.	L.A. Schedule 6 para 9	Complied.
9. NIA shall, prior to the commencement of construction or rehabilitation works on each communal irrigation systems, organize the farmers into an irrigators' associations (IAs).	L.A. Schedule 6 para 10	Complied. Fifty nine IAs have been organized.
10. The Department of Agriculture (DA) shall enter into an agreement with each of the contact farmers selected by the area team, prior to start of the Project extension program.	L.A. Schedule 6 para 11	Complied. Memorandum of Agreement were signed by HADP-DA and farmers' associations.
11. Area teams shall initiate the formation of farmers associations in each barangay under its supervision. The area teams shall provide assistance to the farmers in the initial organization and management of their associations.	L.A. Schedule 6 para 12 and 13	Complied. One hundred ninety one farmers associations and cooperatives have been formed.
12. All staff necessary for the implementation of the Project shall be appointed in accordance with agreed staff requirement.	L.A. Schedule 6 paras 14 to 15	Complied. A total of 154 staff have been appointed, 114 of which are contractual staff.
13. The Borrower shall submit to the Bank for approval a comprehensive program for overseas and local training within the month of the effective date and prior to the assignment of any staff for training.	L.A. Schedule 6 para 16	Complied but delayed.
14. The Borrower shall, promptly, after the effective date take action to enter with each farmer in the Project area whose land is not classified in the "alienable and disposable" category, into a stewardship contract.	L.A. Schedule 6 para 17	Not complied. Farmers do not want to enter into a stewardship contract since they claim that the lands they occupy are ancestral lands. However, a law on Ancestral Rights is being deliberated in Congress, after which if passed, Ancestral Rights will be given to the farmers.
15. Existing regulations of the Department of Environment and Natural Resources (DENR) shall be strictly enforced with respect to all lands in the Project which are not presently under cultivation. The Department of Public Works and Highways (DPWH) shall obtain, prior to the start of construction, the concurrence of DENR with respect to proposed routing.	L.A. Schedule 6 para 18 and 19	Complied.
16. The operation and maintenance of the various Project facilities shall be carried out by the concerned agencies/offices.	L.A. Schedule 6 para 21	Complied.
17. The PMO shall carry out before 1 February 1986 a benchmark survey to expand and elaborate socio-economic information on Project beneficiaries. They shall develop and implement such PBME system in accordance with the Bank's guidelines.	L.A. Schedule 6 para 23	Complied. The Consultant was fielded only in July 1989. Benchmark survey report was submitted to the Bank on 5 January 1990. The PBME system was designed and installed by the Consultant. Implementation was done by PMO.



Covenant	Reference	Status
18. Aside from the surveys needed for PBME, three (3) special studies shall be carried out under the Project by the PMO to assist Project management in overcoming specific design or redesign specific implementation and to support the detailed design or redesign of the activities under the Project.	L.A. Schedule 6 para 24	Complied but delayed. Consultants were engaged to undertake the special studies in August 1993. The reports on the special studies were submitted to the Bank in February 1994.
19. The Borrower shall actively pursue the establishment of an improved credit system.	L.A. Schedule 6 para 26	Being complied. A cooperative bank was established in Benguet and Mountain Province.

## ECONOMIC EVALUATION

### A. Introduction

1. The Mission reestimated the economic internal rate of return (EIRR) of the Project based on the actual costs and incremental benefits. The reestimation was carried out separately for the irrigation, road, and agricultural service components to assess the effectiveness of each component. The impact of the Project on direct beneficiaries was examined through a farm income analysis using typical farm models. The major assumptions and evaluation results are summarized below:

### B. Major Assumptions

#### 1. Price Level

2. Throughout the analysis, all commodity prices are in 1993 Peso values. The Project costs incurred before 1993 were escalated to 1993 prices using the G-5 Manufacturing Unit Value (MUV) index<sup>1</sup> for foreign exchange and the GDP deflator<sup>2</sup> for local currency.

#### 2. Conversion Factors

3. A standard conversion factor (SCF) of 0.80 and a commodity specific conversion factor (CSCF) for construction of 0.82 was applied based on a recent study by Jenkins and El-Hifnawi<sup>3</sup>. The SCF was used in adjusting all benefits and costs in local currency except for construction costs, which were adjusted by the CSCF for construction. A shadow wage rate was not applied for farm labor because the prevailing hired labor wage (₱85 for male and ₱60 for female) is considered to reflect the opportunity cost of labor after an adjustment by the SCF.

#### 3. Commodity Prices

4. Economic prices of all nontradable goods including vegetables, local variety rice, and locally produced farm inputs like chicken manure were estimated in domestic prices multiplied by the SCF. Tradable goods were valued in the border prices after adjusting from the domestic costs of transportation and handling. The financial and economic prices of farm inputs and outputs are listed in Table 1. The import parity prices of chemical fertilizers are based on the World Bank's price projection in Table 2.

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<sup>1</sup> World Bank, Commodity Price Projections, February 1994.

<sup>2</sup> ADB, Key Indicators of Developing Asian and Pacific Countries 1993. For 1993, the local cost escalation factors of 9 per cent was applied.

<sup>3</sup> Jenkins, Glenn P. and El-Hifnawi, Mostafa Baher (Harvard Institute for International Development), Economic Parameters for the Appraisal of Investment Projects: Bangladesh, Indonesia and the Philippines, December 1993 prepared for EDRC/ADB.

**4. Project Life**

5. The economic life of the Project was assumed to be 30 years.

**C. Economic Benefits and Costs****1. General**

6. The benefits include incremental value of crop production generated by the Project and savings in vehicle operating costs (VOC) because of the improvements in the roads. The actual yield data in the Project area is shown in Table 3 and represents the "with" Project situation. Farm input levels at full development stage and under the "without" Project situation were estimated by the Project Management Office (PMO) and used in calculating incremental farm benefits. The costs of the Project include the actual expenditures for the Project, additional investments by farmers, and incremental operation, maintenance, and farm production costs.

**2. Communal Irrigation Systems**

7. The benefits accrued from the irrigation component were estimated based on the increase in cropping intensity for new vegetable irrigation (1,549 ha) and the increase in unit yield for rehabilitated rice irrigation (415 ha). Because of the lack of comprehensive data about cropping patterns and crop yields in CISs, the increase in cropping intensities from 90 per cent to 170 per cent and the increase in rice yields from 1.9 mt/ha to 2.1 mt/ha were assumed based on the random field checks and interviews carried out during the PCR Mission.

8. In addition to actual costs for the irrigation component, farmers' expenditures for land development, polyvinyl chloride pipes and sprinklers are included as a part of investment costs. The costs of repairing CIS were estimated at 25 per cent of initial investment every five years, in addition to annual maintenance labor inputs. It was assumed that polyvinyl chloride pipes were replaced every four years and the sprinklers, every 10 years.

**3. Farm to Market Roads**

9. Estimating direct benefits for road component was difficult. In this analysis, the road benefits are estimated by increased production value resulting from a shift from subsistence rice to commercial vegetables and vehicle operation cost (VOC) savings because of improved road conditions. The PMO has estimated that the total area change from rice to vegetable production induced by the roads improved under the Project was 766 ha. The unit savings of VOC were assumed at ₱ 0.80/km for jeeps and ₱1.00/km for buses/trucks. The costs for routine road maintenance were based on unit annual costs of ₱9,000/km for barangay roads and ₱18,000/km for provincial roads. A sum of ₱4,000/km was added for periodic maintenance of roads.

#### 4. Agricultural Supporting Services

10. Direct benefits accrued under the agricultural support services were primarily the yield increases in 3,890 ha of rice area and 3,127 ha of vegetable area covered by the Project. The incremental yields were estimated at 10 per cent: from 15.4 mt/ha to 17.1 mt/ha for cabbage, 12.0 mt/ha to 13.3 mt/ha for Irish potato, 9.5 mt/ha to 10.5 mt/ha for snap bean, 15.4 mt/ha to 17.1 mt/ha for chinese cabbage and 1.9 mt/ha to 2.1 mt/ha for local variety rice. The benefits were assumed to accrue in a graded manner during five years build-up period beginning in 1989. The annual maintenance expenditure of the Project facilities, was estimated to be two per cent of capital costs.

#### D. Evaluation Results

11. Based on these assumptions, the economic costs and benefits were computed for the period 1987-2016 (30 years) as shown in Table 4. The EIRR of the overall Project was estimated at 12 per cent compared to 18 per cent at appraisal<sup>1</sup>. The EIRR for irrigation component is 34 per cent, for the farm road component is 4 per cent, and for agricultural support services component is 6 per cent. While the output prices are higher than those at appraisal<sup>2</sup>, the major negative factors that influenced the evaluation are: (i) the substantial increase in cost of production of all major crops; (ii) the delay in the accrual of benefits from the rural roads component due to construction delay; (iii) decrease in beneficiary area because of the reduction in overall length of roads and the cost overrun in the road component; (iv) the lower irrigation intensities than originally designed intensities; (v) the farmers' direct capital investment for the land development and purchase of polyvinyl chloride pipes and sprinkler, which were not included at appraisal. However, present evaluation is conservative in the absence of any detailed data support.

12. A sensitivity analysis was carried out to test the likely impacts on the economic viability of the Project for possible adverse changes in benefits. In the case that the benefit decreases by 10 per cent throughout the remaining project period, the EIRR will be reduced to be 10 per cent. The sensitivity indicator is high at 1.6, which indicates vulnerability of the Project to declines in prices and/or decreases in production. An additional case for lower cropping intensity of 150 per cent was calculated for the irrigation component. The analysis of the components is summarized below:

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<sup>1</sup> The Appraisal Report only evaluated the total Project. An analysis of the different components was not carried out.

<sup>2</sup> The farm gate prices in real term are higher than the appraisal estimates by 24 per cent for cabbage, 28 per cent for Irish potato, 49 per cent for snap bean, 35 per cent for Chinese cabbage, and 3 per cent for the local rice variety.

Component	EIRR (Base Case)	10% Decline in Benefits
All Components	12%	10%
Communal Irrigation Systems		
Cropping Intensity: 170 % (Base)	34%	31%
Cropping Intensity: 150 %	29%	26%
Rural Roads	4%	2%
Agricultural Support Services	6%	4%

### E. Farm Budget Analysis

13. The impact of the Project on beneficiary farmers was examined by analyzing the increase in farm income for a typical farm with an average farm size of 0.85 ha<sup>1</sup>. The same assumptions about crop yields, cropping intensity, and farm inputs used as economic analysis were used for the "with" and "without" the Project scenarios. The cropping pattern for a vegetable farm was assumed to be the same as the proportions in total project area: 35 per cent for cabbage, 33 per cent for Irish potato, 13 per cent for snap beans, and 19 per cent for all other vegetables. The output and input prices are expressed in financial prices. The direct farm costs include the costs for seeds, fertilizers, agrochemicals, and hired labor, while the indirect farm costs include land tax and interest on credit. The analysis does not include any income from nonfarm employment, casual farm labor, livestock, and perennial crops.

14. The result of the analysis indicates that the Project has had a substantial impact on beneficiaries. The Project has involved farmers in commercial farming through farm-to-market roads, and allowed them practice more intensive cultivation with irrigation and agriculture services. Their farm income has increased by 97 per cent, from ₦ 36,200 to ₦ 71,300 for farms covered by all components of the Project as shown in Table 5. Substantial benefits have accrued for farms which are newly irrigated, and for the farms which changed from subsistence rice production to vegetables. The farm-to-market roads have increased the farm income from ₦ 17,200 to ₦ 36,200 and the provision of irrigation has increased it further to ₦ 64,400.

<sup>1</sup> PMO, Project Monitoring and Evaluation, Interim and Related Surveys in Benget and Mt. Province, Vol. 1, August 1992, p.45.

Table 1: FARMGATE PRICES OF AGRICULTURAL INPUTS AND OUTPUTS

Item	Unit	Financial Price	Economic Price
<b>I. FARM OUTPUTS <sup>1</sup></b>			
Cabbage	kg	6.73	5.38
Irish Potato	kg	7.55	6.04
Snap Beans	kg	9.36	7.49
Chinese Cabbage	kg	3.64	2.91
Carrot	kg	10.74	8.59
Sweet Pea	kg	24.82	19.86
Tomato	kg	9.51	7.61
Paddy (Local Variety)	kg	7.68	6.14
Paddy (High Yielding Variety)	kg	6.88	5.50
<b>II. FARM INPUTS <sup>2</sup></b>			
<b>A. Seeds</b>			
Cabbage <sup>3</sup>	kg	7,300.00	7,154.00
Irish Potato	kg	16.00	12.80
Snap Beans <sup>3</sup>	kg	120.00	117.60
Chinese Cabbage <sup>3</sup>	kg	3,850.00	3,773.00
Carrot <sup>3</sup>	kg	562.00	550.76
Sweet Pea <sup>3</sup>	kg	180.00	176.40
Tomato <sup>3</sup>	kg	12,500.00	12,250.00
Paddy (Local Variety)	kg	14.00	11.20
Paddy (High Yielding Variety)	kg	13.00	10.40
<b>B. Fertilizer</b>			
14-14-14 <sup>4</sup>	kg	7.20	5.06
Urea <sup>4</sup>	kg	6.90	5.54
Chicken Manure	kg	1.20	0.96
Triple Super Phosphate <sup>4</sup>	kg	5.50	6.22
Muriate of Potash <sup>4</sup>	kg	4.50	5.83
<b>C. Agro-chemical <sup>3</sup></b>			
Sevin	kg	390.00	382.20
Malathion	lit.	190.00	186.20
Azodrin	lit.	295.00	289.10
Decis	lit.	365.00	357.70
Lannate	lit.	275.00	269.50
Tamaron	lit.	450.00	441.00
Dithane	kg	195.00	191.10
Carbofuran	kg	191.00	187.18
Folidol	lit.	295.00	289.10
<b>D. Labor</b>			
Hired (Male)	day	85.00	68.00
Hired (Female)	day	60.00	48.00
Animal	day	100.00	80.00
<b>III. IRRIGATION MATERIALS <sup>2</sup></b>			
Polyvinyl Chloride Pipe	m	1.00	0.80
Sprinkler Head	No.	250.00	200.00

<sup>1</sup> Averages of seasonally adjusted prices during the past three years (1991-1993) after adjusting to 1993 price.

<sup>2</sup> As of 1993.

<sup>3</sup> Imported goods. It is assumed that 90 per cent of financial prices consists of foreign exchange and 10 per cent consists of local currency which is adjusted by SCF.

<sup>4</sup> Import parity prices as of 1993 (see Table 2).

Table 2: IMPORT PARITY PRICES FOR FERTILIZERS IN 1993 CONSTANT PRICE

Item	Unit	Actual							Projections				
		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	2000	2005
Exchange rate	P/\$	SCF = 20.57	0.80 21.10	CSCF (Transportation) = 21.74	0.84 24.31	27.48	27.05	27.60	27.60	27.60	27.60	27.60	27.60
<b>A. UREA (46%)</b>													
1. Actual or projected world price of Urea (any origin), bagged f.o.b.N.W. Europe	\$/mt	141	174	150	168	180	141	107	123	132	136	154	150
2. Freight and Insurance	+ \$/mt	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
3. C.I.F., Manila	= \$/mt	160.72	194.22	169.55	188.26	200.05	161.46	127.17	143.25	151.82	156.11	174.32	170.04
4. C.I.F., Manila in Pesos	= P/mt	3,306	4,097	3,668	4,577	5,497	4,367	3,510	3,954	4,190	4,309	4,811	4,693
5. Manila port handling	+ P/mt	32	32	32	32	32	32	32	32	32	32	32	32
6. Transportation Cost, Manila-Bagui	+ P/mt	806	806	806	806	806	806	806	806	806	806	806	806
7. Handling and dealer cost	+ P/mt	332	395	362	433	507	418	348	383	402	412	452	443
8. Transportation cost to farm (assume P1.0/kg)	+ P/mt	840	840	840	840	840	840	840	840	840	840	840	840
9. Economic farm gate price of urea	= P/mt	5,316	6,170	5,728	6,688	7,682	6,462	5,536	6,015	6,271	6,399	6,942	6,814
10. Economic farm gate price of Nitrogen	= P/mt	11,556	13,414	12,453	14,540	16,701	14,047	12,035	13,077	13,632	13,910	15,091	14,813
<b>B. TRIPPLE SUPER PHOSPHATE (TSP, 46%)</b>													
1. Actual or projected world price of TSP, bulk, f.o.b. US Gulf	\$/mt	167	177	164	141	139	121	111	118	124	126	134	130
2. Freight and Insurance	+ \$/mt	36.50	36.50	36.50	36.50	36.50	36.50	36.50	36.50	36.50	36.50	36.50	36.50
3. C.I.F., Manila	= \$/mt	205.28	215.70	202.30	179.96	177.82	159.60	149.96	156.39	162.82	164.96	172.46	166.18
4. C.I.F., Manila in Pesos	= P/mt	4,222	4,550	4,397	4,375	4,886	4,316	4,139	4,316	4,494	4,553	4,760	4,642
5. Manila port handling	+ P/mt	32	32	32	32	32	32	32	32	32	32	32	32
6. Transportation Cost, Manila-Bagui	+ P/mt	806	806	806	806	806	806	806	806	806	806	806	806
7. Handling and dealer cost	+ P/mt	405	431	419	417	458	412	398	412	427	431	448	438
8. Transportation cost to farm (assume P1.0/kg)	+ P/mt	840	840	840	840	840	840	840	840	840	840	840	840
9. Economic farm gate price of TSP	= P/mt	6,305	6,660	6,495	6,471	7,023	6,407	6,215	6,407	6,599	6,663	6,886	6,758
10. Economic farm gate price of P2O5	= P/mt	13,707	14,478	14,119	14,067	15,267	13,929	13,512	13,928	14,345	14,484	14,970	14,692
<b>C. POTASSIUM CHLORIDE (KCL, 60%)</b>													
1. Actual or projected world price of KCL, bulk, f.o.b. Vancouver	\$/mt	83	98	112	105	115	113	107	107	108	109	115	110
2. Freight and Insurance	+ \$/mt	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
3. C.I.F., Manila	= \$/mt	113.24	128.43	141.98	135.03	144.67	142.53	137.17	137.17	138.24	139.31	144.67	140.39
4. C.I.F., Manila in Pesos	= P/mt	2,329	2,709	3,086	3,283	3,975	3,855	3,786	3,786	3,815	3,845	3,993	3,875
5. Manila port handling	+ P/mt	32	32	32	32	32	32	32	32	32	32	32	32
6. Transportation Cost, Manila-Bagui	+ P/mt	806	806	806	806	806	806	806	806	806	806	806	806
7. Handling and dealer cost	+ P/mt	253	284	314	330	365	375	370	370	372	375	387	377
8. Transportation cost to farm (assume P1.0/kg)	+ P/mt	840	840	840	840	840	840	840	840	840	840	840	840
10. Economic farm gate price of KCL	= P/mt	4,261	4,671	5,079	5,291	6,039	5,909	5,834	5,834	5,866	5,898	6,058	5,930
11. Economic farm gate price of K2O	= P/mt	7,747	8,493	9,234	9,619	10,980	10,743	10,606	10,606	10,666	10,724	11,014	10,782
<b>D. Derived Price of Compound Fertilizer (estimated from prices of N, P2O5 and K2O) 14-14-14</b>													
	P/mt	4,621	5,094	5,013	5,352	6,013	5,421	5,062	5,266	5,410	5,477	5,751	5,640

**Table 3: PRODUCTION OF MAJOR CROPS IN THE PROJECT AREA**  
Comparison of Appraisal Estimates with Actual

Crop	Appraisal Estimate				Actual						
	As of 1986	W/O Project	With Project	Increment	1987	1988	1989	1990	1991	1992	1993
<b>AREA PLANTED (ha)</b>											
Vegetable											
Cabbage	2,920	2,920	3,176	256	3,173	3,177	3,338	3,440	3,498	3,646	3,699
Irish Potato	2,811	2,811	3,927	1,116	2,911	3,001	3,191	3,214	3,362	3,424	3,599
Snap Bean	1,119	1,119	1,217	98	1,169	1,187	1,192	1,195	1,212	1,222	1,240
Chinese Cabbage	674	674	733	59	677	678	677	678	681	685	687
Carrot	555	555	604	49	557	557	560	560	563	577	582
Sweet Pea	227	227	247	20	257	285	287	292	305	362	370
Tomato	109	109	119	10	111	112	114	120	124	128	133
Subtotal	8,415	8,415	10,023	1,608	8,855	8,997	9,359	9,500	9,745	10,044	10,310
Rice (palay)	5,100	5,100	5,100	0	5,513	5,519	5,061	4,899	4,514	4,417	4,360
Root Crops	10,713	10,713	10,336	(377)	10,887	10,887	10,961	10,817	10,785	10,829	10,814
Tree Crops	1,200	1,200	1,200	0	1,200	1,200	1,203	1,201	1,207	1,207	1,207
<b>TOTAL AREA (ha)</b>	<b>25,428</b>	<b>25,428</b>	<b>26,659</b>	<b>1,231</b>	<b>26,455</b>	<b>26,603</b>	<b>26,583</b>	<b>26,417</b>	<b>26,251</b>	<b>26,498</b>	<b>26,691</b>
<b>UNIT YIELD (mt/ha)</b>											
Vegetable											
Cabbage	13.0	14.3	18.1	3.8	12.2	13.0	13.6	14.4	15.3	16.2	17.1
Irish Potato	10.0	11.0	14.1	3.1	9.5	10.0	10.6	11.2	11.9	12.6	13.3
Snap Bean	8.0	8.8	11.1	2.3	7.5	7.9	8.4	8.8	9.4	9.9	10.5
Chinese Cabbage	12.0	13.2	18.1	4.9	12.2	12.9	13.6	14.4	15.3	16.2	17.1
Carrot	12.0	13.2	18.1	4.9	12.2	12.9	13.6	14.4	15.3	16.2	17.1
Sweet Pea	3.0	3.3	5.0	1.7	3.4	3.4	3.8	4.0	4.2	4.5	4.7
Tomato	12.0	13.2	18.2	5.0	12.2	12.2	13.7	14.5	15.3	16.2	17.2
Rice (palay)	2.4	2.7	3.6	0.9	1.8	1.8	1.8	1.8	2.1	2.3	2.1
Root Crops	10.0	11.0	14.0	3.0	n.a.	n.a.	n.a.	n.a.	n.a.	16.5	16.1
Tree Crops	-	-	-	-	-	-	-	-	-	-	-
<b>PRODUCTION (mt)</b>											
Vegetable											
Cabbage	37,960	41,760	57,490	15,730	38,620	41,240	45,500	49,620	53,400	58,900	63,230
Irish Potato	28,110	30,920	55,370	24,450	27,600	30,110	33,880	36,110	39,980	43,090	47,930
Snap Bean	8,950	9,850	13,510	3,660	8,730	9,380	9,960	10,570	11,350	12,110	13,000
Chinese Cabbage	8,090	8,900	13,270	4,370	8,240	8,730	9,230	9,780	10,400	11,070	11,740
Carrot	6,660	7,330	10,930	3,600	6,780	7,180	7,630	8,080	8,590	9,320	9,950
Sweet Pea	680	750	1,240	490	860	960	1,080	1,160	1,290	1,620	1,750
Tomato	1,310	1,440	2,170	730	1,360	1,370	1,560	1,740	1,900	2,080	2,290
Subtotal	91,760	100,950	153,980	53,030	92,190	98,970	108,840	117,060	126,910	138,190	149,890
Rice (palay)	12,180	13,530	18,120	4,590	9,650	9,660	9,260	8,970	9,610	10,070	9,070
Root Crops	107,130	117,840	144,700	26,860	-	-	-	-	-	178,680	174,110
Tree Crops	-	-	-	-	-	-	-	-	-	-	-

Source: Appraisal Report 1986, Project Management Office and Bureau of Agricultural Statistics, CAR.



Table 4: COST AND BENEFIT STREAM OF THE PROJECT  
(Peso '000)

Year	EIRR = 34.13%				EIRR = 3.60%				EIRR = 6.11%				EIRR = 11.54%			
	Irrigation Component				Farm Road Component				Agricultural Service Component				Total Project			
	Project Invest.	O&M Cost	Incremental Benefit	Net Benefit	Project Invest.	O&M Cost	Incremental Benefit	Net Benefit	Project Invest.	O&M Cost	Incremental Benefit	Net Benefit	Project Invest.	O&M Cost	Incremental Benefit	Total Benefit
1987	621	311	0	(932)	88	0	0	(88)	6,516	0	0	(6,516)	7,225	311	0	(7,536)
1988	11,123	50	1,018	(10,155)	5,308	0	0	(5,308)	18,065	0	2,528	(15,537)	34,496	50	3,546	(31,000)
1989	27,959	4,878	1,269	(31,567)	9,521	153	0	(9,674)	30,866	0	5,056	(25,810)	68,345	5,031	6,325	(67,051)
1990	15,019	689	17,612	1,904	38,222	306	963	(37,566)	56,650	0	10,112	(46,538)	109,891	995	28,687	(82,200)
1991	11,068	1,704	19,904	7,132	39,561	729	6,104	(34,187)	49,529	0	18,958	(30,571)	100,158	2,433	44,966	(57,626)
1992	20,510	2,383	24,971	2,077	94,467	729	6,141	(89,054)	59,602	0	22,783	(36,819)	174,579	3,112	53,895	(123,796)
1993	15,291	3,919	35,218	16,008	74,393	2,141	576	(75,957)	46,901	0	19,852	(27,049)	136,585	6,060	55,646	(86,998)
1994	163	3,145	41,799	38,491	2,199	2,753	14,355	9,402	8,798	6,687	24,781	9,296	11,160	12,585	80,935	57,189
1995		2,479	43,994	41,515		4,832	18,097	13,265		6,687	25,493	18,806		13,998	87,584	73,586
1996		4,910	45,429	40,519		7,792	22,143	14,351		6,687	26,819	20,132		19,389	94,391	75,002
1997		3,107	43,125	40,018		7,792	26,079	18,287		6,687	25,459	18,772		17,586	94,663	77,077
1998		6,202	42,937	36,735		7,792	26,004	18,212		6,687	25,348	18,661		20,681	94,289	73,609
1999		3,497	42,749	39,252		7,792	25,930	18,138		6,687	25,237	18,550		17,976	93,916	75,940
2000		2,605	42,561	39,956		7,792	25,855	18,063		6,687	25,126	18,439		17,084	93,542	76,458
2001		6,021	42,613	36,592		7,792	25,875	18,083		6,687	25,157	18,470		20,500	93,645	73,145
2002		2,053	42,664	40,611		7,792	25,895	18,103		6,687	25,187	18,500		16,532	93,746	77,214
2003		6,622	42,715	36,093		7,792	25,915	18,123		6,687	25,217	18,530		21,101	93,847	72,746
2004		3,167	42,767	39,600		7,792	25,935	18,143		6,687	25,248	18,561		17,646	93,950	76,305
2005		3,532	42,818	39,286		7,792	25,955	18,163		6,687	25,278	18,591		18,011	94,051	76,040
2006		4,665	42,818	38,153		7,792	25,955	18,163		6,687	25,278	18,591		19,144	94,051	74,908
2007		2,054	42,818	40,764		7,792	25,955	18,163		6,687	25,278	18,591		16,533	94,051	77,518
2008		6,447	42,818	36,371		7,792	25,955	18,163		6,687	25,278	18,591		20,926	94,051	73,125
2009		4,550	42,818	38,268		7,792	25,955	18,163		6,687	25,278	18,591		19,029	94,051	75,022
2010		2,360	42,818	40,458		7,792	25,955	18,163		6,687	25,278	18,591		16,839	94,051	77,212
2011		4,968	42,818	37,850		7,792	25,955	18,163		6,687	25,278	18,591		19,447	94,051	74,604
2012		2,299	42,818	40,519		7,792	25,955	18,163		6,687	25,278	18,591		16,778	94,051	77,274
2013		7,675	42,818	35,143		7,792	25,955	18,163		6,687	25,278	18,591		22,154	94,051	71,897
2014		2,921	42,818	39,897		7,792	25,955	18,163		6,687	25,278	18,591		17,400	94,051	76,651
2015		2,423	42,818	40,395		7,792	25,955	18,163		6,687	25,278	18,591		16,902	94,051	77,149
2016		4,903	42,818	37,915		7,792	25,955	18,163		6,687	25,278	18,591		19,382	94,051	74,669

**Table 5: FARM BUDGET ANALYSIS**  
(Pesos per Year, Farm Size: 0.85 ha)

		Gross Revenue	Direct Farm Cost	Indirect Farm Cost	Net Farm Income	Increase in %
All Components <sup>1</sup>	W/O Project	62,176	19,991	5,997	36,188	
	With Project	129,187	41,536	16,371	71,280	97%
Irrigation Component <sup>2</sup>	W/O Project	62,176	19,991	5,997	36,188	
	With Project	117,443	37,760	15,238	64,445	78%
Road Component <sup>3</sup>	W/O Project	22,740	4,284	1,285	17,171	
	With Project	62,176	19,991	5,997	36,188	111%
Support Services Component <sup>4</sup>	W/O Project	62,176	19,991	5,997	36,188	
	With Project	68,393	21,990	6,597	39,807	10%

Source: Estimated from farm input data provided by the Project Management Office.

<sup>1</sup> From rainfed vegetable farm to irrigated vegetable farm with agricultural support services. Cropping pattern of vegetable farms is assumed to be: 35 per cent of cabbage, 33 per cent of Irish potato, 13 per cent of snap bean and 19 per cent of others.

<sup>2</sup> From rainfed vegetable farm to irrigated vegetable farm.

<sup>3</sup> From rainfed rice farm to rainfed vegetable farm. Thirty per cent of rainfed paddy field is assumed to be planted for sweet potato during dry season.

<sup>4</sup> Rainfed vegetable farm.

