PD-AAL-085
ISN 1695

4920289/25

BICOL INTEGRATED AREA DEVELOPMENT III

RINCONADA

Project Review Paper

October 1976

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT REVIEW PAPER FACESHEET

1. TRANSACTION CODE: A (A = ADD, C = CHANGE, D = DELETE)

PRP

2. DOCUMENT CODE: 2

3. COUNTRY/ENTITY: Philippines

4. DOCUMENT REVISION NUMBER:

5. PROJECT NUMBER (7 digits): 492-0289

6. BUREAU/OFFICE: A. SYMBOL: ASIA; B. CODE: 04

7. PROJECT TITLE (Maximum 40 characters): Bicol Integrated Area Development III

8. PROPOSED NEXT DOCUMENT: A. 3 PP; B. DATE: MM 10 YY 77

9. ESTIMATED FY OF AUTHORIZATION/OBLIGATION: A. INITIAL FY 78; B. FINAL FY 78

10. ESTIMATED COSTS ($000 OR EQUIVALENT $1 =)

A. FUNDING SOURCE	FIRST FY B. FX	FIRST FY C. L/C	FIRST FY D. TOTAL	LIFE OF PROJECT E. FX	LIFE OF PROJECT F. L/C	LIFE OF PROJECT G. TOTAL
AID APPROPRIATED TOTAL	21000		21000	21000		21000
(GRANT)	( )	( )	( )	( )	( )	( )
(LOAN)	(21000)	( )	(21000)	(21000)	( )	(21000)
OTHER U.S. 1.						
OTHER U.S. 2.						
HOST COUNTRY		18869	18869		18869	18869
OTHER DONOR(S)						
TOTALS	21000	18869	39869	21000	18869	39869

11. PROPOSED BUDGET AID APPROPRIATED FUNDS ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE C. GRANT	PRIMARY TECH. CODE D. LOAN	E. FIRST FY F. GRANT	E. FIRST FY G. LOAN	LIFE OF PROJECT H. GRANT	LIFE OF PROJECT I. LOAN
(1) FN	B253		060		21000		21000
(2)							
(3)							
(4)							
			TOTAL		21000		21000

12. PROJECT PURPOSE (Maximum 480 characters) [X] "X" IF DIFFERENT FROM PID

#1. To increase agricultural production
#2. To increase fish production
#3. To increase popular participation
#4. To improve distribution of income

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15? IF YES, ATTACH CHANGED PID FACE SHEET.

[X] 1 NO 2 YES

14. PLANNING RESOURCE REQUIREMENTS (Staff Funds)

Two Technicians - 3 M/M each = 6 M/M

15. ORIGINATING OFFICE CLEARANCE

SIGNATURE: Lawrence A. Marwell

TITLE: Asst. Director for Regional Development

DATE SIGNED: MM 10 DD 22 YY 76

16. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS; DATE OF DISTRIBUTION: MM DD YY

AID 1330-3 (3-76)

Table of Contents

	Page
Overview	
1. Priority and Relevance	1
2. Description of the Project	2
The Project Area	2
Development Potential	3
Project Components	3
Irrigation, Drainage and Flood Control	5
A. Lake Baao Project	5
B. Lake Buhi Regulation	7
C. Lake Bato Regulation	8
D. Lake Bato-Pantao Bay Diversion Channel	9
E. Rehabilitation of Existing System	11
F. Roads	11
G. Watershed Protection	11
H. Agricultural Support Services	12
1. Crop and Fish Production	12
2. Extension, Farm Institution Support Services and Manpower Training	14
3. AID and Other Relevant Experience	16
4. Beneficiaries	16
5. Feasibility Issues	17
6. Other Donor Coordination	18
7. Financial Plan	19
8. Implementation Plan	20
9. Project Development Schedule	21

Annexes

A Planned Performance Tracking Network
B Initial Environmental Examination
C Logical Framework
D Cost Estimates and Assumptions
E Financial Tables
F Additional Feasibility Data and Analysis
G Maps
H PID Face Sheet
I Social Soundness Analysis
J Problems As Listed By the Seven Mayors of Rinconada

OVERVIEW

This PRP proposes a loan of $21 million to finance the Rinconada Integrated Area Development (IAD) scheme located in six municipalities and one city in the mid-floodplain in the basin area. The total population of the Rinconada area is approximately 256,000. The direct beneficiaries, however, are not limited only to the Rinconada area but are also in the Pili-Bula, Baliwag-San Vicente and Naga-Calabanga IADs (see Map in Annex G-1), the populations of which total an additional 600,000. Under this project, the water impounded in the three lakes within this IAD will provide irrigation water for rice production in the downstream areas during the dry season. The flood control component will also reduce the height and duration of flooding and reduce the extent of flood damage within the project area. The project involves flood control, irrigation and drainage, roads, agricultural support services and watershed protection. It is estimated that total rice production within the River Basin will increase by one-third as a direct result of this proposed project.

The loan will be the fourth major U.S. financed project in the Bicol River Basin. The first project was the Libmanan-Cabusao Integrated Area Development project with a loan of $3.5 million signed in July 1975, for essentially an irrigation and drainage activity tying in agricultural services, land reform, and strengthening farm-level institutions.

The second loan of $10 million will finance the cost of the Bicol Secondary and Feeder Roads Project. Three secondary subprojects and portions of two others will serve this IAD area and these will open up areas of high agricultural potential in the Bicol River Basin.

The third loan of $3.0 million (PP under preparation) will finance the development of 2,500 hectares in the Pili-Bula IAD. This IAD project will involve irrigation and drainage, land development, roads, homesite development tenurial improvement, agricultural and social services.

The proposed Bicol Integrated Area Development III loan is a high GOP priority project and its implementation will improve irrigation and flood control significantly in the mid and lower Bicol River Basin. In addition, it will bring new areas into production and allow double cropping by small farmers in the River Basin area.

1. Priority and Relevance

This project is an integrated approach to area development. The project seeks to increase and more equitably distribute income, and improve the quality of life in the 76,500-hectare project area. It is an integral component of the overall Bicol River Basin Development Program, a high priority GOP effort aimed at integrated rural development.

The Bicol River Basin Development Program was founded on the GOP basic premise that development efforts aimed at the rural sector and the small farmers should focus on delimited geographic areas of high growth potential where incremental investment would yield maximum benefits in both social and economic terms. The programs have been designed to achieve a breakthrough in development through a framework of integrated program components that will reverse the downward economic trend of the region and assist the River Basin's poor majority to catch up socially and economically with national averages by 1990.

The Bicol River Basin Development Program is innovative in several respects. First, a comprehensive systems approach to planning and management has been adopted which integrates physical infrastructure requirements with social and economic requirements for rural development. As a consequence, the Program is a multi-disciplinary and multi-sectoral effort encompassing such diverse sectors as water resources, transportation, agri-business, crops, livestock, fisheries, agricultural credit, agrarian reform, health and nutrition. Finally, the objective of the program is concerned with real increases in per capita income among the basin population, with particular reference to lower income groups.

At the outset it was recognized that further delineation of specific areas within the 312,000 hectare Bicol River Basin should be made to: (1) facilitate management and planning; (2) better rationalize priorities; and (3) allow greater participation of all sectors in the project area. Following the recommendations of the Comprehensive Water Resources study, ten sub-basin areas referred to as Integrated Area Development Schemes (IAD's), were identified on the basis of their homogenous economic patterns, land use, social habits, natural resources, common problems, and potential for development.

One of the identified IADs is Rinconada, the site of this proposed project. The Comprehensive Water Resources Study concluded that the control and utilization of the three natural lakes in the Rinconada area is an essential part of any plan for the development of the water resources of the Bicol River Basin. The effects of the proposed IAD are not confined to the Rinconada area alone but will also benefit the people living within Pili-Bula, Baliwag-San Vicente and Naga-Calabanga IADs. For instance, the water impounded in the three lakes will augment irrigation water availability for 7,500 hectares located outside of the

project area in addition to the increased water available for another 5,000 hectares within the project area. The full development potential of the three downstream IADs depend to a great extent on the implementation of this project.

The Rinconada IAD scheme is a microcosm of the Bicol River Basin Development Program (BRBDP). Its importance lies in the fact that the development of the area's three natural lakes would alleviate flooding, provide irrigation and help control salinity not only within the area but also in other portions of the basin. Consequently, achievement of this project's purposes will bring the Bicol River Basin Development Program significantly closer to attaining its objectives.

2. Description of the Project

The Project Area

The project area is a sub-basin bounded by Lake Bato in the southwest, Mt. Malinao in the southeast, Ragay Hills in the northwest, and the Pawili River of Bula municipality and the foothills of Mt. Isarog in the northeast. It has a total land area of 76,500 hectares, of which 27,000 hectares are arable.[1/] Of the identified arable land, 12,500[2/] hectares are irrigable of which about 9,900 and 8,350 hectares are presently irrigated during the wet and dry seasons, respectively by 343 national, communal and private irrigation systems.[3/] The three inland lakes of Bato, Buhi and Baao with an aggregate area of 6,220 hectares are currently utilized for small scale inland fishing. Lake Buhi is also used for limited hydro-power generation and as a reservoir for irrigation water.

The lowlands of the Rinconada area are subject to recurrent flooding with about 11,170 hectares annually flooded.[4/] Consequently, land productivity is low with a hectare of riceland producing only (1.25 Metric Tons). Palay yield per hectare grew by only 1.65 per cent per annum during the last decade.[5/]

1/ Census of Agriculture, 1960. 1970.
2/ "Irrigability Suitability Classification Report," Bureau of Soils, Manila. 1975.
3/ "Inventory of Irrigation Systems in Camarines Sur," National Irrigation Administration, Naga City, June 1975.
4/ Based on the planimetered area from footnote source #3.
5/ Census of Agriculture, 1960. 1970.

The 1974 population of 256,000 is expected to increase to as much as 406,000 by 2000[6] a condition which would certainly put a squeeze on available resources. Finally, the 1974 average annual per capita income level of ₱622 or ₱3,972 per household (at current prices)[7] does not augur well for a faster pace of growth and development unless basic improvements are made.

Development Potential

The Comprehensive Water Resources Study (copies of which are available in AID/W) has identified potential benefits from the development of the water resources of the River Basin. Significant increases in the palay output is a major direct benefit from the project. For example, the identified irrigable area of 12,500 hectares within the project area is capable of generating an incremental output of 31,600 to 107,000 metric tons of rough rice valued at $10.38 to $14.26 million (₱81.6 to 107 million) annually.[8] In addition, approximately 5,000 hectares of other arable land within the project area could be devoted to intensive multiple cropping capable of generating $1,067 to $1,600 (₱8,000 to ₱12,000) in net farm income per hectare per year.

The potential of Lakes Bato and Buhi for inland fishery production has yet to be developed. With their rich supply of plankton and the use of appropriate technology, Lakes Bato and Buhi could produce 1,730 metric tons of fish valued at $920 thousand (₱6.92 million) per year. Finally, about 450 hectares within Lake Baao could be developed into another inland fishery with a productive potential of 675 metric tons of fish valued at $360 thousand (₱2.7 million) per year.

Project Components

The objective of the proposed project is to increase and equitably distribute income and improve the quality of life of the project beneficiaries. To attain this objective, the GOP is developing an Integrated Area Development scheme which will include the full

---

6/ Derek M. Sherman, "Population Projections for the Bicol River Basin," TAMS/TAE Report No. 14, Comprehensive Water Resources Development Study for the Bicol River Basin Area, TAMS/TAE Joint Venture/BRBDP, Camarines Sur, pp. 17-27

7/ SSRU Report Series

8/ Based on the yield projection from William J. Staub, "Yield of Palay for Various Conditions of Flooding and Irrigation," TAMS/TAE Report No. IV, Comprehensive Water Resources Development Study for the Bicol River Basin Area, TAMS/TAE Joint Venture/BRBDP, Camarines Sur

range of social infrastructure needs of the people as well as physical improvements. This project will fund a share of the physical components of the total plan for the area and the GOP will fund the other components through existing or planned programs for the River Basin. For example, a Basin-wide integrated health program will address the Rinconada residents needs in reducing communicable diseases, improving nutrition, improving water potability, and reducing population growth. The proposed project, therefore, will complement the total integrated plan for the area by focussing on the following components.

RINCONADA IAD
AID & GOP CONTRIBUTIONS IN DOLLARS
($000)

	AID	GOP	TOTAL
I FLOOD CONTROL IRRIGATION & DRAINAGE			
1. REGULATION OF LAKES			
a. ROW, Engineering & Design	1,418	624	2,042
b. Lake Baao Construction	2,200	957	3,157
c. Lake Buhi Construction	920	400	1,320
d. Lake Bato Construction	807	352	1,159
e. Barit, Waras and other Irrigation Systems	3,008	1,332	4,340
Sub-total	8,353	3,665	12,018
2. LAKE BATO-PANTAO BAY DIVERSION			
a. ROW, Engineering & Design	663	685	1,348
b. Construction	10,581	10,190	20,771
Sub-total	11,244	10,875	22,119
II ROADS			
a. Access Roads	416	185	601
b. Secondary Roads	987	431	1,418
Sub-total	1,403	616	2,019
III AGRICULTURAL SUPPORT SERVICES		881	881
IV WATERSHED PROTECTION		2,832	2,832
GRAND TOTAL	21,000(53%)	18,869	39,869

The Project Paper will contain a full description of the integrated plan for the Rinconada area and demonstrate the physical/social linkages. A full description of the coordinative mechanisms and implementing procedures will also be included in the Project Paper. In brief, the overall plan will be fully integrated in a cross-sectoral sense and implementation will be coordinated using existing organization mechanisms of the BRBDP promulgated in Presidential Decree 926.

Irrigation, Drainage and Flood Control

This component would focus on the regulating of Lakes Bato, Buhi and Baao. The Lake Bato-Pantao Bay Diversion Channel will be the major flood control structure. The other works needed include the excavation of the river channels below Lakes Bato and Buhi: a drainage channel between Lakes Baao and Bato, levees to define the boundaries of Lake Baao; and rehabilitation and improvement of existing irrigation facilities.

The above components are estimated to cost a total of $39.869 million of which AID would finance $21.0 million. Below is a summary description of each component.

A. Lake Baao Project

The project area would encompass Lake Baao, the waterlogged and floods areas adjacent to the lake and the higher fringe areas which are irrigable but are presently not being irrigated. The lake and proposed improvements are shown on Annex G- 2

Lake Baao, during the dry season, has an area of 600 hectares, and a maximum water depth of less than one meter which is too shallow to support any significant fishery development. The Bureau of Fisheries and Aquatic Resources has recommended that the depth of water should be greater than 3 meters.

The recommended means of impounding water to the required depth would be the construction of a levee around the low side of the lake generally conforming to the existing limits of the lake. The levee would have a crest at elevation 7 meters above Mean Sea Level (MSL), a top width of 3.5 meters, side slopes of 1 on 2 (30°) with a total length of 5 kilometers. The levee would also be used as an access road. An irrigation canal would be used as a water supply channel for maintaining a controlled water level for fisheries. The bottom of the lake is at elevation 3 meters above MSL, and the controlled water level would then be at elevation 6 meters above MSL. A spillway, an outlet control structure, and an outlet channel would be included.

The 1,400 hectares of unproductive waterlogged land adjacent to Lake Baao has no natural drainage to remove surface water. The area is interlaced with natural spill channels of the Waras and Iriga Rivers which have become filled with sediments and are almost totally obliterated where they flow into the Bicol River. The lack of surface drainage also causes poor drainage in the adjacent areas of the Waras and Barit Irrigation Systems.

A main drain would be excavated along the general alignment of the Waras and Iriga Rivers from their upstreams confluence down to the Bicol River providing needed upstream drainage. This main drain would have a minimum bottom width of 10 meters and an average depth of excavation of 2 meters and any necessary control structures. A network of collector and farm drains would be required for the reclamation and irrigated development of the 1,400 hectares. A similar drainage network would also be required for the problem areas in the Barit Irrigation System. This drainage system would adequately drain the area for dry season crops. However, due to the low ground elevation, there would still be some flooding in the wet season.

On the periphery of the waterlogged land is an additional 2,000 hectares which are annually subjected to moderate and severe flooding. Of the 2,000 hectares, 900 hectares are classified 3R lands,[2/] and 1,100 hectares are classified as 2R lands.

There are approximately 1,000 hectares of higher fringe irrigable lands which are not presently irrigated, but which could be irrigated when these improvements are constructed. The main irrigation canal would be an extension of either the Waras or Barit Irrigation Systems which presently irrigate the area east of the project. The regulation of Lake Buhi will provide sufficient water and both systems would be modified and improved to fully utilize this additional supply of water.

Irrigation and drainage canals will be maintained and cleaned by the irrigators' association. However, the Lake Baao drainage area is of much larger magnitude, and will be evaluated during the feasibility study to determine how maintenance should be accomplished. No major problem is envisioned with routine maintenance and cleaning of the drainage system by the irrigators' association members. However, major maintenance beyond the scope of routine maintenance and requiring large equipment may be required after major storms. The feasibility study will address these problems.

2/ Bureau of Soils, Land Classification Survey, BRBDP

B. Lake Buhi Regulation

Lake Buhi is a natural lake situated between Mt. Iriga and Mt. Malinao. Having a surface area of 16 sq. km., an average depth of 10 to 12 meters, and a drainage area of 105 sq. km., the average annual yield at the outlet of the lake is 10 cubic meters per second. A map of the lake and the proposed structures is shown on Annex G-3

The lake is within the municipality of Buhi and the town of Buhi is situated on the southern shore of the lake near the outlet. Numerous barrios are located around the fringes of the lake.

The lake discharges into the Barit River which is presently being regulated by the National Power Corporation for the operation of the Barit Hydroelectric Power Plant.

The plant, constructed in 1957, is located 6 kms downstream from the lake outlet. An earthfill dam across the Barit River forms the forebay. The turbine discharges into the Daraga River, a tributary of the Barit River. Included in the installation is a 70-meter wide spillway with one meter high timber needle gates. and a 2-meter diameter siphon spillway. The plant is a major source of electrical power in the basin and is operated throughout the year to supply peak power requirements. The capacity of the plant is 1.8 megawatts at a discharge of 12.6 cubic meters per second at a nominal head of 20 meters.

After the Tiwi Geothermal Plant is completed and supplying power to the basin, the Barit Plant should be of less importance. It is anticipated that the operation of the plant could then be modified to conserve water in Lake Buhi for release when needed for downstream irrigation.

The downstream irrigation demands include the existing Barit Irrigation System. This system has a total irrigable area of 2,900 hectares; only 1,600 hectares are presently being irrigated during the dry season, because of a water shortage. Further downstream, the Waras Irrigation System has a potential irrigable area of 620 hectares but only 350 hectares are irrigated during the dry season. At Lake Baao, the proposed development would require irrigation water for a gross area of 1,000 hectares of currently non-irrigated lands and for 1,400 hectares of lands to be reclaimed.

All of these systems require,and could beneficially use irrigation water from Lake Buhi if water could be stored and released at the proper time.

To regulate Lake Buhi, a gated control structure at the outlet of the lake and excavation of a low flow outlet channel are required. The gated control structure would consist of two 8-meter wide by 6 meter-high, fixed wheel vertical lift gates with a discharge capacity of 310 CMS* (the discharge of record). In addition, there would be a 40-meter wide ogee type ungated spillway. These improvements would regulate the lake level between elevation 84 meters above MSL, which is 0.75 meters below record flood levels, and elevation 80 meters above MSL which is one meter lower than the low water of record. Approximately 70 million cubic meters of usable storage could be developed. It is estimated that the low-flow channel would be 3 kms in length with a bottom width of 10 meters and a design flow depth of 2 meters.

C. Lake Bato Regulation

Lake Bato is a natural lake situated in a depression in the south central portion of the basin, and forms the head-waters of the Bicol River. The natural outlet at the north end of the lake is in the municipality of Bato. The drainage area at the outlet of the lake is 874 sq. km. and the average yield from this watershed is 35.3 cubic meters per second. The lake and the proposed improvements are shown in Annex G-5

The lake has a surface area of 25 sq. km. at a surface elevation of 5 meters above MSL. The surface area increases to an area in excess of 60 sq. km.at a maximum flood level (about 10.5 meters MSL). The normal lake level during the wet season varies from 7 to 7.5 meters above MSL with a peak flood level exceeding elevation 10 meters. During any prolonged dry period, the lake level drops rapidly to about elevation 5 to 5.5 meters above MSL. The minimum level is elevation 4.5 meters above MSL.

At the present time, the lake discharge to the Bicol River is uncontrolled and varies from 115 cms* at lake elevation 7.5 meters to 25 cms at elevation 5.5. At elevation 4.5 meters the discharge is negligible. By regulating the discharge to the Bicol River, water could be stored in the lake for release when needed for downstream irrigation.

The proposed improvements for the regulation of Lake Bato would consist of a gated control structure at the outlet of the lake, and the excavation of a low flow channel. The outlet control would be a reinforced concrete structure with two 8-meter wide high fixed wheel vertical left gates and an ogee type ungated spillway. The low flow channel would require the dredging of selected reaches of the Bicol River to increase the low flow capacities. The total aggregate length of channel to be dredged would be 8 kilometers.

With these improvements the lake level could be regulated between elevation 4.5 and 7.5 meters above MSL, and would provide about 90 million cubic meters of usable storage for downstream irrigation. The existing

* Cubic Meter per second

areas presently being irrigated from the Bicol River during the dry season are 1,080 hectares in the Pili-Bula area, 600 hectares in the Baliwag-San Vicente area, and 80 hectares in the Naga-Calabanga area. The maximum projected areas to be irrigated from the Bicol River after project development would be about 2,400 hectares in the Pili-Bula IAD, about o,300 hectares in the Baliwag-San Vicente Project, and about 5,000hectares in the Naga-Calabanga.

Other potential benefits included in the overall development of Lake Bato are fisheries, reduced sedimentation, navigation, and flood control.

D. Lake Bato-Pantao Bay Diversion Channel

This diversion is proposed by,the GOP to divert peak flood flow directly from the basin to reduce damage to agriculture, residential and other projects. The diversion, in conjunction with control of the Lake Bato outlet, would intercept all flood flows from the 850 square kilometers drainage area upstream of Lake Bato and divert those flows directly to Pantao Bay on Ragay Gulf

The flood storage capability of lake Bato would be utilized to absorb the peak upstream runoff and, thereby, reduce the required discharge capacity of the diversion channel. The design capacity of the channel was selected to be 450 CMS at a lake elevation of 9 meters above MSL. With this capacity, the maximum flood level in Lake Bato would be at an approximate elevation of 9.5 meters above MSL for the floodof record.

The diversion channel could be either an open cut or a tunnel through the high coastal ridge. The type of channel will depend on the geology of the area and the cost estimate for each scheme.

Based on the geological findings, the underlying rock is considered to be of poor quality and tunneling would be difficult. An open cut channel could be excavated with normal excavating equipment and with a minimum of blasting. An open channel was selected for further evaluation. However, a tunnel should be investigated as an alternative during the feasibility study.

The diversion channel would be approximately 10 kilometers in length, have a bottom width of 22 meters, a channel slope of 0.0009 and, at design discharge, a flow depth of 6 meters. The diversion channel would extend westernly from Lake Bato along the alignment of the Bulaang River, through a saddle (maximum elevation 80 meters above MSL) in the coastal hills and than along the alignment of the Macabugo River to Pantao Bay.

The excavated section would be benched (berms) on both sides for slope stability and ease of construction. The lower bench could be paved and be used as a roadway to provide access to the presently isolated coastal area.

A gated control structure and closure dike at the outlet of Lake Bato would fully control all discharge from Lake Bato to the Bicol River. There would be a gated control structure at the outlet to the diversion channel to control normal or storage levels in Lake Bato.

Based on the mathematical model LATIS[11/] Lake Bato-Pantao Bay Diversion channel was found to be the most effective flood control scheme for the Bicol River Basin. The model was used to compare the water levels that would occur with flood control works in place. Table 2.1 shows a comparison of water elevation with other flood control schemes. Lake Bato-Pantao Diversion would lower the flood elevation at: Lake Bato by 2.69 meters, Sto. Domingo by 2.16 meters, and at Ombao by 0.71 meters.

Whereas the development in Lake Bato will increase the amount of stored water to augment dry season irrigation, this will also make the areas susceptible to flooding. The Lake Bato-Pantao Bay Diversion Channel can spill off the excess water when heavy rains come at the time when the reservoirs are full or nearly full. It seems to be the most cost-effective means of discharging surplus water from Lake Bato. The channel as designed could reduce the duration of flooding by 30 to 50%.

The feasibility study to be undertaken by the GOP will assess all possible economic and social effects of the channel. The feasibility study is proposed to be financed through the U.S. AID Consulting Services Loan.

TABLE 2.1[11/]

Location	Calibration Run	Balongay Tidal Barrier	Bicol-Ragay Diversion	Elevation, Meters, MSL Sipocot-San Miguel Diversion	Lake Bato-Pantao Bay Diversion
Balongay	3.44	1.34	3.44	3.44	3.44
Cutoff No. 1	2.54	1.99	2.52	2.54	2.55
Naga	2.96	2.36	2.70	2.96	2.94
Ombao	7.74	7.73	7.40	7.74	7.93
Sto. Domingo	9.83	9.83	9.80	9.83	7.67
Libmanan	3.35	3.23	3.35	3.31	3.35
Sipocot	12.41	12.41	12.41	9.51	12.41
Sabang	13.31	13.31	13.31	13.02	13.31
Lake Bato	10.36	10.36	10.34	10.36	7.67

11/ Comparison of maximum flood elevation using Typhoon Sening flood and surge.

E. Rehabilitation of Existing System

About 6,000 hectares of existing Barit,Waras and other irrigation systems ranging from 100 to 600 hectares would require rehabilitation to facilitate on-farm water management.

The rehabilitation will include: additional irrigation and drainage facilities, farm service roads, desilting of canals, and other facilities to adopt rotational control of irrigation water.

F. Roads

There are in the project area 445 kilometers of roads. Of these, only 8 per cent are concrete, 5 per cent asphalt, 27 per cent gravel and 56 per cent earth roads. The gravel and earth roads are in very bad condition and the majority are not passable during the rainy season. This condition results in high transport costs both for passengers and for cargo traffic.

In the project identification process, conducted jointly with the local officials, five out of six municipalities and one city cited transportation as the number one problem in their area. The six municipality mayors and one city mayor have agreed to place high priority on the following secondary road projects:

a) Iriga-Buhi road (Rebuild existing road)
b) Nabua-Bulatan road (Rebuild existing road)
c) Buhi-Hanawan road (Rebuild existing road)
d) San Isidro-Tubigan road (Rebuild existing road)
e) Buhi-Tiwi road (New construction)

The five road projects have an aggregate length of 74 kilometers and are intially estimated to cost $1,418,000. The detailed cost estimates and the feasibilities of the initially identified priority projects will be established in the feasibility study. In addition, 70 kilometers of access roads will be added to irrigation projects and 40 kilometers of access roads will be added to the secondary road projects for a total of 110 kilometers with an estimated cost of $601,000. The location of the access roads and detailed cost estimates will be established in the feasibility study. These roads are in addition to the basinwide Bicol Secondary and Feeder Roads Project which includes 14 higher priority previously identified sub-projects some of which are in the Rinconada area.

G. Watershed Protection

This project component has been identified as a critical element necessary for the attainment of the project objectives.[12/] About 47,500 hectares of the non-arable lands within

12/ TAMS/TAE Report No. XXXI, June 24, 1976, pp. 18-19

the project are steeply sloping lands. Protection of this watershed area will be done through a combination of vegetative and mechanical controls of steep areas. The vegetative means will be done through reforestation and/or agro-forestation using ipil-ipil (Leucaena Specie), pili, and other suitable species to be recommended by the Bureau of Forest Development. Mechanical controls will be done through the construction of any or all of the following: small earthen or rock check dams, small ponds or holding reservoirs, strip cropping, contour furrows and infiltration beds.

At this stage, the GOP has only identified 6,500 hectares for reforestation.[13/] The five-year cost for this effort is estimated to be $2.832 million. The yearly target area (hectares) is shown below:

Total	1st Year	2nd Year	3rd Year	4th Year	5th Year
6,500	2,368	1,856	726	725	725

Additional areas to be reforested, as well as the number of mechanical structures necessary to provide for comprehensive management of the Rinconada watershed will be analyzed in the feasibility study and identified at the Project Paper stage.

Extensive areas of land drain into or through the Rinconada area. These areas include about 60,000 hectares, and a portion of the steep slopes of Mayon Volcano. The surface run-off and suspended load from these areas will be quantified and the harmful effects reduced to extend the life of Lake Bato. Just like watershed management, the projects and the costs to mitigate the adverse effects from these areas on the project will be identified at the Project Paper stage and will be fully assessed in the feasibility study. The funding for this project component will be wholly GOP.

H. Agricultural Support Services

The following agricultural support services are planned by the GOP in direct support of the above project components and will be financed solely through GOP budgets.

1. Crop and Fish Production

Current agricultural productivity in the project area is low and unstable, particularly in regard to rice and fish. The average rice yield per hectare is only 40 cavans (1.76 metric tons) against a potential of 100 cavans (4.4 metric tons).

13/ See Annex J

The agricultural support services program is designed to intensify crop and fish production through the GOP line agencies concerned and promotion of agribusiness and rural banking which use corollary activities under the larger BRBDP program. Although the principal thrust is on irrigated rice, efforts will also be made to improve the productivity of rainfed rice, corn, sugarcane, coconut and abaca. Commercial vegetable and fruit production either as monoculture or in multiple cropping will also be encouraged to meet the expanding market potential. Intensified, applied research and demonstration will include on-farm water management, variety trials, fertilizer response, and multi-cropping. The University of Hawaii, for example, will have completed Phase I of their irrigation planning study for the 3,200-hectare Barit system in Rinconada which will be incorporated in the full feasibility study.

The average fresh water lake fish yield per hectare is only 200 kilos against a potential of two tons in fishponds and 8 tons in fish pens. The GOP proposes to introduce new technology into fish production management, including temperature and oxygen content levels, feed mixtures, and better fish rearing practices, improved marketing and storage methods, improved fishpond or fish pen management and better spawning, and fry and fingerling growth concepts that relate to market demands.

Intensified fish production in the three lakes (Bato, Buhi and Baao) will be achieved through fish pen culture technology. The principal species to be produced is bangus (milkfish). Production of monosexed tilapia and carp using fish pens will also be used depending on the conditions.

To achieve the targets of intensified crop and fish production, applied research training extension, and, in the case of fisheries, production of sufficient fry and fingerlings should be undertaken.

The existing pilot project on fish pen production in Lake Bato will be continued and expanded to the other lakes as water conditions permit. Studies will be undertaken on limnology, population dynamics, and pesticide and fertilizer residues. In addition, a study will be undertaken to determine the lake regulation stages which would maximize fish yields. Basic work will be done by BFAR (see below) and incorporated in the final feasibility study.

Agricultural support servi es for improving crop and fish production and marketing will require a GOP contribution of $526,000 (or ₱3,945,000).

2. Extension, Farm Institution Support Services & Manpower Training

The agricultural support activities in the Rinconada LAD will also be composed of the following sub-components: Integrated Extension System, Farm Institution Development, Manpower Training and Land Tenure Improvement.

a. Integrated Extension Services - This program is designed to strengthen the extension support service capability of the Area Development Team (ADT) for the Rinconada area. Basic to this, the program envisions instituting a reorientation process for the extension program and personnel of the various line agencies, conduct training programs for extension personnel, and undertake regular performance evaluation. With these, extension services will be better able to provide for the improvement of the agrarian structure, the development of workable farming systems, the improvement of the delivery systems for agricultural technology, and credit, and to increase the productivity of identified groups who need training in special skills.

The personnel for the program will be drawn from the Bureau of Agricultural Extension (BAEX), the Bureau of Plant Industry (BPI), the Bureau of Fisheries and Aquatic Resources (BFAR), the Department of Agrarian Reform (DAR), the Department of Local Government and Community Development (DLGCD), the Department of Health (DH), the Department of Education and Culture (DEC), and the National Irrigation Administration (NIA). Together they will work within the ADT mechanism of the Rinconada area which will serve as the integrating tool for the extension support services program and functions of the various line agencies operating within the program area. The program is designed to be carried out over a span of six years at a cost of $156,000 (or ₱1,170,000).

b. Farm Institutions Support Services Project - The aim of this project is to establish farm level organizational mechanisms to ensure optimum participation of the program beneficiaries in the Rinconada development efforts. Specifically identified for development are the compact farms, the samahang nayons and the irrigators' association.

The compact farms are envisioned to be the primary production and management units in the area. They will serve as channels for the introduction and demonstration of recommended farm practices, and as the responsible groups to acquire and operate small farm machinery and other inputs for production.

The compact farm will be organized within the umbrella of the Samahang Nayon (SN) programs which are designed to constitute the core of the area marketing cooperatives. This policy will not only ensure that compact farm membership will come from the same SN but will also enable the compact farm to engage in the various programs of this pre-cooperative association, i.e., the samahang nayon.

The Irrigators' Association will be composed wholly of farmer tillers with farms inside the influence area of the irrigation systems, and this Association will be the vehicle for the institutionalization of efficient on-farm management practices. Its manner of organization will be mainly governed by set National Irrigators' Association (NIA) guidelines. The associations will have their own charter and will be registered with the Securities and Exchange Commission (SEC).

The entire project covering the development of compact farms, samahang nayons and the irrigators' association will be undertaken during a six-year time span at a total cost of $103,000 (or ₱810,000).

c. Manpower Training - A training sub-component will be prepared to meet present and future skills requirements in the area. More specifically, it is designed to impart management and technical skills to the Rinconada ADT regular and integral members, compact farms, samahang nayon and irrigators' association members. Training will cover farm management; crop production including multiple cropping techniques; off-farm income generating activities; on-farm management; farm mechanization; post harvest technology and the concepts and principles basic to compact farms such as pre-coop groups and irrigators' associations.

Training will be handled by a multi-disciplinary group of training specialists to be organized from among training personnel of the Department of Agriculture, the DAR, the DLGCD, the DOH, the DEC, the BFAR, the NIA and other concerned agencies. Existing training facilities will be utilized for the purpose and implementation will span a four-year period. The total initial estimated cost of this component is estimated to be $91,000 (or ₱683,000). The agencies will provide the training staff.

d. Land Tenure Improvement - This project will link completion of the land reformation efforts in the area. The target is to turn each one of the 3,533 farmer-tenants eligible under the law for Certificates of Land Transfer into amortizing owners. Moreover, another 5,171 share tenants within this project area will have received leasehold contracts prior to any fund disbursements under the proposed loans.

The total agricultural support services budget will require a local currency budget estimated at $881,000 (or ₱6,603,000) over a 5-year period and will be funded through the agencies concerned (with commitments under the total loans).

3. AID and Other Relevant Experience

AID has been involved in the Bicol River Basin Development Program since its inception in 1973. Our role has been to provide both technical and capital assistance to the BRBDP in the development of the program. These activities have included the provision of funds to permit the contracting of TAMS/TAE to conduct the Comprehensive Water Resources Survey for the basin that was completed in August 1976, consultants to participate in the Intermodal Transport, Agribusiness, Water Balance and Water Supply, Pilot Land Consolidation and other surveys, a contract with Kansas State University to conduct feasibility studies in the agri-business field, a contract with the University of Hawaii to conduct irrigation studies, and a $3.5 million loan to help finance the pilot Libmanan-Cabusao Integrated Area Development Project. In addition, a $10 million loan for the construction of farm to market and feeder roads was approved and then signed by U.S. AID in April 1976.

AID as an institution has had similar experiences in area development in other countries and much of the expertise that exists within the agency can be effectively utilized. In addition, AID also has in depth experience in implementing programs at the local level in the Philippines.

Specific experience within the region which is directly applicable to this proposed project is the Libmanan-Cabusao Integrated Area Development. This project which is now being implemented covers about 4,000 hectares of land and it will serve approximately 13,000 families directly or indirectly in the municipalities of Libmanan and Cabusao, Camarines Sur Province, Bicol Region. The project involves the close coordination of major activities or subprojects under the unified management of an Area Development Team. An AID $3.5 million loan supports the construction of irrigation and drainage structures (to be owned, operated and maintained by Irrigators' Service Associations organized by the local farmers/tillers) and farm service roads. Funds other than loan proceeds will be used for land reform; compact farms and extension services development; applied reasearch; and the development of an organizational and management structure in the project area to insure efficient and fully integrated implementation of this and other projects and to assure maximum local participation.

4. BENEFICIARIES

The population in the project area is about 256,000 in 1975. The present population is projected to become 300,000 by 1985 and 406,000 by 2000 using the high population growth rate assumption. The project area's population constitutes about 28 per cent of the Bicol River Basin Program area. It is estimated that about 216,860 or 79 per cent reside in the rural areas.

The population in the project area is generally young. In 1970, it was estimated that about 47 per cent are 14 years old and below; 26 per cent are within the 15-29 age bracket and the remaining 27 per cent are 30 years old and over. The literacy rate in the project area is 79 per cent.

There are approximately 97,400 economically active members of the labor force in 1975. Of these, 7,890 or 8.1 per cent are unemployed. The unemployment rate is higher than the basin's average of 7.7 per cent. The majority of the people are farmers. It was estimated that about 70 per cent of the labor force are engaged in agriculture; 12 per cent in manufacturing and 18 per cent in other industries.

The average annual family income in the project area is about ₱4,000 ($533) in 1974. The average per capita income for the same year is only ₱622. The rural family income of ₱3,416 is only 55 per cent of its urban counterpart. It is also estimated that about 61 per cent of the households have an income of less than ₱3000/annum ($400).

The standard of living in the project area is quite low. In 1970, it was reported that more than half (57 per cent) of the dwelling units utilized nipa for house roofs, 16 per cent had cogon roofs and the remaining 27 per cent had durable roofs (galvanized iron, asbestos and concrete). Less than one per cent (0.20 per cent) of the households own television sets, 1.5 per cent have refrigerators and 41 per cent have radios. The 1970 Census reported that about 11 per cent of the households were using electricity for lighting. The remaining 89 per cent were using kerosene, oil and other lighting materials.

The domestic water supply is also a major problem. It was estimated that only 2.7 per cent of the households are served by piped water; 4.5 per cent by artesian wells and the remaining 92.8 per cent are served by open wells, springs, rain water, lakes, rivers and streams. In addition, it was reported that only 23 per cent of the households have flush water-sealed toilets, 57 per cent have an antipolo closed pit, open or public toilets and the remaining 20 per cent have no toilets at all.

5. Feasibility Issues

The TAMS/TAE report states that the Lake Bato-Pantao Bay Diversion channel is not feasible by itself but then qualifies this by stating that all of the benefits of the diversion have not been quantified and recommends that further detailed economic analysis of the diversion be made in the feasibility study. TAMS/TAE did not consider the Lake Bato regulation and the Lake Bato-Pantao Bay Diversion channel as one subproject working together regulating the outflow from Lake Bato into the Bicol River to reduce downstream flooding. AID engineers believe that further study is necessary on the effects of the diversion or

alternate flood protection system on the downstream flooding of the Bicol River and that these benefits should be quantified. All of this will be covered in the feasibility study. A more detailed discussion is included in Annex F.

In addition, the 4,000 hectares of waterlogged land adjacent to Lake Baao will be investigated in the feasibility study and the most beneficial use of the land recommended.

6. Other Donor Coordination

In regard to the program generally, U.S. AID as well as the BRBDP coordinate closely with other donors regarding their participation in the Bicol River Basin Program. For example, in the case of the Libmanan-Cabusao Integrated Area Development Project, a close working relationship has existed between the Basin, U.S. AID and the UNDP. The UNDP is directly supporting the Bureau of Soils, which conducted the land classification study for the project area. The Bureau of Soils and the United Nations technicians worked closely with the National Irrigation Administration and the U.S. AID's Irrigation Adviser in developing the appropriate land classification methodology for determining the irrigability and suitability of project lands.

At present, there are no major projects in the Basin financed by external donors. The Japanese funded equipment for the Bicol River cut-off channel number 3. However, the BRBDP and U.S. AID are keeping the IBRD and the Asian Development Bank (ADB) appraised of the water resource planning work now underway in the Basin. The GOP has expressed their interest to IBRD in their supporting projects in the Bicol River Basin Development Program. U.S. AID has also directly discussed upcoming projects in the area with IBRD, ADB, the Japanese Government and the German Government.

The ADB is financing $24 million to upgrade the railroad from Manila to and through the Bicol. Given the anticipated large capital requirements necessary to implement the Bicol River Basin's flood control and irrigation development program, it is imperative that both the USAID and the GOP keep other donors appraised of the planning now underway. The government has clearly recognized this need and has taken several ADB and IBRD missions on field trips to projects in the Basin. Several working level missions are planned over the coming months to identify discrete project packages for financial commitments by ADB and IBRD, as well as several bilateral donors. The GOP is anticipating major financial commitments from other donors to be made in CY 1979 with implementation in 1980 and beyond. Both the IBRD and ADB have indicated that timing acceptable-- but early financing would be very unlikely.

In the proposed project, both ADB and IBRD were specifically invited to participate with the GOP and USAID but their budgets are committed and the earliest availability would preclude timely participation. If,however, other projects in their presently planned portfolios drop out, there is a possibility that they could pick up other IADs in the Basin.

7. Financial Plan

The proposed loan of $21 million will be the 4th US Loan in direct support of the Bicol River Basin Development Program. It is intended to provide about half of the costs for the development of water resources, flood control and the essential supporting components of the Rinconada Integrated Area Development Scheme.

Earlier loan activities included the Libmanan-Cabusao Integrated Area Development Project for $3.5 million which was signed in July 1975 and the Bicol Secondary and Feeder Roads Project for $10 million which was signed in April 1976. A project paper is in preparation for a $3 million loan to assist in the development of the Bula IAD. The latest estimates indicate that the total cost of developing the water resources, flood control and related components in Rinconada will be in the neighborhood of $39,869 million (₱299,018M). This estimate was based on the result of the pre-feasibility-level study contracted to the TAMS-TAE group (Tippets-Abbett-McCarthy-Stratton and Trans-Asia Engineering Associates Joint Venture) called the "Comprehensive Water Resources Study of the Bicol River Basin." A feasibility study programmed to commence in the 1976-1977 period will definitively spell out the costs and timing of resource inputs.

The loan will be needed to finance construction, purchase materials, and hire consultants for engineering and design. A preliminary estimate of funding requirements and timing is annexed to this PRP. The reader should refer to the "Cost Estimates and Assumptions" and the "Financial Tables" in Annexes D and E respectively.

It is planned that the fiscal and management mechanisms established by Presidential Decree 926 for the BRBDP will be utilized. These are successfully employed in the Bicol Secondary and Feeder Roads Project as well as the Libmanan/Cabusao IAD.

Annex D shows the construction estimates completed by the consultants (TAMS/TAE), however they did not do detailed estimates of future inflation costs. The financial tables in Annex E itemize estimated total future inflated annual disbursements (Table E-1) and also show on separate tables the estimated AID contribution (Table E-2) and GOP contribution (Table E-3). The AID contribution in dollars is inflated at the rate of 6% per year, while the GOP peso contribution (expressed in dollars) is inflated at the rate of 7% per year. Mechanical equipment (liftgates, reinforcing steel, etc.) and construction equipment rental and operating costs to complete the work are inflated at 15% per year.

The total uninflated financial requirements to complete the Rinconada IAD III project (1976 prices) are shown in Table E-4 and the uninflated AID and GOP contributions are shown in Tables E-5 and E-6 respectively. Table E-7 shows the uninflated total project costs in Pesos. These last four tables are the "working tables" and show important basic steps in the calculations.

3. Implementation Plan

The project will be implemented through the coordinating mechanism of the Bicol River Basin Development Program Office (BRBDPO). Initially, the BRBDP was being implemented by the Bicol River Basin Council (BRBC) created on May 17, 1973 through Executive Order 412. To ensure the full integration of development activities in the Bicol River Basin (BRB) and to boost its function as a coordinating center for interagency planning and management of BRB projects, Presidential Decree No. 926 was promulgated on 28 April 1976 which defined the policies, jurisdiction and organization to carry out the BRBDP.

In addition to employing the implementing structures of PD 926, and recognizing that local leadership, both political and civic, are powerful social forces in the organization of people into productive communities, the Camarines Sur portion of the basin has been divided into seven (7) Development Areas each composed of from 5 to 6 municipalities, and managed by an Area Development Team (ADT). The ADT harness the energies of the accepted leadership at the local level. These are the town mayors, barangay leaders, business and farm leaders, civic and religious leaders, as well as government line agency field heads and technicians/extension workers.

These institutional mechanisms that have been developed are all embracing and comprehensive in scope and absorb all possible social forces that exert influences in the basin's development. The integration of such forces into the overall effort is critical to the achievement of BRBDP's mission.

The project will be implemented through a Project Management Office (PMO) to be organized by the BRBDPO. The PMO is the management organization that will carry out actual administration, contracting, and management of the project. The Bureau of Public Works will be the lead implementing agency for this project and as such, will head the PMO. The PMO will integrate into a functional office, all agencies identified as crucial to the attainment of the goal and objectives of the project. Each GOP line agency will assign representatives as full time technical or administrative staff members. Other professional staff will be hired as necessary. The PMO will work closely with the Rinconada ADT based in Iriga City to effectively link the project with the plans and programs of this ADT.

Utilization of the BRBDPO as the overall coordinator of Basin project activities has been a standard practice and has been effective over the past three years. The utilization of the PMO as a project level coordination body has been developed and is being employed in the implementation of the Libmanan-Cabusao IAD and the Bicol Secondary and Feeder Roads project.

The detailed implementation plan, including the time of input projections and evaluation schedules will be finalized upon completion of the feasibility study and the preliminary engineering designs.

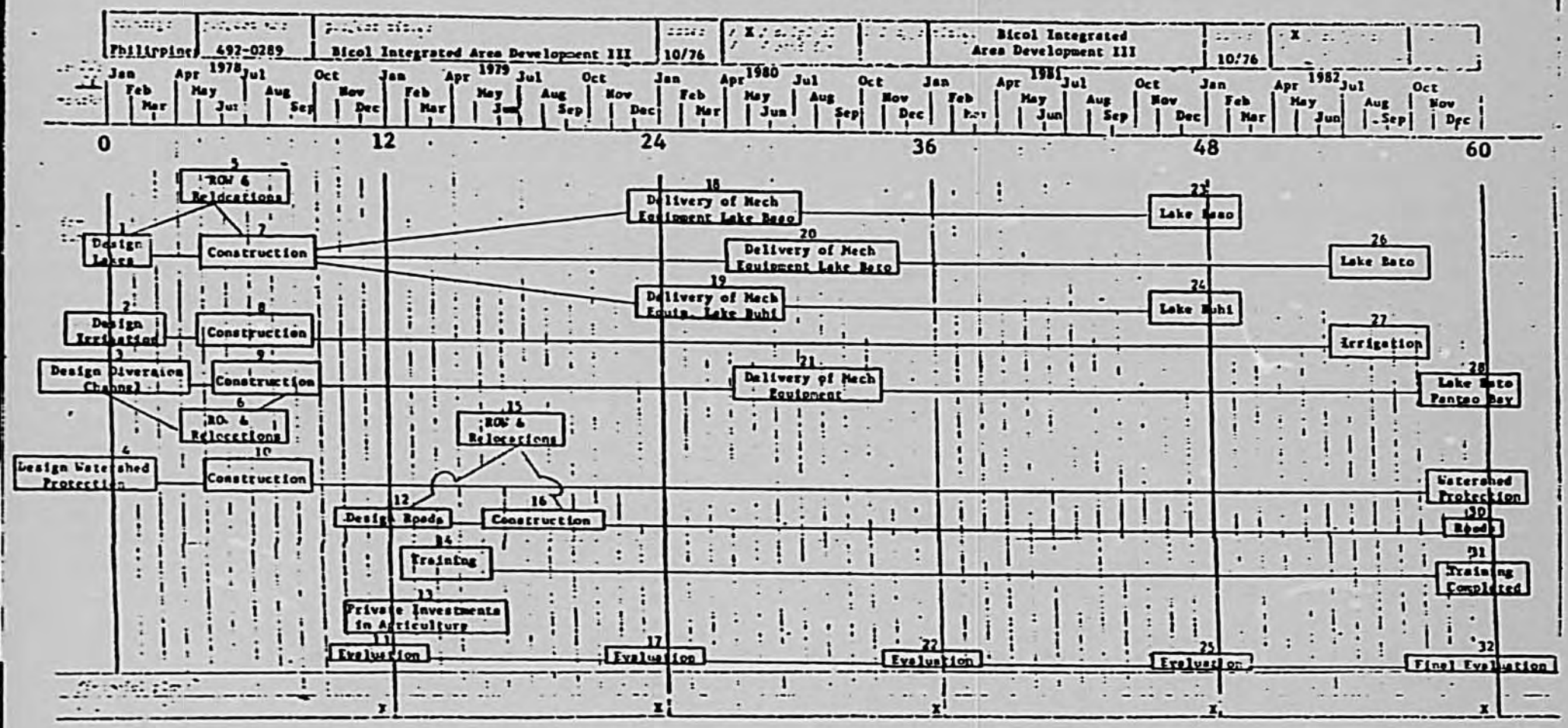
9. Project Development Schedule

This LAD project, as with the other LAD project in Libmanan-Cabusao, has been and will continue to be developed collaboratively with the GOP. The Project Paper, as in the case of this PRP, will be jointly developed and coordinated by a team made up of GOP interagency personnel, led by the BRBDPO staff, the Area Development Team/Iriga members and the USAID/Bicol.

The feasibility study together with the engineering designs will be completed by December 1977. The line agencies will prepare the detailed supporting project component plans during early 1978. The socio-economic data base of the project area will be updated between January and July 1977, to ensure that the plans and programs take fully into account the people's aspirations, particularly the intended project beneficiaries. An evaluation plan and schedule will also be developed, taking into consideration the socio-economic baseline information and the overall project thrust. With these inputs, an overall integrated implementation plan will be prepared and completed between January and March 1978. The Project Paper itself will be based on all the items discussed above and will be prepared during the months of April and May 1978 and submitted to AID/W in June 1978.

AID/W assistance will be required in the development of the project paper. This assistance should be in the form of a three-man team for a total of 2 man-months in the April-May 1978 period.

PROJECT PERFORMANCE TRACKING NETWORK



country:	project no:	project title:	date:	/X/ original	approvd:
Philippines	492-0289	Bicol Integrated Area Development III	10/76	/ / revision #	

CPI NARRATIVE

1. 1/78 Begin designing regulation structure for three lakes.
2. 1/78 Begin designing irrigation systems.
3. 1/78 Begin designing Lake Bato-Pantao Bay diversion channel.
4. 1/78 Begin designing Watershed Protection.
5. 6/78 Begin ROW & relocation for lakes regulation.
6. 6/78 Begin ROW & relocation for diversion channel.
7. 7/78 Begin construction of lakes regulation structure.
8. 7/78 Begin construction of irrigation systems.
9. 7/78 Begin construction of diversion channel.
10. 7/78 Begin construction of watershed protection.
11. 12/78 First annual evaluation.
12. 1/79 Begin designing roads.
13. 2/79 Initial private investment that would directly affect agribusiness in Rinconada.
14. 3/79 Begin training.
15. 6/79 Begin ROW & relocation for roads project.
16. 7/79 Begin road construction.
17. 12/79 Second annual evaluation.
18. 3/80 Delivery of mechanical equipment for Lake Baao structure completed.
19. 3/80 Delivery of mechanical equipment for Lake Buhi structure completed.
20. 7/80 Delivery of mechanical equipment for Lake Bato structure completed.
21. 7/80 Delivery of mechanical structure for diversion channel completed.
22. 12/80 Third annual evaluation.
23. 12/81 Complete Lake Baao structure.
24. 12/81 Complete Lake Buhi structure.
25. 12/81 Fourth annual evaluation.
26. 8/82 Lake Bato regulation structure completed.
27. 8/82 Irrigation systems completed.

Country:	Project no:	Project title:	Date:	/X / original	Approval:
Philippines	492-0289	Bicol Integrated Area Development III	10/76	/ / revision #	

CPI NARRATIVE

28. 12/82 Diversion channel completed.

29. 12/82 Watershed protection completed.

30. 12/82 Roads completed.

31. 12/82 Training completed.

32. 12/82 Final evaluation of project.

INITIAL ENVIRONMENTAL EXAMINATION

Project Location : The Rinconada Integrated Area Development is located in the mid-Bicol River Basin approximately 400 kilometers southeast of Manila on Luzon Island, Republic of the Philippines.

Project Title : The Rinconada Integrated Area Development.

Funding : Fiscal Year 1978 - $21,000,000

Life of Project: Begin FY 78
End FY 82

IEE Prepared by: Ralph Bird Date: 10/21/76
General Engineer Advisor

Environmental Action Recommended: Environmental Assessment needed

Concurrence: Date: 11/2/76

Acting Director

Assistant Administrators/Directors Decision:

Date:

Approved _____

Disapproved_____

I Examination of Nature, Scope, and Magnitude of Environmental Impacts for the Rinconada Integrated Area Development

A. Description of the Project

The Bicol River Basin

The Bicol River Basin is located about 400 kilometers southeast of Manila on the Bicol Peninsula, which forms the southeastern part of the Island of Luzon, Republic of the Philippines. The length of the basin is about 130 kilometers, its width averages 20 to 25 kilometers, and its area is about 312,000 hectares. Approximately 1,100,000 persons reside in the basin.

The Project Area

The project area is a sub-basin bounded by Lake Bato in the southwest, Mt. Malinao in the southeast, Ragay Hills in the northwest, and the Pawili River of Bula municipality and the foothills of Mt. Isarog in the northeast. It has a toal land area of 76,500 hectares, of which 27,000 hectares are arable.[1] Of the identified arable land, 12,500[2] hectares are irrigable of which about 9,900 and 8,350 hectares are presently irrigated during the wet and dry seasons, respectively by 343 national, communal and private irrigation systems.[3] The three inland lakes of Bato, Buhi and Baao with an aggregate area of 6,220 hectares are currently utilized for small scale inland fishing. Lake Buhi is also used for limited hydro-power generation and as a reservoir for irrigation water.

The lowlands of the Rinconada area are subject to recurrent flooding with about 11,170 hectares annually flooded.[4] Consequently, land productivity is low with a hectare of riceland producing only (1.25 Metric Tons). Palay yield per hectare grew by only 1.65 per cent per annum during the last decade.[5]

1/ Census of Agriculture, 1960. 1970.
2/ "Irrigability Suitability Classification Report," Bureau of Soils, Manila. 1975.
3/ "Inventory of Irrigation Systems in Camarines Sur," National Irrigation Administration, Naga City, June 1975.
4/ Based on the planimetered area from footnote source #3.
5/ Census of Agriculture, 1960. 1970.

The 1974 population of 256,000 is expected to increase to as much as 406,000 by 2000[6] a condition which would certainly put a squeeze on available resources. Finally, the 1974 average annual per capita income level of ₱622 or ₱3,972 per household (at current prices)[7] does not auger well for a faster pace of growth and development unless basic improvements are made.

Development Potential

The Comprehensive Water Resources Study (copies of which are available in AID/W) has identified potential benefits from the development of the water resources of the River Basin. Significant increases in the palay output is a major direct benefit from the project. For example, the identified irrigable area of 12,500 hectares within the project area is capable of generating an incremental output of 81,600 to 107,000 metric tons of rough rice valued at $10.88 to $14.26 million (₱81.6 to 107 million) annually.[8] In addition, approximately 5,000 hectares of other arable land within the project area could be devoted to intensive multiple cropping capable of generating $1,067 to $1,600 (₱8,000 to ₱12,000) in net farm income per hectare per year.

The potential of Lakes Bato and Buhi for inland fishery production has yet to be developed. With their rich supply of plankton and the use of appropriate technology, Lakes Bato and Buhi could produce 1,730 metric tons of fish valued at $920 thousand (₱6.92 million) per year. Finally, about 450 hectares within Lake Baao could be developed into another inland fishery with a productive potential of 675 metric tons of fish valued at $360 thousand (₱2.7 million) per year.

Project Components

The objective of the proposed project is to increase and equitably distribute income and improve the quality of life of the project beneficiaries. To attain this objective, the GOP is developing an Integrated Area Development scheme which will include the full

6/ Derek M. Sherman, "Population Projections for the Bicol River Basin," TAMS/TAE Report No. 14, Comprehensive Water Resources Development Study for the Bicol River Basin Area, TAMS/TAE Joint Venture/BRBDP, Camarines Sur.

7/ SSRU Report Series

8/ Based on the yield projection from William J. Staub, "Yield of Palay for Various Conditions of Flooding and Irrigation," TAMS/TAE Report No. IV, Comprehensive Water Resources Development Study for the Bicol River Basin Area, TAMS/TAE Joint Venture/BRBDP, Camarines Sur

range of social infrastructure needs of the people as well as physical improvements. This project will fund a share of the physical components of the total plan for the area and the GOP will fund the other components through existing or planned programs for the River Basin. For example, a Basin-wide integrated health program will address the Rinconada residents needs in reducing communicable diseases, improving nutrition, improving water potability, and reducing population growth. The proposed project, therefore, will complement the total integrated plan for the area by focussing on the following components.

RINCONADA IAD
AID & GOP CONTRIBUTIONS IN DOLLARS
($000)

	AID	GOP	TOTAL
I FLOOD CONTROL IRRIGATION & DRAINAGE			
1. REGULATION OF LAKES			
a. ROW, Engineering & Design	1,418	624	2,042
b. Lake Baso Construction	2,200	957	3,157
c. Lake Buhi Construction	920	400	1,320
d. Lake Bato Construction	807	352	1,159
e. Barit, Waras and other Irrigation Systems	3,008	1,332	4,340
Sub-total	8,353	3,665	12,018
2. LAKE BATO-PANTAO BAY DIVERSION			
a. ROW, Engineering & Design	663	685	1,348
b. Construction	10,581	10,190	20,771
Sub-total	11,244	10,875	22,119
II ROADS			
a. Access Roads	416	185	601
b. Secondary Roads	987	431	1,418
Sub-total	1,403	616	2,019
III AGRICULTURAL SUPPORT SERVICES		881	881
IV WATERSHED PROTECTION		2,832	2,832
GRAND TOTAL	21,000 (53%)	18,869	39,869

The Project Paper will contain a full description of the integrated plan for the Rinconada area and demonstrate the physical/social linkages. A full description of the coordinative mechanisms and implementing procedures will also be included in the Project Paper. In brief, the overall plan will be fully integrated in a cross-sectoral sense and implementation will be coordinated using existing organization mechanisms of the BRBDP promulgated in Presidential Decree 926.

Irrigation, Drainage and Flood Control

This component would focus on the regulating of Lakes Bato, Buhi and Baao. The Lake Bato-Pantao Bay Diversion Channel will be the major flood control structure. The other works needed include the excavation of the river channels below Lakes Bato and Buhi; a drainage channel between Lakes Baao and Bato, levees to define the boundaries of Lake Baao; and rehabilitation and improvement of existing irrigation facilities.

The above components are estimated to cost a total of $39.869 million of which AID would finance $21.0 million. Below is a summary description of each component.

Lake Baao Project

The project area would encompass Lake Baao, the waterlogged and floods areas adjacent to the lake and the higher fringe areas which are irrigable but are presently not being irrigated. The lake and proposed improvements are shown on Page 26

Lake Baao, during the dry season, has an area of 600 hectares, and a maximum water depth of less than one meter which is too shallow to support any significant fishery development. The Bureau of Fisheries and Aquatic Resources has recommended that the depth of water should be greater than 3 meters.

The recommended means of impounding water to the required depth would be the construction of levee around the low side of the lake generally conforming to the existing limits of the lake. The levee would have a crest at elevation 7 meters above Mean Sea Level (MSL), a top width of 3.5 meters, side slopes of 1 on 2 (30°) with a total length of 5 kilometers. The levee would also be used as an access road. An irrigation canal would be used as a water supply channel for maintaining a controlled water level for fisheries. The bottom of the lake is at elevation 3 meters above MSL, and the controlled water level would then be at elevation 6 meters above MSL. A spillway, an outlet control structure and an outlet channel would be included.

The 1,400 hectares of unproductive waterlogged land adjacent to Lake Baso has no natural drainage to remove surface water. The area is interlaced with natural spill channels of the Waras and Iriga Rivers which have become filled with sediments and are almost totally obliterated where they flow into the Bicol River. The lack of surface drainage also causes poor drainage in the adjacent areas of the Waras and Barit Irrigation Systems.

A main drain would be excavated along the general alignment of the Waras and Iriga Rivers from their upstreams confluence down to the Bicol River providing needed upstream drainage. This main drain would have a minimum bottom width of 10 meters and an average depth of excavation of 2 meters and any necessary control structures. A network of collector and farm drains would be required for the reclamation and irrigated development of the 1,400 hectares. A similar drainage network would also be required for the problem areas in the Barit Irrigation System. This drainage system would adequately drain the area for dry season crops. However, due to the low ground elevation, there would still be some flooding in the wet season.

On the periphery of the waterlogged land is an additional 2,000 hectares which are annualy subjected to moderate and severe flooding. Of the 2,000 hectares, 900 hectares are classified 3R lands,[9] and 1,100 hectares are classified as 2R lands.

There are approximately 1,000 hectares of higher fringe irrigable lands which are not presently irrigated, but which could be irrigated when these improvements are constructed. The main irrigation canal would be an extension of either the Waras or Barit Irrigation Systems which presently irrigate the area east of the project. The regulation of Lake Buhi will provide sufficient water and both systems would be modified and improved to fully utilize this additional supply of water.

Irrigation and drainage canals will be maintained and cleaned by the irrigators association. However, the Lake Baso drainage area is of much larger magnitude, and will be evaluated during the feasibility study to determine how maintenance should be accomplished. No major problem is envisioned with routine maintenance and cleaning of the drainage system by the irrigators association members. However, major maintenance beyond the scope of routine maintenance and requiring large equipment may be required after major storms. The feasibility study will address these problems.

9/ Bureau of Soils, Land Classification Survey, BRBDP

Lake Buhi Regulation

Lake Buhi is a natural lake situated between Mt. Irigan and Mt. Malinao. Having a surface area of 18 sq. km., an average depth of 10 to 12 meters, and a drainage area of 105 sq. km. The average annual yield at the outlet of the lake is 10 cubic meters per second. A map of the lake and the proposed structures is shown on Page 27

The lake is within the municipality of Buhi and the town of Buhi is situated on the southern shore of the lake near the outlet. Numerous barrios are located around the fringes of the lake.

The lake discharges into the Barit River which is presently being regulated by the National Power Corporation for the operation of the Barit Hydroelectric Power Plant.

The plant, constructed in 1957, is located 6 kms downstream from the lake outlet. An earthfill dam across the Barit River forms the forebay. The turbine discharges into the Daraga River, a tributary of the Barit River. Included in the installation is a 70-meter wide spillway with one meter high timber needle gates. and a 2-meter diameter siphon spillway. The plant is a major source of electrical power in the basin and is operated throughout the year to supply peak power requirements. The capacity of the plant is 1.8 megawatts at a discharge of 12.6 cubic meters per second at a nominal head of 20 meters.

After the Tiwi Geothermal Plant is completed and supplying power to the basin, the Barit Plant should be of less importance. It is anticipated that the operation of the plant could then be modified to conserve water in Lake Buhi for release when needed for downstream irrigation.

The downstream irrigation demands include the existing Barit Irrigation System. This system has a total irrigable area of 2,900 hectares; only 1,600 hectares are presently being irrigated during the dry season, because of a water shortage. Further downstream, the Waras Irrigation System has a potential irrigable area of 620 hectares but only 350 hectares are irrigated during the dry season. At Lake Baao, the proposed development would require irrigation water for a gross area of 1,000 hectares of currently non-irrigated lands and for 1,400 hectares of lands to be reclaimed.

All of these system require, and could beneficially use irrigation water from Lake Buhi if water could be stored and released at the proper time.

To regulate Lake Buhi, a gated control structure at the outlet of the lake and excavation of a low flow outlet channel are required. The gated control structure would consist of two 8-meter wide by 6 meter high, fixed wheel vertical lift gates with a discharge capacity of 310 CMS* (the discharge of record). In addition, there would be a 40-meter wide ogee type ungated spillway. These improvements would regulate the lake level between elevation 84 meters above MSL, which is 0.75 meters below record flood levels, and elevation 80 meters above MSL which is one meter lower than the low water of record. Approximately 70 million cubic meters of usable storage could be developed. It is estimated that the low-flow channel would be 3 kms in length with a bottom width of 10 meters and a design flow depth of 2 meters.

Lake Bato Regulation

Lake Bato is a natural lake situated in a depression in the south central portion of the basin, and forms the head-waters of the Bicol River. The natural outlet is at the north. The drainage area of the outlet of the lake is 874 sq. km. and the average yield from this watershed is 35.8 cubic meters per second. The lake and the proposed improvements are shown in Page 28.

The lake has a surface area of 25 sq. km. at a surface elevation of 5 meters above MSL. The surface area increases to an area in excess of 60 sq. km. at a maximum flood level (about 10.5 meters MSL). The normal lake level during the wet season varies from 7 to 7.5 meters above MSL with a peak flood level exceeding elevation 10 meters. During any prolonged dry period, the lake level drops rapidly to about elevation 5 to 5.5 meters above MSL. The minimum level is elevation 4.5 meters above MSL.

At the present time, the lake discharge to the Bicol River is uncontrolled and varies from 115 cms at lake elevation 7.5 meters to 25 cms at elevation 5.5. At elevation 4.5 meters the discharge in negligible. By regulating the discharge to the Bicol River, water could be stored in the lake for release when needed for downstream irrigation.

The proposed improvements for the regulation of Lake Bato would consist of a gated control structure at the outlet of the lake, and the excavation of a low flow channel. The outlet control would be a reinforced concrete structure with two-8-meter wide high fixed wheel vertical lift gates and an ogee type ungated spillway. The low flow channel would require the dredging of selected reaches of the Bicol River to increase the low flow capacities. The total aggregate length of channel to be dredged would be 8 kilometers.

With these improvements the lake level could be regulated between elevation 4.5 to 7.5 meters above MSL, and would provide about 90 million cubic meters of usable storage for downstream irrigation. The existing

* Cubic Meter per second

areas presently being irrigated from the Bicol River during the dry season are 1,080 hectares in the Pili-Bula area, 600 hectares in the Baliwag-San Vicente area, and 80 hectares in the Naga-Calabanga area. The maximum projected areas to be irrigated from the Bicol River after project development would be about 2,400 hectares in the Pili-Bula IAD, about 6,300 hectares in the Baliwag-San Vicente Project, and about 5,000hectares in the Naga-Calabanga.

Other potential benefits included in the overall development of Lake Bato are fisheries, reduced sedimentation, navigation, and flood control.

Lake Bato-Pantao Bay Diversion Channel

This diversion is proposed by the GOP to divert peak flood flow directly from the basin to reduce damage to agriculture, residential and other projects. The diversion, in conjunction with control of the Lake Bato outlet, would intercept all flood flows from the 850 square kilometers drainage area upstream of Lake Bato and divert those flows directly to Pantao Bay. A map of the diversion channel is shown on page 29.

The flood storage capability of lake Bato would be utilized to absorb the peak upstream runoff and, thereby, reduce the required discharge capacity of the diversion channel. The design capacity of the channel was selected to be 450 CMS at a lake elevation of 9 meters above MSL. With this capacity, the maximum flood level in Lake Bato would be at an approximate elevation of 9.5 meters above MSL for the flood of-record.

The diversion channel could be either an open cut or a tunnel through the high coastal ridge. The type of channel will depend on the geology of the area and the cost estimate for each scheme.

Based on the geological findings, the underlying rock is considered to be of poor quality and tunneling would be difficult. An open cut channel could be excavated with normal excavating equipment and with a minimum of blasting. An open channel was selected for further evaluation. However, tunnel should be investigated as an alternative during the feasibility study.

The diversion channel would be approximately 10 kilometers in length, have a bottom width of 22 meters, a channel slope of 0.0009 and, at design discharge, a flow depth of 6 meters. The diversion channel would extend westernly from Lake Bato along the alignment of the Bulaang River, through a saddle (maximum elevation 80 meters above MSL) in the coastal hills and than along the alignment of the Macabugo River to Pantao Bay.

The excavated section would be benched (berms) on both sides for slope stability and ease of construction. The lower bench could be paved and be used as a roadway to provide access to the presently isolated coastal area.

A gated control structure and closure dike at the outlet of Lake Bato would fully control all discharge from Lake Bato to the Bicol River. There would be a gated control structure at the outlet to the diversion channel to control normal or storage levels in Lake Bato.

Based on the mathematical model LATIS[11/] Lake Bato-Pantao Bay Diversion channel was found to be the most effective flood control scheme for the Bicol River Basin. The model was used to compare the water levels that would occur with flood control works in place. Table 2.1 shows a comparison of water elevation with other flood control schemes. Lake Bato-Pantao Diversion would lower the flood elevation at: Lake Bato by 2.69 meters, Sto. Domingo by 2.16 meters, and at Ombao by 0.71 meters.

Whereas the development in Lake Bato will increase the amount of stored water to augment dry season irrigation, this will also make the areas susceptible to flooding. The Lake Bato-Pantao Bay Diversion Channel can spill off the excess water when heavy rains come at the time when the reservoirs are full or nearly full. It seems to be the most cost-effective means of discharging surplus water from Lake Bato. The channel as designed could reduce the duration of flooding by 30 to 50%.

The feasibility study to be undertaken by the GOP will assess all possible economic and social effects of the channel. The feasibility study is proposed to be financed through the U.S. AID Consulting Services Loan.

TABLE 2.1[II/]

Location	Calibration Run	Balongay Tidal Barrier	Bicol-Ragay Diversion	Elevation, Meters, MSL Sipocot-San Miguel Diversion	Lake Bato-Pantao Bay Diversion
Balongay	3.44	1.84	3.44	3.44	3.44
Cutoff No. 1	2.54	1.99	2.52	2.54	2.55
Naga	2.96	2.86	2.78	2.96	2.94
Ombao	7.74	7.73	7.40	7.74	7.93
Sto. Domingo	9.83	9.83	9.80	9.83	7.67
Libmanan	3.35	3.23	3.35	3.31	3.35
Sipocot	12.41	12.41	12.41	9.51	12.41
Sabang	13.31	13.31	13.31	13.02	13.31
Lake Bato	10.36	10.36	10.34	10.36	7.67

11/ Comparison of maximum flood elevation using Typhoon Sening flood and surge.

Rehabilitation of Existing System

About 6,000 hectares of existing Barit, Waras and other irrigation systems ranging from 100 to 600 hectares would require rehabilitation to facilitate on-farm water management.

The rehabilitation will include: additional irrigation and drainage facilities, farm service roads, desilting of canals, and other facilities to adopt rotational control of irrigation water.

Roads

There are in the project area 445 kilometers of roads. Of these, only 8 per cent are concrete, 5 per cent asphalt, 27 per cent gravel and 56 per cent earth roads. The gravel earth roads are in very bad condition and the majority are not passable during the rainy season. This condition results in high transport costs both for passengers and for cargo traffic.

In the project identification process, conducted jointly with the local officials, five out of six municipalities and one city cited transportation as the number one problem in their area. The six municipality mayors and one city mayor have agreed to place high priority on the following secondary road projects:

a) Iriga-Buhi road (Rebuild existing road)
b) Nabua-Bulatan road (Rebuild existing road)
c) Buhi-Hanawan road (Rebuild existing road)
d) San Isidro-Tubigan road (Rebuild existing road)
e) Buhi-Tiwi road (New construction)

The five road projects have an aggregate length of 74 kilometers and are initially estimated to cost $1,418,000. The detailed cost estimates and the feasibilities of the initially identified priority projects will be established in the feasibility study. In addition, 70 kilometers of access roads will be added to irrigation projects and 40 kilometers of access roads will be added to the secondary road projects for a total of 110 kilometers with an estimated cost of $601,000. The location of the access roads and detailed cost estimates will be established in the feasibility study.

Watershed Protection

This project component has been identified as a critical element necessary for the attainment of the project objectives.[12] About 47,500 hectares of the non-arable lands within

12/ TAMS/TAE Report No. XXXI, June 24, 1976, pp. 18-19.

the project are steeply sloping lands. Protection of this watershed area will be done through a combination of vegetative and mechanical controls of steep areas. The vegetative means will be done through reforestation and/or agro-forestation using ipil-ipil (Leucaena Specie), pili, and other suitable species to be recommended by the Bureau of Forest Development. Mechanical controls will be done through the construction of any or all of the following: small earthen or rock check dams, small ponds or holding reservoirs, strip cropping, contour furrows and infiltration beds.

At this stage, the GOP has only identified 6,500 hectares for reforestation.[13/] The five-year cost for this effort is estimated to be $2.832 million. The yearly target area (hectares) is shown below:

Total	1st Year	2nd Year	3rd Year	4th Year	5th Year
6,500	2,368	1,856	726	725	725

Additional areas to be reforested, as well as the number of mechanical structures necessary to provide for comprehensive management of the Rinconada watershed will be analyzed in the feasibility study and identified at the Project Paper stage.

Extensive areas of land drain into or through the Rinconada. These areas include about 60,000 hectares, and a portion of the steep slopes of Mayon Volcano. The surface run-off and suspended load from these areas will be quantified and the harmful effects reduced to extend the life of Lake Bato. Just like watershed management, the projects and the costs to mitigate the adverse effects from these areas on the project will be identified at the Project Paper stage and will be fully assessed in the feasibility study. The funding for this project component will be wholly GOP.

Agricultural Support Services

The following agriculture support services are planned by the GOP in direct support of the above project components and will be financed solely through GOP budgets.

1. Crop and Fish Production

Current agricultural productivity in the project area is low and unstable, particularly in regard to rice and fish. The average rice yield per hectare is only 40 cavans (1.76 metric tons) against a potential of 100 cavans (4.4 metric tons).

13/ See Annex J

The agricultural support services program is designed to intensify crop and fish production through the GOP line agencies concerned and promotion of agribusiness and rural banking which use corollary activities under the larger BRBDP program. Although the principal thrust is on irrigated rice, efforts will also be made to improve the productivity of rainfed rice, corn, sugarcane, coconut and abaca. Commercial vegetable and fruit production either as monoculture or in multiple cropping will also be encouraged to meet the expanding market potential. Intensified, applied research and demonstration will include on-farm water management, variety trials, fertilizer response, and multi-cropping. The University of Hawaii, for example, will have completed Phase I of their irrigation planning study for the 3,200-hectare Barit system in Rinconada which will be incorporated in the full feasibility study.

The average fresh water lake fish yield per hectare is only 200 kilos against a potential of two tons in fishponds and 8 tons in fish pens. The GOP proposes to introduce new technology into fish production management, including temperature and oxygen content levels, feed mixtures, and better fish rearing practices, improved marketing and storage methods, improved fishpond or fish pen management and better spawning, and fry and fingerling growth concepts that relate to market demands.

Intensified fish production in the three lakes (Bato, Buhi and Baao) will be achieved through fish pen culture technology. The principal species to be produced is bangus (milkfish). Production of monosexed tilapia and carp using fish pens will also be used depending on the conditions.

To achieve the targets of intensified crop and fish production, applied research training extension, and, in the case of fisheries, production of sufficient fry and fingerlings should be undertaken.

The existing pilot project on fish pen production in Lake Bato will be continued and expanded to the other lakes as water conditions permit. Studies will be undertaken on limnology, population dynamics, and pesticide and fertilizer residues. In addition, a study will be undertaken to determine the lake regulation stages which would maximize fish yields. Basic work will be done by BFAR (see below) and incorporated in the final feasibility study.

Agricultural support services for improving crop and fish production and marketing will require a GOP contribution of $526,000 (or ₱3,945,000).

2. Extension, Farm Institution Support Services & Manpower Training

The agricultural support activities in the Rinconada LAD will also be composed of the following sub-components: Integrated Extension System, Farm Institution Development, Manpower Training and Land Tenure Improvement.

a. Integrated Extension Services - This program is designed to strengthen the extension support service capability of the Area Development Team (ADT) for the Rinconada area. Basic to this, the program envisions instituting a reorientation process for the extension program and personnel of the various line agencies, conduct training programs for extension personnel, and undertake regular performance evaluation. With these, extension services will be better able to provide for the improvement of the agrarian structure, the development of workable farming systems, the improvement of the delivery systems for agricultural technology, and credit, and to increase the productivity of identified groups who need training in special skills.

The personnel for the program will be drawn from the Bureau of Agricultural Extension (BAEX), the Bureau of Plant Industry (BPI), the Bureau of Fisheries and Aquatic Resources (BFAR), the Department of Agrarian Reform (DAR), the Department of Local Government and Community Development (DLGCD), the Department of Health (DH), the Department of Education and Culture (DEC), and the National Irrigation Administration (NIA). Together they will work within the ADT mechanism of the Rinconada area which will serve as the integrating tool for the extension support services program and functions of the various line agencies operating within the program area. The program is designed to be carried out over a span of six years at a cost of $156,000 (or ₱1,170,000).

b. Farm Institutions Support Services Project - The aim of this project is to establish farm level organizational mechanisms to ensure optimum participation of the program beneficiaries in the Rinconada development efforts. Specifically identified for development are the compact farms, the samahang nayons and the irrigators association.

The compact farms are envisioned to be the primary production and management units in the area. They will serve as channels for the introduction and demonstration of recommended farm practices, and as the responsible groups to acquire and operate small farm machinery and other inputs for production.

The compact farm will be organized within the umbrella of the Samahang Nayon (SN) programs which are designed to constitute the core of the area marketing cooperatives. This policy will not only ensure that compact farm membership will come from the same SN but will also enable the compact farm to engage in the various programs of this pre-cooperative association, i.e., the samahang nayon.

The Irrigators' Association will be composed wholly of farmer tillers with farms inside the influence area of the irrigation systems, and this Association will be the vehicle for the institutionalization of efficient on-farm management practices. Its manner of organization will be mainly governed by set National Irrigators' Association (NIA) guidelines. The associations will have their own charter and will be registered with the Securities and Exchange Commission (SEC).

The entire project covering the development of compact farms, samahang nayons and the irrigators' association will be undertaken during a six-year time span at a total cost of $108,000 (or ₱810,000).

c. Manpower Training - A training sub-component will be prepared to meet present and future skills requirements in the area. More specifically, it is designed to impart management and technical skills to the Rinconada ADT regular and integral members, compact farms, samahang nayon and irrigators' association members. Training will cover farm management; crop production including multiple cropping techniques; off-farm income generating activities; on-farm management; farm mechanization; post harvest technology and the concepts and principles basic to compact farms such as pre-coop groups and irrigators' associations.

Training will be handled by a multi-disciplinary group of training specialists to be organized from among training personnel of the Department of Agriculture, the DAR, the DLGCD, the DOH, the DEC, the BFAR, the NIA and other concerned agencies. Existing training facilities will be utilized for the purpose and implementation will span a four-year period. The total initial estimated cost of this component is estimated to be $91,000 (or ₱683,000). The agencies will provide the training staff.

d. Land Tenure Improvement - This project will link completion of the land reformation efforts in the area. The target is to turn each one of the 3,533 farmer-tenants eligible under the law for Certificates of Land Transfer into amortizing owners. Moreover, another 5,171 share tenants within this project area will have received leasehold contracts prior to any fund disbursements under the proposed loans.

The total agricultural support services budget will require a local currency budget estimated at $881,000 (or ₱6,608,000) over a 5-year period and will be funded through the agencies concerned (with commitments under the total loans).

II. IDENTIFICATION AND EVALUATION OF ENVIRONMENTAL IMPACTS

IMPACT IDENTIFICATION AND EVALUATION FORM

Impact Areas and Sub-areas	Impact Identification and Evaluation 1/
A. LAND USE	
1. Changing the character of the land through:	
a. Increasing the population	L
b. Extracting natural resources	L
c. Land clearing	L
d. Changing soil character	M
2. Altering natural defenses	H
3. Foreclosing important uses	L
4. Jeopardizing man or his works	M
B. WATER QUALITY	
1. Physical state of water	M
2. Chemical and biological states	L
3. Ecological balance	M
C. ATMOSPHERIC	
1. Air additives	L
2. Air pollution	L
3. Noise pollution	L

1/ N - No environmental impact
L - Little environmental impact
M - Moderate environmental impact
H - High environmental impact
U - Unknown environmental impact

IMPACT IDENTIFICATION AND EVALUATION FORM 2

D. NATURAL RESOURCES

1. Diversion, altered use of water ---------- M

2. Irreversible, inefficient commitments --------- L

E. CULTURAL

1. Altering physical symbols ---------- N

2. Dilution of cultural traditions ---------- N

F. SOCIOECONOMIC

1. Changes in economic/employment patterns -------- H

2. Changes in population ---------- M

3. Changes in cultural patterns ---------- H

G. HEALTH

1. Changing a natural environment ---------- M

2. Eliminating an ecosystem element ---------- M

H. GENERAL

1. International impacts ---------- N

2. Controversial impacts ---------- N

3. Larger program impacts ---------- M

DISCUSSION OF IMPACTS

A. Land Use

1. Changing the character of the land through:

a. Increasing the population - The population of the Bicol River Basin is not expected to increase rapidly in the future. The increase due to reduced out-migration from the basin will probably be offset by the results of family planning efforts. Over-population is not expected to be a problem in the basin. One of the major benefits of this project is increased employment for the presently unemployed and underemployed Bicolanos. The small increase in population is expected to have little environmental impact.

b. Extracting natural resources - This project does not have any components which extract natural resources. The main thrust of this project is increasing the dry season river water available for irrigation. One beneficial side effect will be increased ground water recharge making more ground water available for municipal water supply in Rinconada and downstream, and also for farm irrigation downstream. This project component will have a little beneficial environmental impact.

c. Land clearing - This project has a small land clearing component. The areas to be cleared are (a) the 1,400 hectares of waterlogged land in the vicinity of Lake Baao, (b) the right-of-way for the Lake Bato-Pantao Bay Diversion Channel, (c) the right-of-way for the new Buhi-Tiwi secondary road, (d) minor portions of the right-of-way required for improvements to existing secondary and access roads, and (e) minor portions of right-of-way for irrigation system extensions and rehabilitations. Compared to the total Rinconada area, these areas to be cleared are minor and widely scattered. Appropriate measures will be taken during construction to reduce harmful impacts and the newly cleared areas will be planted to eliminate the long run harmful impacts. The land clearing components will have moderate environmental impacts during the construction phase and little impact during the long run.

d. Changing soil character - Increased irrigation may have some minor long run effects on the soil, but most of the lands have been intermittently irrigated for many years with no obvious harmful effects. Draining the 1,400 waterlogged hectares will probably change the soil character of this area and this will be studied in the feasibility study prior to any construction. The watershed protection

component will have a beneficial impact on the upland areas involved by reducing erosion and increasing the vegetative capacity of the soil. The overall effect of changing the character of the soil will have a moderate beneficial impact on the environment.

2. Altering natural defenses - Significant improvements to the natural defenses of the Rinconada area are planned. Flood control components will reduce the widespread damage now caused by annual floods. Watershed protection will reduce upland erosion. Improved drainage will reduce or eliminate localized flooding and ponding. Roads, drainage and irrigation facilities will be designed to improve the local environment. Some localized adverse impacts will occur during construction and these will be held to a minimum. The construction will be dispersed and will have a minor impact on the area as a whole. The improvements to the natural defenses of the Rinconada will have a high beneficial environmental impact.

3. Foreclosing important uses - Minor changes in present land use are planned. The areas that will have permanent changes in land use are (a) the 1,400 hectares of waterlogged land near Lake Baao, (b) the right-of-way for the Lake Bato-Pantao Diversion Channel, (c) the right-of-way for the new Buhi-Tiwi secondary road, and (d) minor additional right-of-ways required for secondary or access road construction. The waterlogged area will be studied during the feasibility study and the best use of this area determined. The diversion right-of-way is mostly upland forests in a remote location. The Buhi-Tiwi road right-of-way is mostly through mountain forest in a remote location. The minor additional rights-of-way required for secondary and access roads will be scattered throughout the entire Rinconada area. The changes in land use will not foreclose any important land use and will have little environmental impact.

4. Jeopardizing man or his works - The Rinconada area is part of the Bicol River Basin and the entire basin is in the path of frequent typhoons, is subjected to heavy rainfall, is near the active Mayon Volcano, and is an earthquake area. In short, it is a problem area and that is the reason for the Bicol River Basin Development Program with the Rinconada Integrated Area Development a part of that program. The designs for the various components of this project will consider these factors. The Rinconada area does not have any potential man-made disaster areas and the proposed construction will be well designed to avoid these problems and will have a moderate beneficial impact on the environment.

B. Water Quality

1. Physical state of water - The physical state of the water in the Rinconada area will be improved by this project. The watershed protection component will reduce upland soil erosion which will reduce siltation and improve the water quality in the streams, rivers and lakes. The completion of this project will have a moderate beneficial environmental impact on the physical state of water.

2. Chemical and biological states - The increased dry season irrigation will probably cause an increase in the amount of pollutants such as pesticides, herbicides and fertilizer. Improved farming practices will reduce these pollutants levels to acceptable standards over a period of years as the farmers learn proper dosages. The increased dry season flow will probably improve the quality of the Bicol River Water by diluting the existing pollutants in the water. The present quality of the dry season Bicol River water is poor. The additional flow will also prevent increased salinity intrusion in the lower Bicol River. In the long run, this project will have little effect on chemical or biological state of the water.

3. Ecological balance - The ecological balance will not be upset in the greatest portion of the Rinconada but will become more stabilized because of the project improvements. The ecological balance will be upset in the 1,400 waterlogged hectares in the vicinity of Lake Baao. This will be investigated during the feasibility study and the best solution recommended. Another area where the ecological balance will be upset is Pantao Bay on Ragay Gulf where large volumes of fresh water will be discharged into the sea water during heavy storm periods. This also needs to be investigated during the feasibility study. These two areas will probably have high ecological balance impacts, but the remaining Rinconada area will have little ecological balance impacts. Taken on an overall basis the entire Rinconada area will have moderate ecological balance environmental impacts.

C. Atmospheric

1. Air additives - The project has no components which will increase the quantity of air additives. There might be minor secondary long range effects as the farmers double crop their fields and spray more pesticides and herbicides from hand held sprayers. Because the chemicals are expensive and the farmers are frugal the excess spray will be minimal. Improved farming practices

will also reduce the amount of chemicals used and further reduce the excess spray. The environmental impact of air additives will be little.

2. Air pollution - The construction phase of this project will probably cause small increase in localized air pollution which will disappear as the construction is completed. Most of the irrigation systems flow by gravity. The few small pumped irrigation systems will probably be converted to electricity as rural electrification becomes available. The environmental impact of air pollution will be little.

3. Noise pollution - The construction phase of this project will probably cause a small increase in localized noise pollution which will disappear as the construction is completed. The completed project will have no component which increases noise pollution. The environmental impact of noise pollution will be little.

D. Natural Resources

1. Diversion-altered use of water - The proposed regulation of water in Lakes Buhi and Bato will not increase the lake level higher than levels previously experienced. The regulation will store the water in the lakes for longer periods of time and release it during the dry season when it is needed for downstream irrigation. The small diversion canal feeding water from the Barit irrigation system into Lake Baao will change the route of the water and the storage in Lake Baao will lengthen the travel time but the water will still eventually end up in the Bicol River as it now does. The diversion of flood waters from Lake Bato to Pantao Bay will reduce downstream flooding in the Bicol River and reduce the flood damages. The diversion, altered use of water will have a moderate environmental impact.

2. Irreversible, inefficient commitments - This project is planned to make efficient use of existing natural resources which will improve the quality of life for the Rinconada population. The irreversible commitment of natural resources for this project is the changed land uses as discussed in paragraphs 1-c and 1-d. The irreversible commitment of changed land uses will have little environmental impact.

E. Cultural

1. Altering physical symbols - This project will not alter any physical symbols of culture in Rinconada. It will have no

environmental impact on physical cultural symbols.

2. Dilution of cultural traditions - This project will not dilute any cultural traditions of Rinconada. It will have no environmental impact on cultural traditions.

F. Socio-Economic

1. Changes in economic/employment patterns - The main goal of this project is to bring about a sustained rise in income levels of the rural poor in Rinconada and the lower Bicol River Basin, increase employment and improve their life. This project will have a high environmental impact on the economic/employment patterns.

2. Changes in population - This project will slightly increase the population in Rinconada and the lower Bicol River Basin by reducing the out-migration of young Bicolanos searching for a better life elsewhere. This population inrease will probably be mitigated as family planning becomes more widely accepted. This project will have a moderate environmental impact on socio-economic changes.

3. Changes in cultural patterns - When the goal of this project is reached, there will be changes in the cultural patterns of the Bicolanos. The project goal is stated in paragraph F-1. The Bicolano family will have more spendable income and have more leisure time than ever before.. Surely this will bring about changes in cultural patterns. This project will have high environmental impact on changes in cultural patterns.

G. Health

1. Changing a natural environment - No major changes to a natural environment are planned for this project. Flood levels will be lowered and durations will be reduced but floods will not be eliminated. Harmful elements of the environment will be modified and made less harmful. This project will have a moderate environmental impact on changing a natural environment.

2. Eliminating an ecosystem element - The proposed draining of the 1,400-hectare waterlogged area will eliminate this swampy ecosystem element. This will be investigated during the feasibility study and the most beneficial use of this area will be determined. If the area is drained, this project will have a moderate environmental impact on eliminating an ecosystem element.

H. General

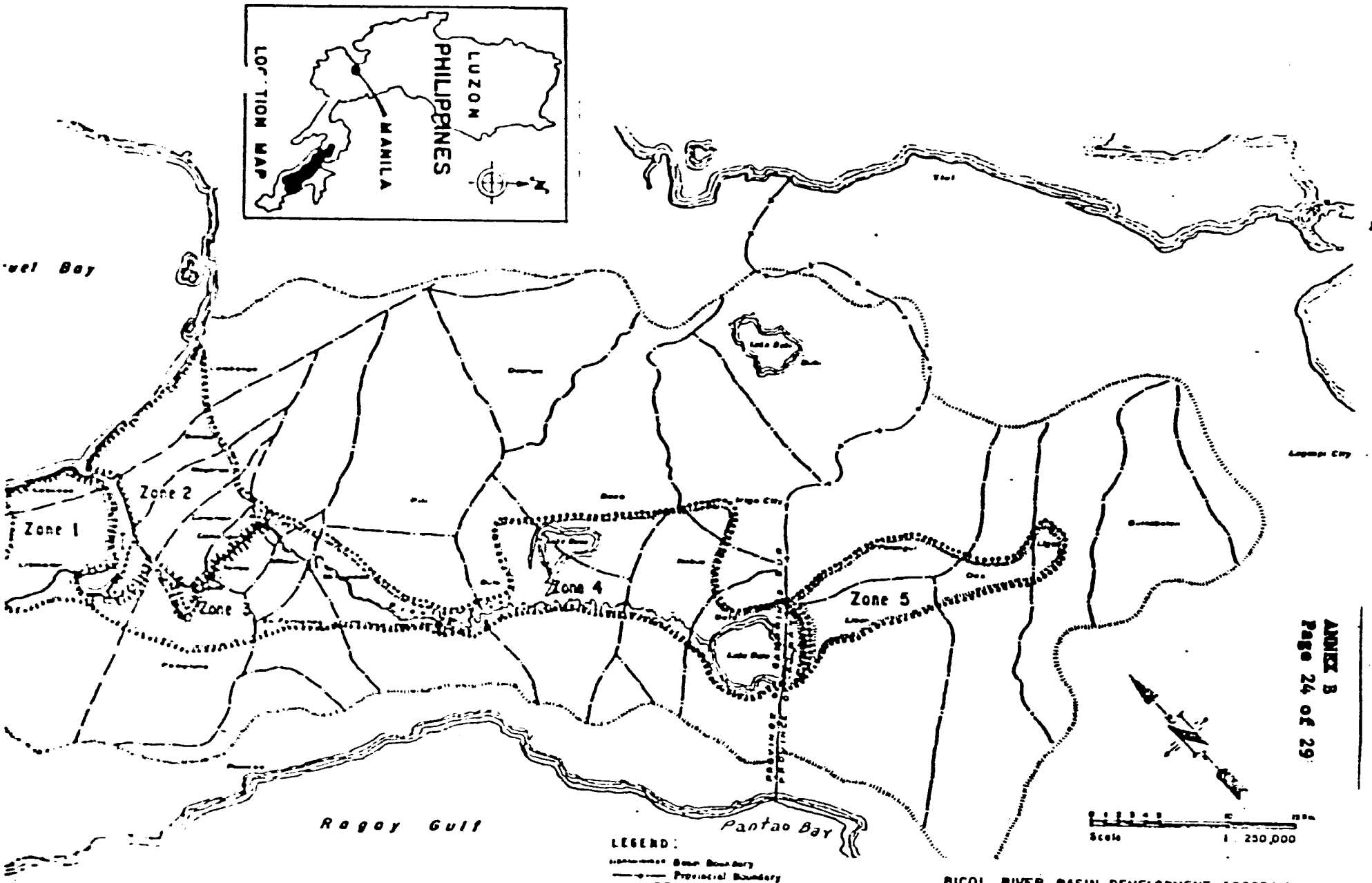
1. International impacts - This project does not have any international environmental impacts.

2. Controversial impacts - This project does not have any controversial environmental impacts. The entire project has been coordinated with the local and national governments by the Bicol River Basin Development Program Office. The local population are in favor of the proposed project improvements and believe that their lives will be improved when the project is completed.

3. Larger program impacts - The Rinconada project is one of ten Integrated Area Development (IAD) making up the entire Bicol River Basin Development Project . The proposed project drainage and irrigation components will have moderate beneficial environmental impacts on the downstream IADs. Initial Environmental Examinations will be prepared for these other IADs when funding is proposed.

II. Recommendation for Environmental Action

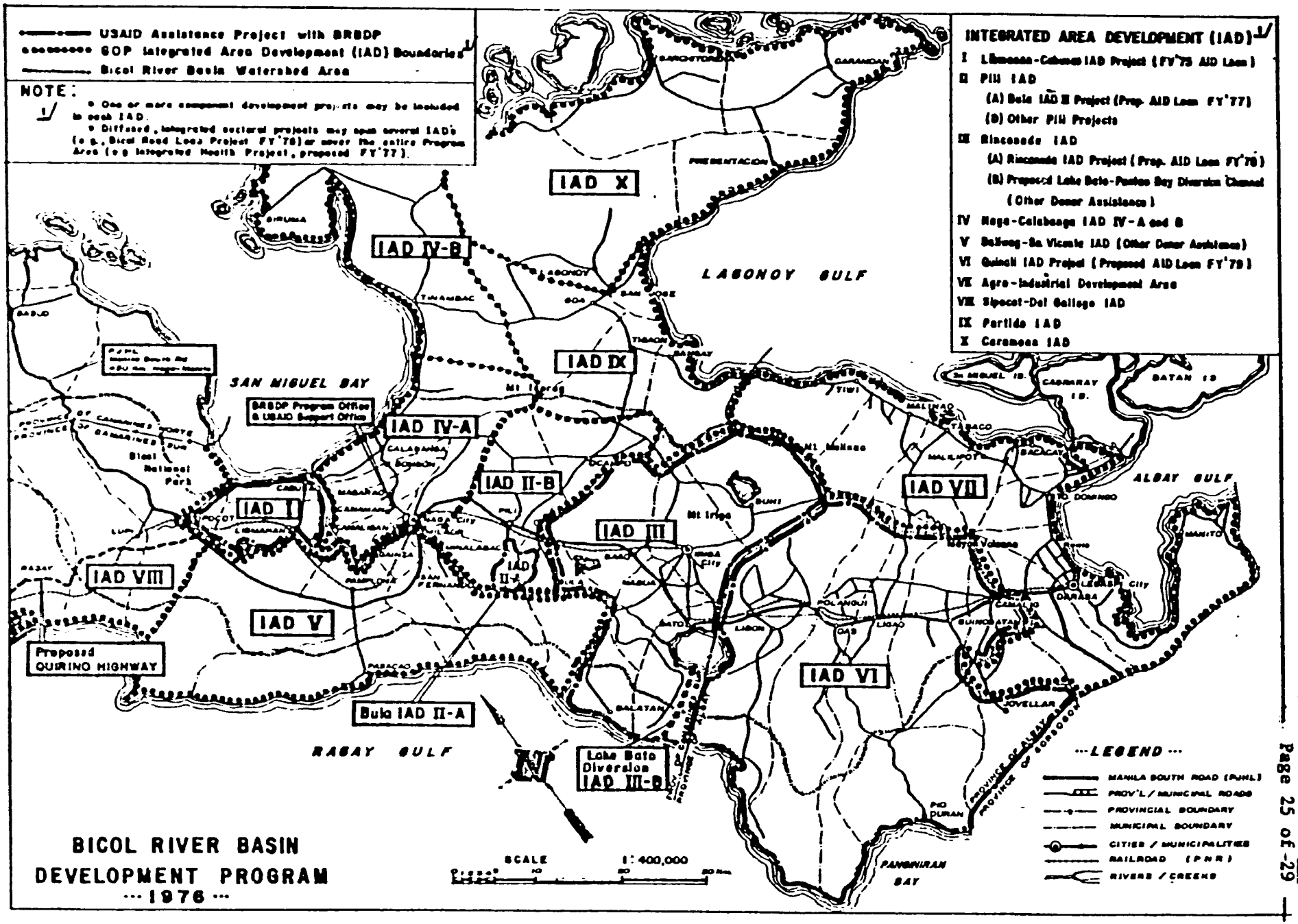
Based upon the foregoing review, this project will have a significant effect on the environment and, therefore, an Environmental Assessment is required.

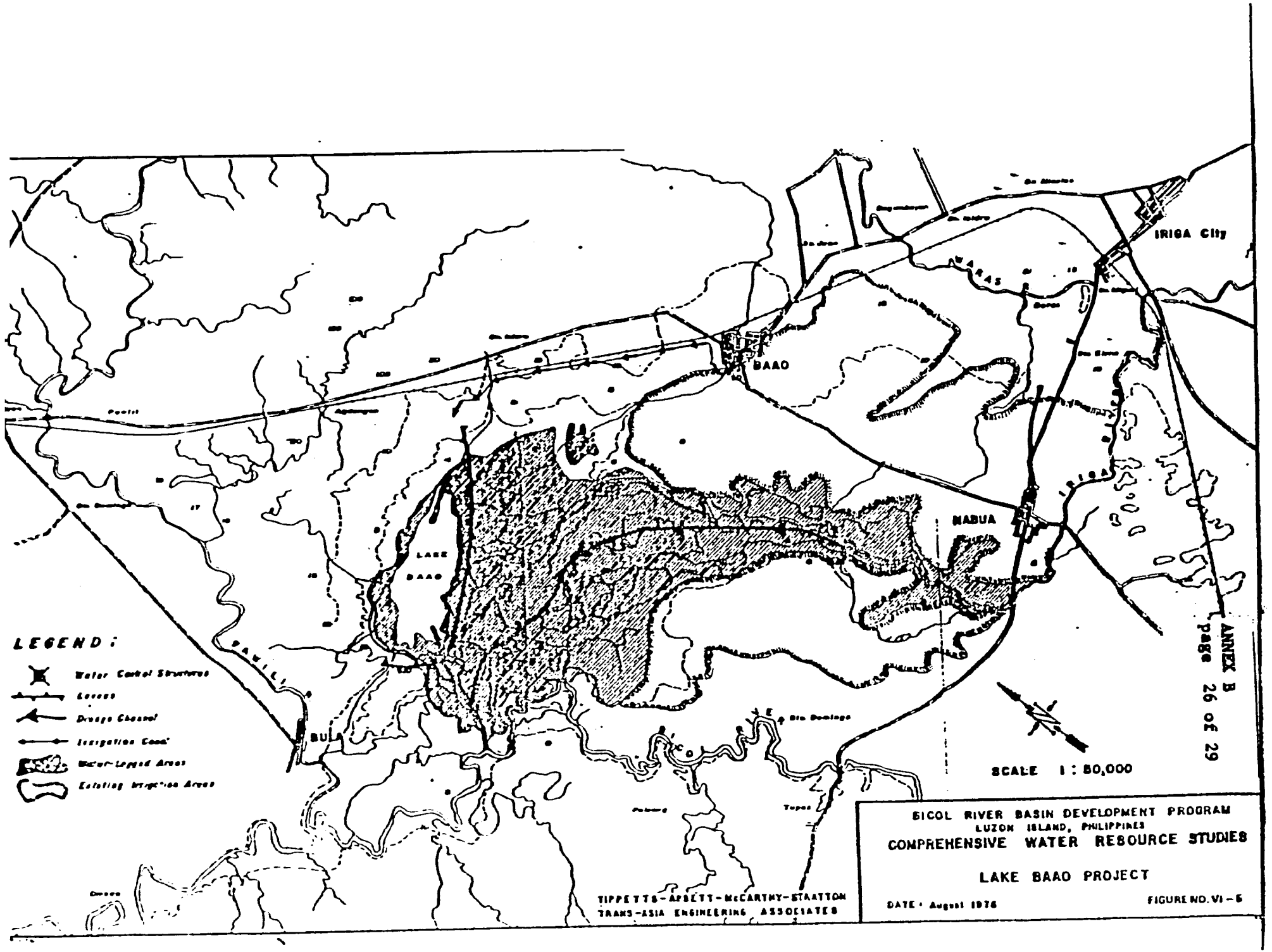


T:PFETTS - AEBETT - McCARTHY - STRATTON
TAAMS - ASIA ENGINEERING ASSOCIATES

BICOL RIVER BASIN DEVELOPMENT PROGRAM
LUZON ISLAND, PHILIPPINES
COMPREHENSIVE WATER RESOURCE STUDIES
MUNICIPALITIES and FLOOD ZONES

DATE August, 1976 FIGURE NO IV - 1


USAID Assistance Project with BRBDP
GOP Integrated Area Development (IAD) Boundaries 1/
Bicol River Basin Watershed Area
NOTE:
1/ • One or more component development projects may be included in each IAD.
• Diffused, integrated sectoral projects may span several IAD's (e.g., Bicol Road Loan Project FY'78) or cover the entire Program Area (e.g. Integrated Health Project, proposed FY'77).
INTEGRATED AREA DEVELOPMENT (IAD) 1/
I Libmanan-Cabusao IAD Project (FY'75 AID Loan)
II Pili IAD
(A) Bula IAD II Project (Prop. AID Loan FY'77)
(B) Other Pili Projects
III Rinconada IAD
(A) Rinconada IAD Project (Prop. AID Loan FY'78)
(B) Proposed Lake Bato-Pantao Bay Diversion Channel (Other Donor Assistance)
IV Naga-Calabanga IAD IV-A and B
V Baliwag-San Vicente IAD (Other Donor Assistance)
VI Guinobatan IAD Project (Proposed AID Loan FY'79)
VII Agro-Industrial Development Area
VIII Sipocot-Del Gallego IAD
IX Partido IAD
X Caramoan IAD
IAD X
IAD IV-B
IAD IX
IAD IV-A
IAD II-B
IAD I
IAD III
IAD VII
IAD VIII
IAD V
IAD VI
IAD II-A
Bula IAD II-A
Lake Bato Diversion IAD III-B
LABONOY GULF
SAN MIGUEL BAY
ALBAY GULF
RAGAY GULF
PANGANIRAN BAY
BRBDP Program Office & USAID Support Office
Proposed QUIRINO HIGHWAY
Bicol National Park
Mt Iriga
Mt Malinao
Mt Isarog
SCALE 1:400,000
BICOL RIVER BASIN DEVELOPMENT PROGRAM
... 1976 ...
... LEGEND ...
MANILA SOUTH ROAD (PNHL)
PROV'L / MUNICIPAL ROADS
PROVINCIAL BOUNDARY
MUNICIPAL BOUNDARY
CITIES / MUNICIPALITIES
RAILROAD (PNR)
RIVERS / CREEKS

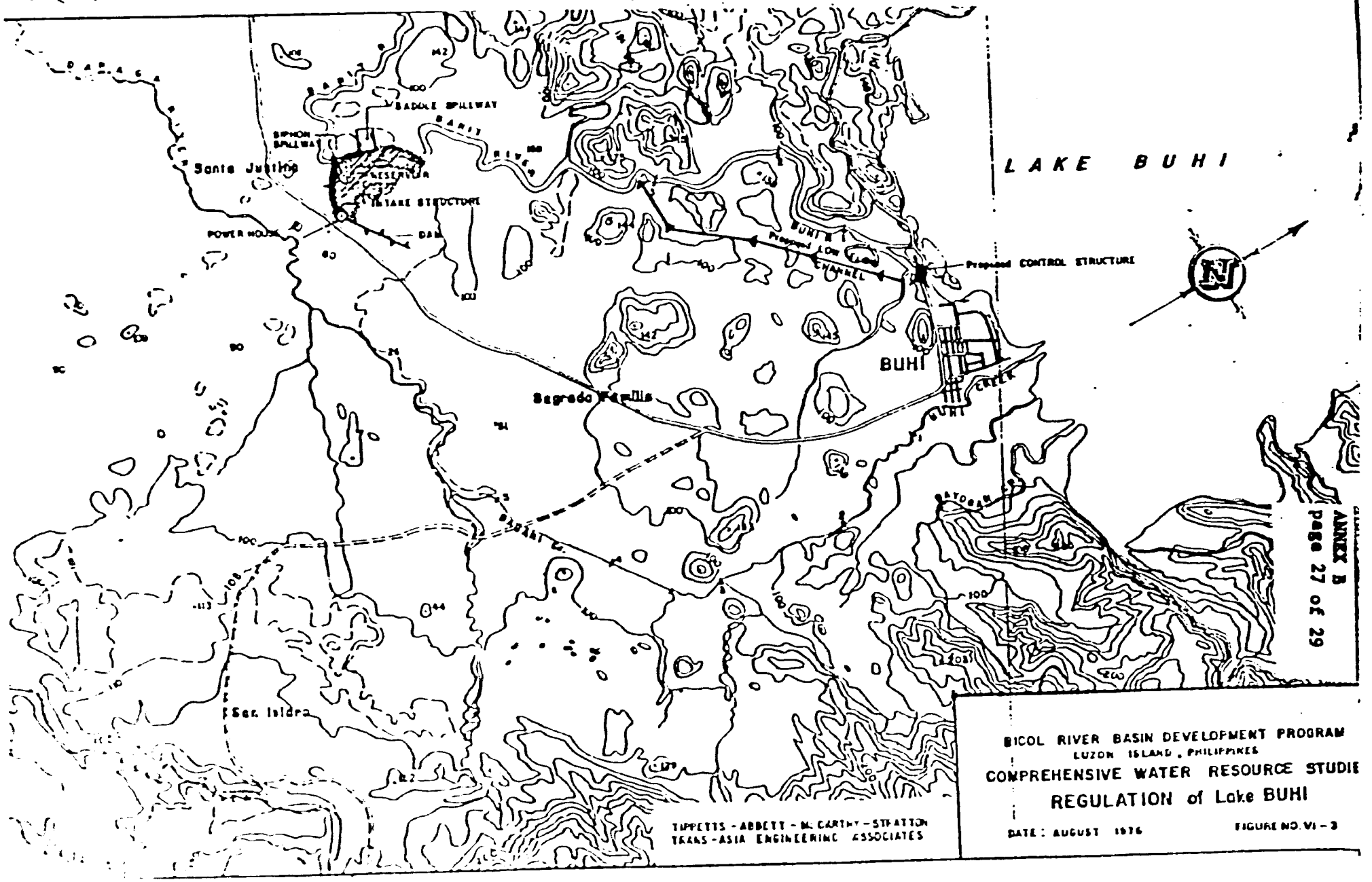


BICOL RIVER BASIN DEVELOPMENT PROGRAM
LUZON ISLAND, PHILIPPINES
COMPREHENSIVE WATER RESOURCE STUDIES

LAKE BAAO PROJECT

DATE : August 1976

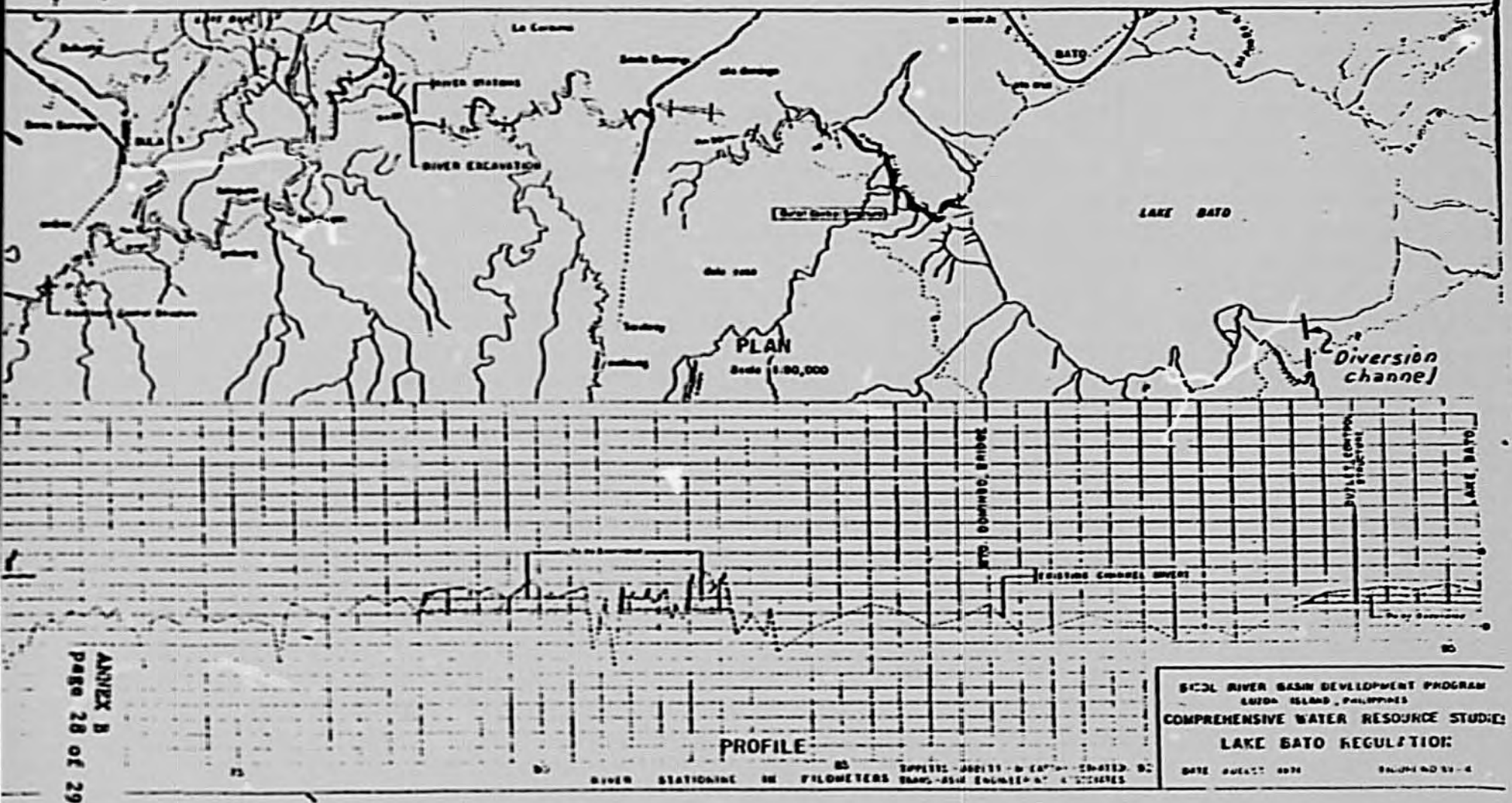
FIGURE NO. VI – 6



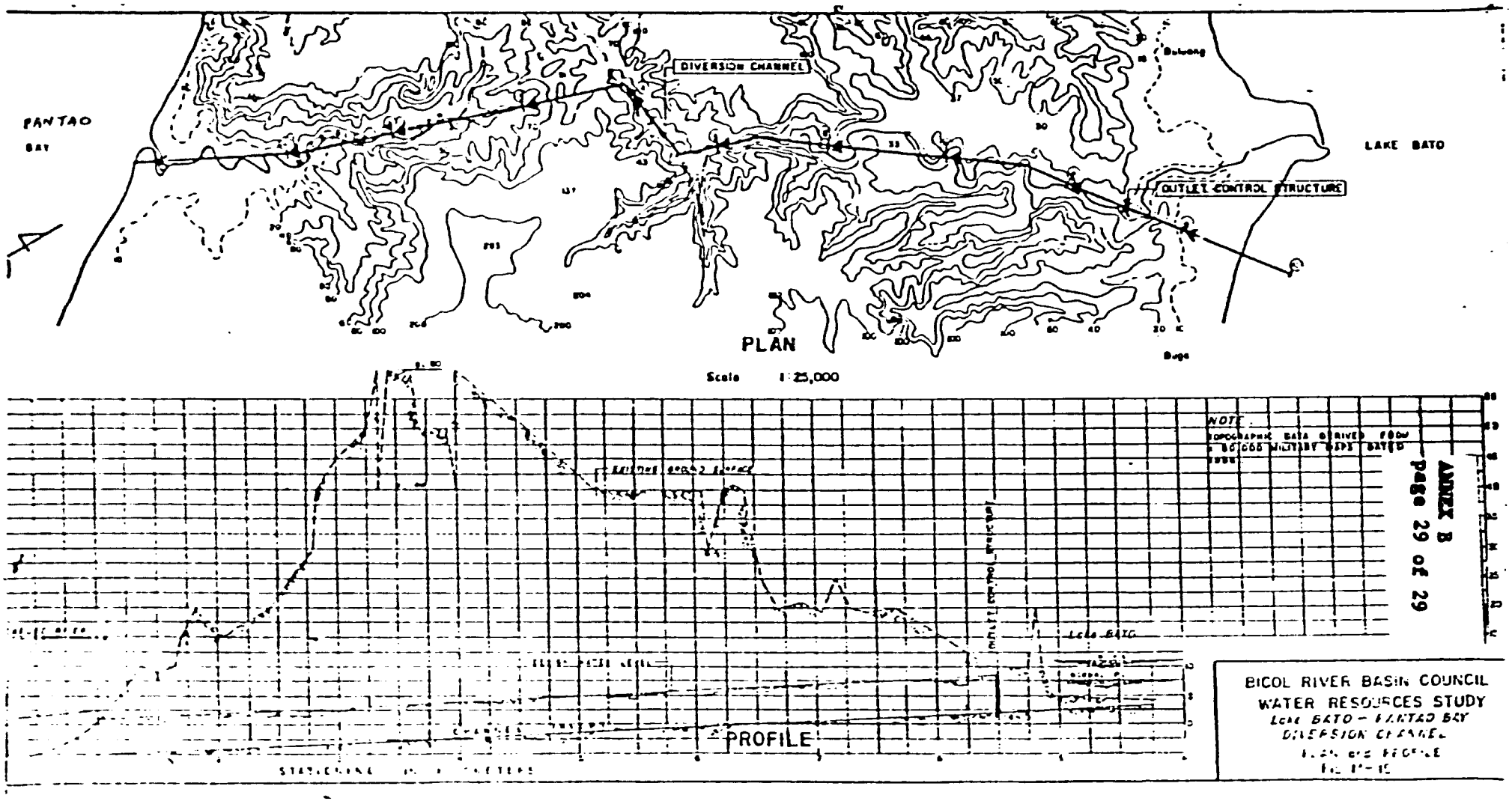
BICOL RIVER BASIN DEVELOPMENT PROGRAM
LUZON ISLAND, PHILIPPINES
COMPREHENSIVE WATER RESOURCE STUDIE
REGULATION of Lake BUHI

TIPPETTS - ABBETT - McCARTHY - STRATTON
TRANS-ASIA ENGINEERING ASSOCIATES

DATE: AUGUST 1976 FIGURE NO. VI - 3



BICOL RIVER BASIN DEVELOPMENT PROGRAM
LUZON ISLAND, PHILIPPINES
COMPREHENSIVE WATER RESOURCE STUDIES
LAKE BATO REGULATION



BICOL RIVER BASIN COUNCIL
WATER RESOURCES STUDY
LAKE BATO – PANTAO BAY
DIVERSION CHANNEL
PLAN AND PROFILE
FIG. B-15

ANNEX C

Life of Project: ______
From FY ______ To FY ______
Total U.S. Funding: ______
Date Prepared: ______

Project Title & Number: [illegible] INTEGRATED AREA DEVELOPMENT III (IAD III) [illegible]

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes: (A-1) [illegible]	Measures of Goal Achievement: (A-2) [illegible]	(A-3) 1. [illegible] multi-purpose survey. 2. Regional and local statistics. 3. Special surveys. 4. On-site observations.	Assumptions for achieving Goal Targets: (A-4) [illegible] 6. Political and economic stability. 7. Price stability. 8. Markets available for production increases.
Project Purpose: (B-1) 1. [illegible] 2. Improve distribution of income. 3. Increase popular participation.	Conditions that will indicate purpose has been achieved. End-of-Project Status. (B-2) [illegible]	(B-3) [illegible]	Assumptions for achieving Purpose: (B-4) [illegible]
Project Outputs: Stage II [illegible]	Magnitude of Outputs: Stage II (C-2a) [illegible]	Stage II (C-3a) [illegible]	Assumptions for achieving Outputs: Stage II (C-4a) [illegible]
Project Outputs: Stage I (C-1b) [illegible]	Magnitude of Outputs: Stage I (C-2b) [illegible]	Stage I (C-3b) [illegible]	Assumptions for achieving Outputs: Stage I (C-4b) [illegible]
Project Inputs: (D-1) [illegible]	Implementation Target (Type and Quantity) (D-2) [illegible] (See Financial Plan)	(D-3) [illegible]	Assumptions for providing Inputs: (D-4) [illegible]

[illegible]

COST ESTIMATES AND ASSUMPTIONS[1/]

Presented herein are the cost estimates for all project components of the Rinconada IAD. The construction cost estimates are based on prices that would be paid under construction contracts in early 1976. The cost estimates include administration cost with allowance for right-of-way, relocations and project contingencies.

A. Lake Baao Development

This development, a sub-project of the Rinconada IAD, would include:

- A levee around the lower side of Lake Baao to maintain a controlled water depth in the lake for fisheries.
- The reclamation of 1,400 hectares of waterlogged lands.
- Irrigation development in the reclaimed area, 2,000 hectares on the periphery and about 1,000 hectares of higher lands.

The levee would have an average height of 3 meters and would extend from the high lands on the northeast to the high lands on the west of the lake. The total length of levee would be 5 kilometers. A mass concrete overflow spillway structure and an outlet channel would be required to handle flood flows.

The levee would have to be constructed with mechanical equipment. The excavation would be under water and the conditions are not suitable for manual work.

There is no data available on the foundation conditions, and some special foundation treatment may be required in critical reaches. The area is isolated and undeveloped so relocations and right-of-way should not be a problem. However, access and mobilization could require some special consideration.

The reclamation of the waterlogged area would require a main drain to be dredged from the Bicol River upstreams to the confluence of the Waras and Iriga Rivers. The main drain would have a minimum bottom width of 10 meters and a length of 7 kilometers. Existing channels would be excavated and improved where feasible, but in some reaches, these channels are filled with sediments. It has been assumed that a BPW's[2/] hydraulic dredge would be used for this project and that the spoil could be deposited on the adjacent low lands.

A supplemental network of collector and farm drains would be required to complete the drainage works.

1/ Taken from TAMS/TAE Technical Report No. XIX - Pre-feasibility Cost Estimates, Major Civil Works by Robert Finch, Consulting Cost Estimator

2/ Bureau of Public Works

The irrigation development would consist of a main canal extending from the existing Waras and Barit Irrigation Systems. The main canal would be 5 kilometers in length and extend along the high ground paralleling the railroad tracks. This canal would also supply water to Lake Baao to maintain the proper water level.

A supplemental network of irrigation laterals and terminal distribution channels would also be required to irrigate about 2,000 hectares including approximately 1,400 hectares of the reclaimed lands.

The estimated costs are shown in Tables D-1, D-2, D-3 and D-4.

B. Lake Buhi Regulation

This project would develop regulation facilities for controlling the discharge from Lake Buhi to conserve water for release when needed for downstream irrigation. These facilities would consist of a reinforced concrete, gated spillway and control structure at the outlet of Lake Buhi and an excavated low flow outlet channel.

The control structure would contain two (2) each vertical life gates with a width of 8 meters and a height of 6 meters. Vertical lift gates were selected to permit the raising at the gates above flood levels. An integral and substantial part of these gates is the frame and hoisting mechanism. It is estimated that each gate would weigh 15,000 kg; the frame, 12,000 kg; and the hoist, 10,000 kg. for a total weight of 37,000 kg/gate.

There is no sub-surface exploration at the structure site, but local outcrops of rock indicate that a good foundation for the structure is probably available.

The outlet channel would have a bottom width of 10 meters and an average depth of excavation of 6 meters. The channel would be approximately 3 kilometers in length and would generally parallel the Buhi River. A separate low flow channel was considered because flows must be maintained in the Buhi River for operation of the Barit Hydro-Electric Plant and for downstream irrigation requirements. Also, the existing channel is though rock and large boulders and lowering the invert could be an extremely difficult excavation.

The estimated construction cost of the control structure and low flow channel is shown in Table D-5. The contingency factor has been increased because of the uncertain foundation conditions, and because of the possibility of rock excavation in the low flow channel.

C. Lake Bato Regulation

This project would develop regulation facilities for controlling

the discharge from Lake Bato to conserve water for release when needed for downstream irrigation. These facilities would consist of a reinforced concrete, gated control structure at the outlet of Lake Bato, and the dredging of a low flow channel through selected reaches of the Bicol River.

The control structure would contain two (2) each vertical lift gates with a width of 8 meters and a height of 6 meters. Vertical lift gates were selected to permit the raising of the gates above flood levels. There is no sub-surface exploration at the structure site, but the borings at the site of the Sto. Domingo Bridge indicated intermittent strata of soft sandy silt and clay. The foundation for the structure could be a problem, and it was assumed that it would be founded on concrete piles. Some seepage control may also be necessary.

The structure would be constructed in a bend off the existing channel. Water control during construction should not be a significant problem. Spoil from the dredging of the inlet and outlet channel to the structure would be used for closure of the existing river channel.

The low flow channel would have a bottom width of 10 meters and an average depth of excavation of 2 meters. The total aggregate length of dredging would be 8 kilometers.

The estimated construction cost of the control structure and low flow channel is shown in Table D-6.

D. Lake Bato-Pantao Bay Diversion Channel

The Lake Bato-Pantao Bay Diversion Channel Project would consist of a 10-kilometer long diversion channel through the hills between Lake Bato and Pantao Bay, a gated concrete control structure at the inlet to the diversion channel, a closure levee 3-kilometer long and 3-1/2 meter high at the Bicol River outlet of Lake Bato, and the addition of flood control gates to the proposed control structure at the inlet to the Bicol River.

Site Conditions

The construction area along the alignment of the diversion channel is open and undeveloped, and access, right-of-way and relocations should not be a significant problem. However, a temporary Pier would probably be required on Pantao Bay for the landing of equipment and petroleum products.

Exposed rock along the alignment is shattered or decomposed shale. It was estimated that only 10-15 percent of the excavating would require drilling or blasting. The remainder could be excavated by shovels, tractors and elevated loaders. The total volume of excavation would be

approximately 17,000,000 cubic meters in place or 20,000,000 cubic meters loose. The undulating, undeveloped terrain adjacent to the excavation would provide a ready spoil area for the excavated material.

Details of Cost Estimate

The total cost of all construction work, estimated to pre-feasibility standards, would be P98,000,000. The investment cost would be about P105,000,000. Right-of-way and relocation costs have not been included, but the area is undeveloped and these costs should be minimal.

This cost estimate is based on a 5 year- construction schedule of 2, 10-hour shifts per day, 300 days, per year. This schedule would require a production rate of 700 cubic meters of excavation per hour.

It has been assumed that the work be performed by a Filipino/Foreign Joint Venture with duty free import of equipment and fuels. Only the top management would be foreign personnel and all other work would be done by Filipino Nationals.

Mobilization of the equipment and of the facilities for their efficient operation and maintenance would be a significant aspect of the project. Mobilization would include the construction of a temporary pier, of a staging area for the assembly and storage of equipment, of fuel handling and storage facilities, of warehouses, maintenance shops and camp facilities. Due to the weather conditions and the duration of the project, all equipment and facilities should be durable and new, or in such condition to permit continuous operation as scheduled. The estimated costs are given in Tables D-8, D-9, D-10 and D-11.

Table D-1

LAKE BAAO DEVELOPMENT
COST ESTIMATE (TOTAL)

Item	Total Cost ($)	Total Cost (₱)
1. Lake Baao Levee and Outlet Works	$ 223,100	₱ 1,673,000
2. Drainage and Relocation Works	611,000	4,583,000
3. Irrigation Development	700,900	5,257,000
SUB-TOTAL	$1,535,100	₱11,513,000
4. Lake Baao Storage	266,700	2,000,000
5. On-Farm Development	320,000	2,400,000
TOTAL, Lake Baao Development	$2,121,800	₱15,913,000

Table D-2

LAKE BAAO LEVEE AND OUTLET WORKS
COST ESTIMATE (SUB-TOTAL)

Item	Unit Cost (₱)	Quantity	Total Cost ($)	Total Cost (₱)
1. Mobilization	L.S.		$ 6,670	₱ 50,000
2. Embankment (Equipment)	7.50/m^3	150,000m^3	150,000	1,125,000
3. Placement of 15 cm. River Run Gravel	20/m^3	2,000m^3	5,300	40,000
4. Outlet Channel Excavation	9.50/m^3	20,000m^3	15,870	119,000
5. Spillway Structure	L.S.		8,000	60,000
SUB-TOTAL			$185,870	₱1,394,000
6. Contingencies, 20%			37,200	279,000
TOTAL, Levee Project			$223,070	₱1,673,000

Table D-3 LAKE BAAO DRAINAGE AND RECLAMATION WORKS
COST ESTIMATED (SUB-TOTAL)

Item	Unit Cost (₱)	Quantity	($)	Total Cost (₱)
1. Mobilization	L.S.		$ 5,330	₱ 40,000
2. Dredging	9.50/m^3	400,000	506,670	3,800,000
3. Drainage Network	283/ha.	1,400	43,470	326,000
SUB-TOTAL			$555,470	₱4,166,000
4. Contingencies, 10%			55,600	417,000
TOTAL, Drainage and Reclamation			$611,070	₱4,583,000

Table D-4 LAKE BAAO IRRIGATION DEVELOPMENT
COST ESTIMATE (SUB-TOTAL)

Item	Unit Cost	Quantity	Total Cost ($)	Total Cost (₱)
Main Canal				
1. Common Excavation	5.00/m³	25,000m³	$ 16,670	₱ 125,000
2. Canal Embankmen	3.50/m³	15,000m³	6,930	52,000
3. Service Road	28,000/km	5km	18,670	140,000
4. Misc. Structures	"L.S."		6,670	50,000
SUB-TOTAL			$48,940	₱ 367,000
5. Contingencies, 10%			4,930	37,000
TOTAL, Main Canal			$53,870	₱ 404,000
Service Area				
6. Laterals	1,800/ha.	2,000has.	$480,000	₱3,600,000
7. Terminal Irrigation	406/ha.	2,000has.	108,270	812,000
SUB-TOTAL			$588,270	₱4,412,000
8. Contingencies, 10%			58,800	441,000
TOTAL, Service Area			$647,070	₱4,853,000
9. Lake Buhi Storage	1,000/ha.	2,000has.	266,670	2,000,000
TOTAL, Irrigation Development			$967,610	₱7,257,000

Table D-5 LAKE BUHI REGULATION
COST ESTIMATE (TOTAL)

Item	Unit Cost	Quantity	Total Cost ($)	Total Cost (₱)
Control Structure				
1. Mobilization	L.S.		$ 20,000	₱ 150,000
2. Diversion & Water Control	L.S.		6,670	50,000
3. Cofferdams	10/m³	10,000m³	13,330	100,000
4. Mass Concrete	330/m³	600m³	26,400	198,000
5. Structural Concrete	660/m³	1,200m³	105,600	792,000
6. Reinforcing Steel	4.75/kg.	120,000kg.	76,000	570,000
7. Vertical Lift Gate	25/kg.	74,00kg.	246,670	1,850,000
SUB-TOTAL			$494,670	₱3,710,000
8. Contingencies, 15%			74,130	556,000
TOTAL, Control Structure			$568,800	₱4,266,000
Low Flow Outlet Channel				
9. Mobilization	L.S.		$ 13,330	₱ 100,000
10. Channel Excavation and Disposal	7.50/m³	260,000/m³	260,000	1,950,000
SUB-TOTAL			$273,330	₱2,050,000
11. Contingencies, 20%			57,330	430,000
TOTAL, Low Flow Channel			$330,670	₱2,480,000
TOTAL, Lake Buhi Regulation			$899,470	₱6,746,000

Table D-6

LAKE BATO REGULATION
COST ESTIMATE (SUB-TOTAL)

Item	Unit Cost	Quantity	Total Cost ($)	Total Cost (₱)
1. Mobilization	L.S.		$ 13,333	₱100,000
2. Channel excavation	9.50/m³	200,000m³	253,333	1,900,000
3. Concrete Piles	80/m	750m	8,000	60,000
4. Mass Concrete	330/m³	300m³	13,200	99,000
5. Structural Concrete	660/m³	1,000m³	88,000	660,000
6. Reinforcing Steel	4.75/kg	100,000kg.	63,333	475,000
7. Vertical Lift Gates 2 -8m x 6m	25/kg	74,000kg.	246,667	1,850,000
SUB-TOTAL			$685,867	₱5,144,000
8. Contingencies			258,533	1,939,000
TOTAL			$944,400	₱7,083,000

Table D-7

DIVERSION DAM AT CHANNEL INLET
AT LAKE BATO
COST ESTIMATE (SUB-TOTAL)

The following estimate for gates and miscellaneous works was based on the review of the costs of the Barit and Sto. Tomas Dams.

Item	Unit Cost	Quantity	Total Cost ($)	Total Cost (₱)
1. Concrete	600/m³	7,500m³	$600,000	₱4,500,000
2. Gates and Misc.	L.S.		250,000	1,875,000
SUB-TOTAL			$850,000	₱6,375,000
3. Mobilization, Overhead and Project			200,000	1,500,000
TOTAL, Diversion Dam			$1,050,000	₱7,875,000

Table D-3 LAKE BATO-PANTAO BAY DIVERSION CHANNEL COST ESTIMATE (TOTAL)

			Total Cost	
		($)		(₱)
1. Mobilization and Demob		$1,371,467		₱10,286,000
2. Equipment, Spare Tires and Fuel		4,573,733		34,303,000
3. Labor		1,373,067		10,298,000
4. ANFO, Wire and Blasting Caps @ $.75/lb. 2,000,000 m³ of Drilling & Blasting 1 lb/m³		1,500,000		11,250,000
5. Structures:				
Raising Existing Lake Bato Outlet Structure	$126,667		₱ 950,000	
Levees, Lake Bato Outlet	100,000		750,000	
Inlet Structure to Diversion Channel	466,667		3,500,000	
		693,333		5,200,000
6. Overhead and Project, 25%		2,377,867		17,834,000
TOTAL, Construction Cost		$11,889,467		₱89,171,000
7. Contingency, 10%		1,188,934		8,917,000
TOTAL, Lake Bato-Pantao Bay Diversion		$13,078,400		₱98,088,000

Table D-9 MOBILIZATION & DEMOBILIZATION FOR DIVERSION CHANNEL COST ESTIMATE (SUB-TOTAL)

Item	Unit Cost	Quantity	Total Cost ($)	Total Cost (₱)
1. Temporary Pier 27m x 15m	1.200/m^2	450m^2	$ 64,800	₱ 436,000
2. Staging Area	40/m^2	50,000m^2	266,667	2,000,000
3. Fuel Storage	75/BBL	10,000BBL	100,000	750,000
4. Office & General Warehouse	750/m^2	500 m^2	50,000	375,000
5. Parts Warehouse & Shops	500/m^2	500 m^2	33,333	250,000
6. Temporary Road	400,000/km.	5 km.	266,667	2,000,000
7. Water Supply & Distribution	L.S.		26,667	200,000
8. Sanitary System	L.S.		26,667	200,000
9. Temporary Power & Distribution	1,500/KVA	300 KVA	60,000	450,000
10. Camp Facilities	40/m^2	500 m^2	2,667	20,000
11. Fencing	15/m	10,000 m	20,000	150,000
12. Housing & Medical Facilities	1,000/m^2	200 m^2	26,667	200,000
13. Fixtures & Supplies	L.S.		53,333	400,000
SUB-TOTAL			$997,467	₱7,481,000
14. Misc. Small Tools, Supplies, Office Equipment	10%		99,733	748,000
SUB-TOTAL			$1,097,200	₱8,229,000
15. Demobilization	25%		274,267	2,057,000
TOTALS			$1,371,467	₱10,286,000

Table D-10

EQUIPMENT [illegible]
FOR [illegible] ON CHANNEL
COST ESTIMATE SUB-TOTAL

Item	Unit Cost	Quantity	(*)	Total Cost* (*)
1. Crane, 50 T for Pier	2,625,000	1 each	[illegible]50,000	$ 2,625,000
2. Track Dozers	1,125,000	6 each	900,000	6,750,000
3. Shovels, 32 yd	1,500,000	2 each	400,000	3,000,000
4. Front End Loader, Track, 4yd	1,000,000	2 each	266,667	2,000,000
5. Elevating Loader	400,000	2	100,667	800,000
6. Skidder, 518	400,000	2	100,667	800,000
7. Grader, 12G	500,000	2	133,333	1,000,000
8. Trunks, 5 yd	200,000	6	160,000	1,200,000
9. Scrapers 612	1,000,000	6	800,000	6,000,000
10. Conveyer Line, 500 meters	900,000	-	120,000	900,000
11. Dragline, 6 yd	2,000,000	1	266,667	2,000,000
12. Fuel Trunk, 3000 Gal	250,000	2	66,666	500,000
13. Service Trunk	200,000	2	53,332	400,000
14. Pickup	50,000	6	40,000	300,000
15. Jeeps	50,000	6	40,000	300,000
16. Compressor with drills	100,000	6	80,000	600,000
17. Manhauls	200,000	1	266,667	2,000,000
SUB-TOTAL			$4,156,267	$31,175,000
18. Spare Tires & P.O.L.	37.5%		1,560,933	$11,704,000
SUB-TOTAL			5,717,200	$42,879,000
19. Salvage, 20%		Less	1,142,467	8,576,000
TOTAL			$4,573,733	$34,303,000

* CIF Jobsite including spare parts.

Table D-11 CONTRACTOR'S ORGANIZATION AND LABOR FORCE FOR DIVERSION CHANNEL COST ESTIMATE (SUB-TOTAL)

Item	Quantity	Unit Cost ($)	Unit Cost (₱)	Total Cost ($)	Total Cost (₱)
Labor					
Project Manager	1	$100	₱750/day		
Chief Engineer	1	100	750/day		
Surveyors (2parties)	6men	18.50	100/day		
Construction Engineer	2	5.50	40/day		
Reports and Drafting	2	4	30/day		
	12	$222.00	1,670/day		
Construction Supt.	1				
Earthwork	2 men				
Roads	2 men				
Master Mechs.	2 men				
Fuel Dept.	2 men				
Harbor Chief	2 men				
	11 men	$40	300/day		
Purchasing Agent	1				
Comproller	1				
Accounts	4 men				
Payroll	2 men				
Timekeepers	2 men				
Camp. Mgr.	1				
Clerks, janitor & Drivers	25 men				
	36 men	$67	500/day		
Field Crews					
Operators	40 men				
Mechanics	25 men				
Helpers	25 men				
Service Mechanics	10 men				
	100 men	$267	2,000/day		
Common Labor	100 men	$200	1,500/day		
		$796	5,970/day		
TOTAL LABOR: 1,500 @ $796 - ₱970/day				$1,194,000	₱8,955,000
Insurance, Taxes, Severance, Vacations, 15%				179,067	1,343,000
TOTAL				$1,373,067	₱10,298,000

TABLE E-1

RINCONADA IAD
INFLATED FINANCIAL REQUIREMENTS
($000)

	77	78	79	80	81	82	TOTAL
I FLOOD CONTROL, IRRIGATION & DRAINAGE							
1. REGULATION OF LAKES							
a. ROW, Engineering & Design	705	803	534				2,042
b. Lake Bao Construction							
40% Mechanical etc. at 15%	387	556	240	275			1,458
Other at 6 or 7%/annum	496	660	263	280			1,699
Sub-total b	883	1,216	503	555			3,157
c. Lake Buhi Construction							
37% Mechanical at 15%	151	219	125	72			567
Other at 6 or 7%/annum	222	293	155	83			753
Sub-total	373	512	280	155			1,320
d. Lake Bato Construction							
41% Mechanical etc. at 15%	118	178	117	66	76		555
Other at 6 or 7%/annum	145	203	123	65	68		604
Sub-total d	263	381	240	131	144		1,159
e. Rehab. Communal Irrigation Systems	1,663	829	881	470	497		4,340
Sub-total (a,b,c,d & e)	3,887	3,741	2,438	1,311	641		12,018
2. LAKE BATO-PANTAO BAY DIVERSION							
a. ROW, Engineering & Design	464	531	353				1,348
b. Construction							
52% Mechanical etc. at 15%	2,584	3,900	2,562	1,474	1,694		12,214
Other at 6 or 7%/annum	2,045	2,859	1,771	926	986		8,557
Sub-total b	4,629	6,759	4,303	2,400	2,680		20,771
Sub-total a & b	5,093	7,290	4,656	2,400	2,680		22,119
CUMULATIVE TOTAL	8,980	11,031	7,094	3,711	3,321		34,137
II ROADS							
a. Access Roads		285	151	80	85		601
b. Secondary Roads							
30% Mechanical etc. at 15%		229	133	76	85		523
Other at 6 or 7%/annum		423	224	121	127		895
Sub-total b		652	357	197	212		1,418
Sub-total a & b		937	508	277	297		2,019
CUMULATIVE TOTAL	8,980	11,968	7,602	3,988	3,618		36,156
III AGRICULTURAL SUPPORT SERVICES**							
a. Integrated Extension Services		249	132	70	75		526
b. Training		43	39	39	35		156
Sub-total		54	66	37	42		199
		346	237	146	152		881
CUMULATIVE TOTAL	8,980	12,314	7,839	4,134	3,770		37,037
IV WATERSHED PROTECTION**							
10% Mechanical etc. at 15%	122	99	38	44	51		354
Reforestation at 6 or 7%/annum	948	713	254	272	291		2,478
Sub-total	1,070	812	292	316	342		2,832
GRAND TOTAL	10,050	13,126	8,131	4,450	4,112		39,869

**-Not funded by AID.

TABLE E-2

RINCONADA IAD
INFLATED AID CONTRIBUTION IN DOLLARS
($000)

	77	78	79	80	81	81	TOTAL
I FLOOD CONTROL, IRRIGATION & DRAINAGE							
1. REGULATION OF LAKES							
a. ROW, Engineering & Design		491	557	370			1,418
b. Lake Baao Construction							
40% Mechanical etc. @15%/yr.		271	389	168	193		1,021
Other @6%/yr.		345	459	182	193		1,179
Sub-total b		616	848	350	386		2,200
c. Lake Buhi Construction							
37% Mechanical etc. @15%/yr.		106	154	87	50		397
Other @6%/yr.		154	204	107	58		523
Sub-total c		260	358	194	108		920
d. Lake Bato Construction							
41% Mechanical etc. @15%/yr.		82	125	82	46	53	388
Other @6%/yr.		101	141	85	45	47	419
Sub-total d		183	266	167	91	100	807
e. Rehab. Communal							
Irrigation System @6%/yr.		1,157	575	610	324	342	3,008
Sub-total (a,b,c,d & e)		2,707	2,604	1,691	909	442	8,353
2. LAKE BATO-PANTAO BAY DIVERSION							
a. ROW, Engineering & Design @6%/yr.		229	261	173			663
b. Construction							
52% Mechanical etc. @15%/yr.		1,292	1,950	1,280	736	847	6,105
Other @6%/yr.		1,012	1,678	855	452	479	4,476
Sub-total b		2,304	3,628	2,135	1,188	1,326	10,581
Sub-total a & b		2,533	3,889	2,308	1,188	1,326	11,244
CUMULATIVE TOTAL		5,240	6,493	3,999	2,097	1,768	19,597
II ROADS							
a. Access Roads @6%/yr.			198	105	55	58	416
b. Secondary Roads							
30% Mechanical etc. @15%/yr.			161	93	54	60	368
Other @6%/yr.			293	155	83	88	619
Sub-total b			454	248	137	148	987
Sub-total a & b			652	353	192	206	1,403
GRAND TOTAL TO BE FUNDED BY AID		5,240	7,145	4,352	2,289	1,974	21,000

TABLE E-3

RINCONADA IAD
INFLATED GOP CONTRIBUTION IN DOLLARS
($000)

	77	78	79	80	81	82	TOTAL
I FLOOD CONTROL, IRRIGATION & DRAINAGE							
1. REGULATION OF LAKES							
a. ROW, Engineering & Design		214	246	164			624
b. Lake Baao Construction							
40% Mechanical etc. @15%/yr.		116	167	72	82		437
Other at 7%/yr.		151	201	81	87		520
Sub-total b		267	368	153	169		957
c. Lake Buhi Construction							
37% Mechanical etc. @15%/yr.		45	65	38	22		170
Other at 7%/yr.		68	89	48	25		230
Sub-total c		113	154	86	47		400
d. Lake Bato Construction							
41% Mechanical etc. @15%/yr.		36	53	35	20	23	167
Other @7%/yr.		44	62	38	20	21	185
Sub-total d		80	115	73	40	44	352
e. Rehab. Communal Irrigation System @7%/yr.		506	254	271	146	155	1,332
Sub-total (a,b,c,d & e)		1,180	1,137	747	402	199	3,665
2. LAKE BATO-PANTAO BAY DIVERSION							
a. ROW, Engineering & Design		235	270	180			685
b. Construction							
52% Mechanical etc. @15%/yr.		1,292	1,950	1,282	738	847	6,109
Other @7%/yr.		1,033	1,181	886	474	507	4,081
Sub-total b		2,325	3,131	2,168	1,212	1,354	10,190
Sub-total a & b		2,560	3,401	2,348	1,212	1,354	10,875
CUMULATIVE TOTAL		3,740	4,538	3,095	1,614	1,553	14,540
II ROADS							
a. Access Roads @7%/yr.			87	46	25	27	185
b. Secondary Roads							
30% Mechanical etc. @15%/yr.			68	40	22	25	155
Other @7%/yr.			130	69	38	39	276
Sub-total b			198	109	60	64	431
Sub-total a & b			285	155	85	91	616
CUMULATIVE TOTAL		3,740	4,823	3,250	1,699	1,644	15,156
III AGRICULTURAL SUPPORT SERVICES							
a. Integrated Extension Services			249	132	70	75	526
b. Training			43	39	39	35	156
Sub-total			54	66	37	42	199
			346	237	146	152	881
CUMULATIVE TOTAL		3,740	5,169	3,487	1,845	1,796	16,037
IV WATERSHED PROTECTION							
10% Mechanical etc. @15%/yr.		122	99	38	44	51	354
Reforestation @7%/yr.		948	713	254	272	291	2,478
Sub-total		1,070	812	292	316	342	2,832
GRAND TOTAL FUNDED BY GOP		4,810	5,981	3,779	2,161	2,138	18,869

TABLE E-4

RINCONADA IAD
NON-INFLATED FINANCIAL REQUIREMENTS
($000)

	77	78	79	80	81	82	TOTAL
I FLOOD CONTROL, IRRIGATION & DRAINAGE							
1. REGULATION OF LAKES							
a. ROW, Engineering & Design		624	669	418			1,711
b. Lake Baao Construction							
40% Mechanical etc.		293	366	137	137		933
Other		439	549	206	206		1,400
Sub-total b		732	915	343	343		2,333
c. Lake Buhi Construction							
37% Mechanical etc.		114	144	72	36		366
Other		196	244	122	61		623
Sub-total c		310	388	194	97		989
d. Lake Bato Construction							
41% Mechanical etc.		89	117	67	33	33	339
Other		128	169	96	48	47	488
Sub-total d		217	286	163	81	80	827
e. Rehab. Communal Irrigation System		1,472	690	690	346	344	3,542
Sub-total (a,b,c,d & e)		3,355	2,948	1,808	867	424	9,402
2. LAKE BATO-PANTAO BAY DIVERSION							
a. ROW, Engineering & Design		409	439	274			1,122
b. Construction							
52% Mechanical etc.		1,954	2,564	1,465	733	732	7,448
Other		1,803	2,367	1,353	676	676	6,875
Sub-total b		3,757	4,931	2,818	1,409	1,408	14,323
Sub-total a & b		4,166	5,370	3,092	1,409	1,408	15,445
CUMULATIVE TOTAL		7,521	8,318	4,900	2,276	1,832	24,847
II ROADS							
a. Access Roads			237	118	59	59	473
b. Secondary Roads							
30% Mechanical etc.			151	76	38	37	302
Other			352	176	89	88	705
Sub-total b			503	252	127	125	1,007
Sub-total a & b			740	370	186	184	1,480
CUMULATIVE TOTAL		7,521	9,058	5,270	2,462	2,016	26,327
III AGRICULTURAL SUPPORT SERVICES **							
a. Integrated Extension Service			203	101	50	50	404
b. Training			36	32	28	24	120
Sub-total			46	53	27	27	153
			285	186	105	101	677
CUMULATIVE TOTAL		7,521	9,343	5,456	2,567	2,117	27,004
IV WATERSHED PROTECTION**							
10% Mechanical etc.		92	65	22	22	22	223
Reforestation		828	582	194	194	194	1,992
Sub-total		920	647	216	216	216	2,215
GRAND TOTAL		8,441	9,990	5,672	2,783	2,333	29,219
YEARLY CUMULATIVE TOTAL		8,441	18,431	24,103	26,886	29,219	

**-Not funded by AID
All figures include 15% contingency.

TABLE E-5

RINCONADA IAD 1/
NON-INFLATED AID CONTRIBUTION IN DOLLARS
($000)

	77	78	79	80	81	82	TOTAL
I FLOOD CONTROL, IRRIGATION & DRAINAGE							
1. REGULATION OF LAKES							
a. ROW, Engineering & Design		437	468	293			1,198
b. Lake Baao Construction							
40% Mechanical etc.		205	256	96	96		653
Other		307	385	144	144		980
Sub-total b		512	641	240	240		1,633
c. Lake Buhi Construction							
37% Mechanical etc.		80	101	50	25		256
Other		137	171	85	43		436
Sub-total c		217	272	135	68		692
d. Lake Bato Construction							
41% Mechanical etc.		62	82	47	23	23	237
Other		90	118	67	34	33	342
Sub-total d		152	200	114	57	56	579
e. Rehab. Communal							
Irrigation System		1,030	483	483	242	241	2,479
Sub-total (a,b,c,d, & e)		2,348	2,064	1,265	607	297	6,581
2. LAKE BATO-PANTAO BAY DIVERSION							
a. ROW, Engineering & Design		204	219	137			560
b. Construction							
52% Mechanical etc.		977	1,282	732	366	366	3,723
Other		901	1,183	677	338	338	3,437
Sub-total b		1,878	2,465	1,409	704	704	7,160
Sub-total a & b		2,082	2,684	1,546	704	704	7,720
CUMULATIVE TOTAL		4,430	4,748	2,811	1,311	1,001	14,301
II ROADS							
a. Access Roads			166	83	41	41	331
b. Secondary Roads							
30% Mechanical etc.			106	53	27	26	212
Other			246	123	62	62	493
Sub-total b			352	176	89	88	705
Sub-total a & b			518	259	130	129	1,036
GRAND TOTAL TO BE FUNDED BY AID		4,430	5,266	3,070	1,441	1,130	15,337

1/ 1976 Prices.
All figures include 15% contingency.

TABLE E-6

RINCONADA IAD 1/
NON-INFLATED GOP CONTRIBUTION IN DOLLARS
($000)

	77	78	79	80	81	82	TOTAL
I FLOOD CONTROL, IRRIGATION & DRAINAGE							
1. REGULATION OF LAKES							
a. ROW, Engineering & Design		187	201	125			513
b. Lake Baao Construction							
40% Mechanical etc.		88	110	41	41		280
Other		132	164	62	62		420
Sub-total b		220	274	103	103		700
c. Lake Buhi Construction							
37% Mechanical etc.		34	43	22	11		110
Other		59	73	37	18		187
Sub-total c		93	116	59	29		297
d. Lake Bato Construction							
41% Mechanical etc.		27	35	20	10	10	102
Other		38	51	29	14	14	146
Sub-total d		65	86	49	24	24	248
e. Rehab. Communal Irrigation System		442	207	207	104	103	1,063
Sub-total (a,b,c,d & e)		1,007	884	543	260	127	2,821
2. LAKE BATO-PANTAO BAY DIVERSION							
a. ROW, Engineering & Design		205	220	137			
b. Construction							
52% Mechanical etc.		977	1,282	733	367	366	3,725
Other		902	1,184	676	338	338	3,438
Sub-total b		1,879	2,466	1,409	705	704	7,163
Sub-total a & b		2,084	2,686	1,546	705	704	7,725
CUMULATIVE TOTAL		3,091	3,570	2,089	965	831	10,546
II ROADS							
a. Access Roads			71	35	18	18	142
b. Secondary Roads							
30% Mechanical etc.			45	23	11	11	90
Other			106	53	27	26	212
Sub-total b			151	76	38	37	302
Sub-total a & b			222	111	56	55	444
CUMULATIVE TOTAL		3,091	3,792	2,200	1,021	886	10,990
III AGRICULTURAL SUPPORT SERVICES**							
a. Integrated Extension Services			203	101	50	50	404
b. Training			36	32	28	24	120
Sub-total			46	53	27	27	153
			285	186	105	101	677
CUMULATIVE TOTAL		3,091	4,077	2,386	1,126	987	11,667
IV WATERSHED PROTECTION**							
10% Mechanical etc.		92	65	22	22	22	223
Reforestation		828	582	194	194	194	1,992
Sub-total		920	647	216	216	216	2,215
GRAND TOTAL TO BE FUNDED BY GOP		4,011	4,724	2,602	1,342	1,203	13,882

**-Not [illegible]d by AID.
All figures [illegible]clude 15% contingency.

TABLE E-7

RINCONADA IAD
NON-INFLATED CASH FLOW 1/ IN PESOS
(₱000)

	77	78	79	80	81	82	TOTAL
I FLOOD CONTROL, IRRIGATION & DRAINAGE							
1. REGULATION OF LAKES							
a. ROW, Engineering & Design		4,679	5,348	3,342			13,369
b. Lake Baao Construction							
12% Mechanical etc.		659	878	329	290		2,156
Other		4,831	6,442	2,416	2,455		16,144
Sub-total b		5,490	7,320	2,745	2,745		18,300
c. Lake Buhi Construction							
37% Mechanical etc.		861	1,148	574	315		2,898
Other		1,467	1,955	978	460		4,860
Sub-total c		2,328	3,103	1,552	775		7,758
d. Lake Bato Construction							
41% Mechanical etc.		667	934	533	267	273	2,674
Other		959	1,343	768	384	378	3,832
Sub-total d		1,626	2,277	1,301	651	651	6,506
e. Rehab. Communal Irrigation System		11,040	5,520	5,520	2,760	2,760	27,600
Sub-total (a,b,c,d & e)		25,163	23,568	14,460	6,931	3,411	73,533
2. LAKE BATO-PANTAO BAY DIVERSION							
a. ROW, Engineering & Design		3,069	3,508	2,192			8,769
b. Construction							
52% Mechanical etc.		14,651	20,511	11,721	5,860	6,368	59,111
Other		13,524	18,934	10,819	5,410	4,902	53,589
Sub-total b		28,175	39,445	22,540	22,270	11,270	112,700
Sub-total a & b		31,244	42,953	24,732	11,270	11,270	121,469
CUMULATIVE TOTAL		56,407	66,521	39,192	18,201	14,681	195,002
II ROADS							
a. Access Roads			1,898	947	475	475	3,795
b. Secondary Roads							
30% Mechanical etc.			1,208	603	302	302	2,415
Other			2,818	1,409	704	704	5,635
Sub-total b			4,026	2,012	1,006	1,006	8,050
Sub-total a & b			5,924	2,959	1,481	1,481	11,845
CUMULATIVE TOTAL		56,407	72,445	42,151	19,682	16,162	206,847
III AGRICULTURAL SUPPORT SERVICES**			1,620	805	403	402	3,230
a. Integrated Extension Services			283	256	224	192	960
b. Training			369	424	216	216	1,224
Sub-total			2,276	1,485	843	810	5,414
CUMULATIVE TOTAL		56,407	74,721	43,636	20,525	16,972	212,261
IV WATERSHED PROTECTION**							
10% Mechanical etc.		690	518	172	172	173	1,725
Reforestation		6,210	4,657	1,553	1,553	1,552	15,525
Sub-total		6,900	5,175	1,725	1,725	1,725	17,250
CUMULATIVE TOTAL		63,307	79,896	45,361	22,250	18,697	229,511

**-Not funded by AID.
1/ 1976 Prices.
All figures include 15% contingency.
In 1978 $1.00 = ₱7.50; in 1979-1982 $1.00 = ₱8.0

Additional Feasibility Data and Analyses

The project will generate four types of direct benefits, namely: (a) incremental value added, (b) reduction in flood damage, (c) savings in transport costs, and (d) increased efficiency because of improved health, and more effective extension services, institutional development and other programs.

Incremental value added from rice will result from (a) increases in the cultivated area through the reclamation of waterlogged lands, (b) increases in area that will be irrigated, and (c) increases in the cropping intensity. The comparative analyses of rice production with and without the project are shown in Tables F-1 and F-2. This increase of 53,252 metric tons would create an increase of 33% in total rice production in the River Basin.

There will be a significant increase in fresh water fish production outputs because of the addition of Lake Baao to the area that can be used for fish production. It is projected that annual production will reach 1,050 metric tons of fish valued at $560 thousand. In addition, 2,100 metric tons can be expected from Lake Buhi and Bato with a yield of $1,127,700 annually.

Savings in flood damage and crop and fish losses will accrue to the project area and to areas in the lower basin. In fact the lower basin may benefit more than Rinconada because the water stored will irrigate 7,500 hectares in the lower basin and only 5,000 hectares in Rinconada.

The rain and flood waters that could be stored in Rinconada are useful for irrigation, but their storage also creates problems. As the water level rises in the Lake Bato reservoir during the rainy season the chance of flooding also increases. The larger rainstorms tend to come toward the end of the rainy season when the reservoir would be fairly full or during the early part of the dry season when the same reservoir conditions exist. In light of this fact, the TAMS/TAE Water Resources Survey recommended that the Lake Bato-Pantao Bay diversion channel should be examined in the forthcoming feasibility study as a way to rapidly drain surplus waters. Based on incomplete data and very limited analysis (i.e., the full potential benefits were not able to be examined due to time and lack of sufficient data), the limited and preliminary findings about the proposed diversion channel were not favorable. But, given the fact that the diversion channel may in fact be necessary to prevent the flooding that now exists without the storage structures, the consultants recommended its inclusion in the feasibility study. Based on this recommendation, the GOP has included the channel in the terms of reference for the feasibility study, as well as those for preliminary engineering design, and have requested that funds be included in this project for its construction.

The refinements needed to conclude the feasibility study on the Lake Bato-Pantao Diversion are not especially complex or lengthy, but complete analysis will be needed before a definitive judgment can be made about the channel's viability or necessity. Volume II, page IV-2 of the TAMS/TAE Report states that at least one tropical depression affecting the Basin Area can be expected every year. The information on damage caused by the December 1975 flood was collected by the TAMS/TAE consultants even though it was not included in their terms of reference. Agricultural damages[1/] in the December 1975 storm primarily damaged the November 1975 rice planting. Damages ranged from an estimated 25% reduction in yield to a complete loss. Most farmers replanted rather than accept lower yields. Other losses included livestock, 6,000 chickens and ducks, 13 carabaos, 172 swine and losses to the permanent crops of banana, papaya and coconut. Soil erosion and soil deposits caused damages in the upper basin. In some cases, soil deposition was beneficial such as around Lake Baao, but in the area around Lake Bato and upstream, the fertility of the soil was greatly reduced and actually covered some fields so heavily that replanting could not take place until the excess sand and gravel was removed.

Urban damage occurred in most towns affected by the floods. By way of example, the average loss per household ranged from a low of ₱253 to ₱510 to ₱489 to ₱1,487 per household at Ligao. The 1975 flood inundated in excess of 40,000 hectares and caused estimated damages of around $5 million.

In May of 1976 there was a tropical depression which caused serious damages to the Basin Area because of extensive flooding. Since this was merely a tropical depression, it probably will never be mentioned in the record books because there were no winds associated with it. However, it dropped as much rain and caused as severe flooding as typhoon Sening did in 1970. The rainfall was recorded, but this and other similar statistics were not gathered or analyzed in the TAMS/TAE report and must be fully considered in the feasibility study. It is these data and the analyses that will flow from them that will ultimately determine the economic viability and/or necessity of the diversion channel.

Tabulated below are the storm frequencies and the amount of rainfall that can be expected with each storm based on a 14-year record period. TAMS/TAE looked at Typhoon type storms which have a 10- to 13-year frequency, but there are frequent smaller storms that cause nearly as extensive damage because whether flooding lasts 7 days on 3 weeks is almost the same because 5 days flooding is sufficient to ruin rice and most of the other crops.

1/ Vol. II, page IV-4 TAMS/TAE Report, August 1976

STORM FREQUENCY: (AVERAGE OF 14-YR. PERIOD)

AMOUNT OF RAINFALL	NUMBER OF OCCURRENCES	
Less than 100 mm	220	per year
100 - 150 mm	6	-do-
150 - 200 mm	3	-do-
200 - 300 mm	2	-do-
300 - 400 mm	1	-do-
400 - 500 mm	1	per 7 years
More than 500 mm	1	per 14 years

Based on information available, the mean rainfall that produces severe floods is a 235 mm rainfall that drains into Lake Bato. As can be seen from the Table above, an average of 2 storms a year occurs with rainfall of 200-300 mm, 1 storm a year with 300-400 mm, 1 storm every 7 years with 400-500 mm and 1 storm every 14 years with more than 500 mm of rain. Consequently, there is a potential for 3 storms or more a year to cause severe flooding. Even though severe flooding may only occur if Lake Bato is full, the likelihood of this occurring appears certain on a fairly regular basis. Since the longest storms occur at the height of the rainy season, there seems to be a high probability that severe floods would occur almost annually instead of once every 10 years. Annual flood savings could prove the Lake Bato-Pantao Bay Diversion not only viable but necessary.

The frequency of potential flooding and the month of its occurrence need to be examined, along with the rate of the filling of Lakes Bato, Buhi and Baao. The necessity to save irrigation water must be balanced against the likelihood of heavy rainfall. It is clear that this conflict of timing which was not able to be examined by TAMS/TAE is a critical piece of information for proper feasibility determination. TAMS/TAE has already stated that further and more refined study was needed of flood damage in the feasibility study so that potential flood damage could be related to cycles of the harvest season. All of these studies can be combined.

Construction of roads to serve the irrigation areas will significantly increase access to the most productive cropland in the project area, and the new feeder roads will provide accessibility to the markets. They will also make a major contribution in reducing the cost of transportation. Available data and analysis show a possible reduction of at least 30% in both the cost of cargo and passenger traffic. Time savings along improved roads and along new roads should result in savings in time of 40% or more.

The agricultural support services program will assist in all aspects of crop and fish production and contribute to marketing efficiency that would directly benefit the farmer and assist in eliminating middleman profits. Land tenure improvements will contribute to increased production as a result of the increased incentives that will be realized by the farmer through land ownership.

The estimates of total project costs and the above-mentioned direct benefits will be the subject of a feasibility study. However, a pre-feasibility study that has recently been completed by TAMS/TAE Joint Venture (copies available in AID/W) has contributed significantly to this PRP. During the upcoming feasibility study, comparative analysis of family income and expenditures with and without the project will be developed, These and other economic and financial indicators as well as sensitivity analysis will also be developed during the feasibility study and will serve as the principal basis for the project paper.

The proposed LAD III project at this stage in the analysis includes only preliminary design of the physical infrastructure and it is not possible at this stage to make final judgments without preliminary engineering studies and/complete study of all of the sites. However, based on the experience and knowledge of the engineers involved in the study, there appears to be no impediments to development as described in this paper and it is expected that development can occur as scheduled. The project paper will reflect fully the findings and recommendations of the feasibility study.

A socio-economic evaluation of the Rinconada area has been made and it will be updated prior to the submission of the project paper to insure sociological and relevant attitudinal findings have been verified.

Table F-1 PRELIMINARY ESTIMATED RICE PRODUCTION IN TOTAL RINCONADA PROJECT AREA 1980

Without Project:

1.	Yield Per Hectare		
	a. Irrigated Land	-53 cavans(2.33 M.T.)/hectare/crop	
	b. Non-irrigated land	-31 cavans (1.36 M.T.)/hectare/crop	
2.	Cultivated Area		
	a. Area Irrigated	-8346 hectares	
	b. Area non-irrigated	-2784 hectares	
	c. Non-Cultivated	-1400 hectares	
3.	Crop Intensity	-2 crops/year - irrigated	
		-1 crop/year - non-irrigated	
		-1.55 crops/year	
4.	Total Production		
	a. Irrigated Land	-884,676 cavans/year	38,926 MT
	b. Non-Irrigated Land	- 86,304 cavans/year	3,797 MT
	c. Total Production	-970,980 cavans/year	42,723 MT

With Project:

1.	Irrigated Land	-74 cavans (3.26 MT) hectare/crop	
2.	11,130 hectares with 2 crops	-1,647,240 cavans/year	72,479 MT
	1,000 hectares with 1 crop	-74,000 cavans/year	3,256 MT
	400 hectares with no crops		
3.	Total Production	-1,721,240 cavans/year	75,735 MT
		-Additional Production	33,012 MT
4.	Cropping Intensity	- 1.86 crops/year	

44 kilos/cavan (Field Measure of Rice (Palay)

MT - Metric Tons

Table F-2 PRELIMINARY ESTIMATED INCREASED RICE PRODUCTION OUTSIDE THE RINCONADA PROJECT AREA IN 1980

IAD II (PILI-BULA)

Without Project:

1. Yield Per Hectare	
a. Irrigated Land	- 53 cavans (2.33 MT)/hectare/crop
b. Non-irrigated Land	- 31 cavans (1.36 MT)/hectare/crop
2. Cultivated Area	
a. Area Irrigated	- NA
b. Area Non-irrigated	- 2,500 hectares
c. Non-Cultivated	- --
3. Crop Intensity	- 2 crops/year - irrigated
	- 1 crop/year - non-irrigated
4. Total Production	
a. Irrigated Land	- NA
b. Non-irrigated Land	- 77,500 cavans (3,410 MT) /year
c. Total Production	- -----

With Project:

1. Irrigated Land 2,500 has	- 74 cavans (3.26 MT)/hectare/crop
	- 370,000 cavans (16,250 MT)/year
2. Non irrigated Land	- ------
3. Total Production	- Additional Production - 187,500 cavans (8,250 MT) per year
4. Cropping Intensity	- NA

Table F-2 (Cont'd) PRELIMINARY ESTIMATED INCREASED RICE PRODUCTION OUTSIDE THE RINCONADA PROJECT AREA IN 1980

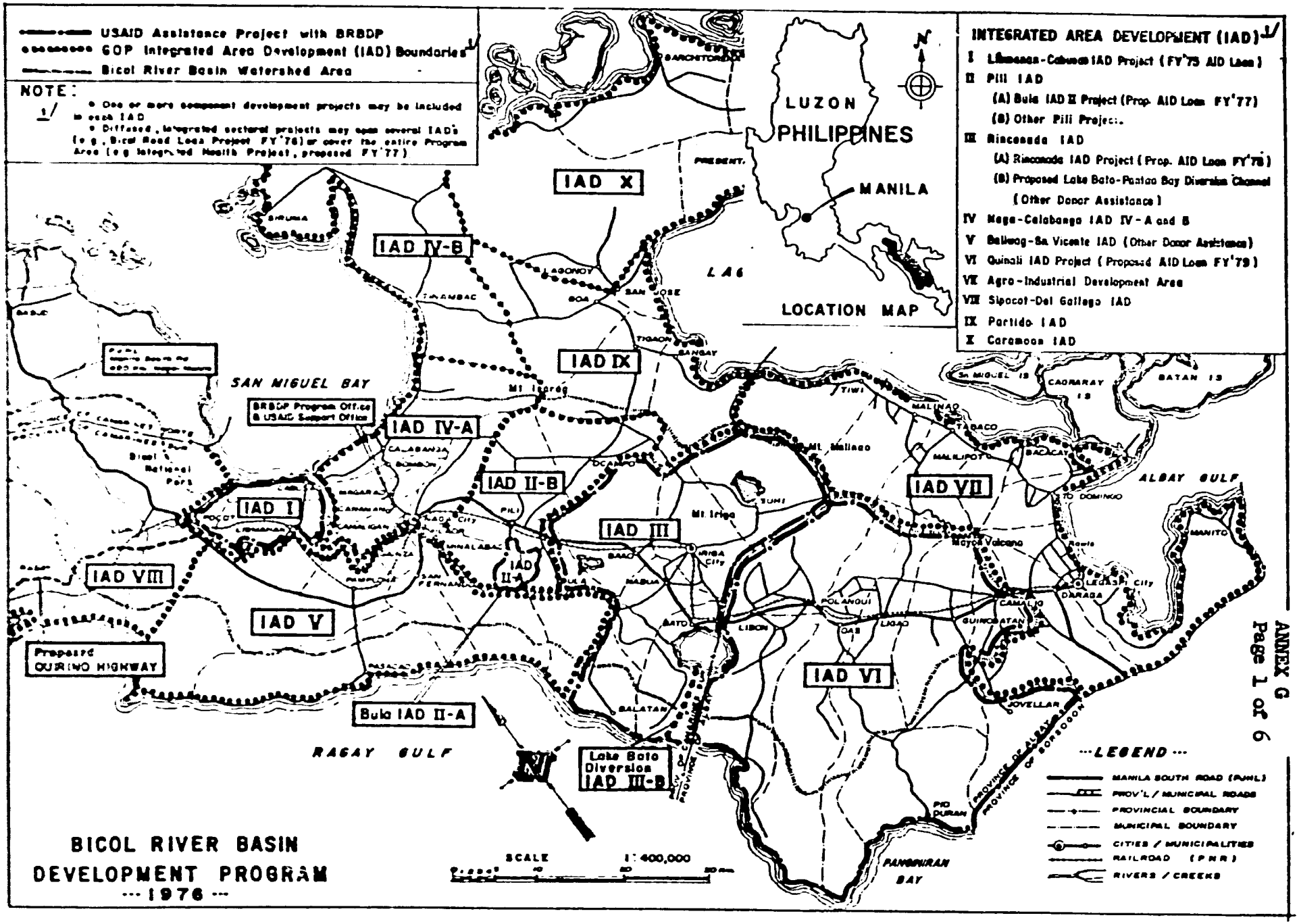
IAD IV A (NAGA-CALABANGA)

Without Project:

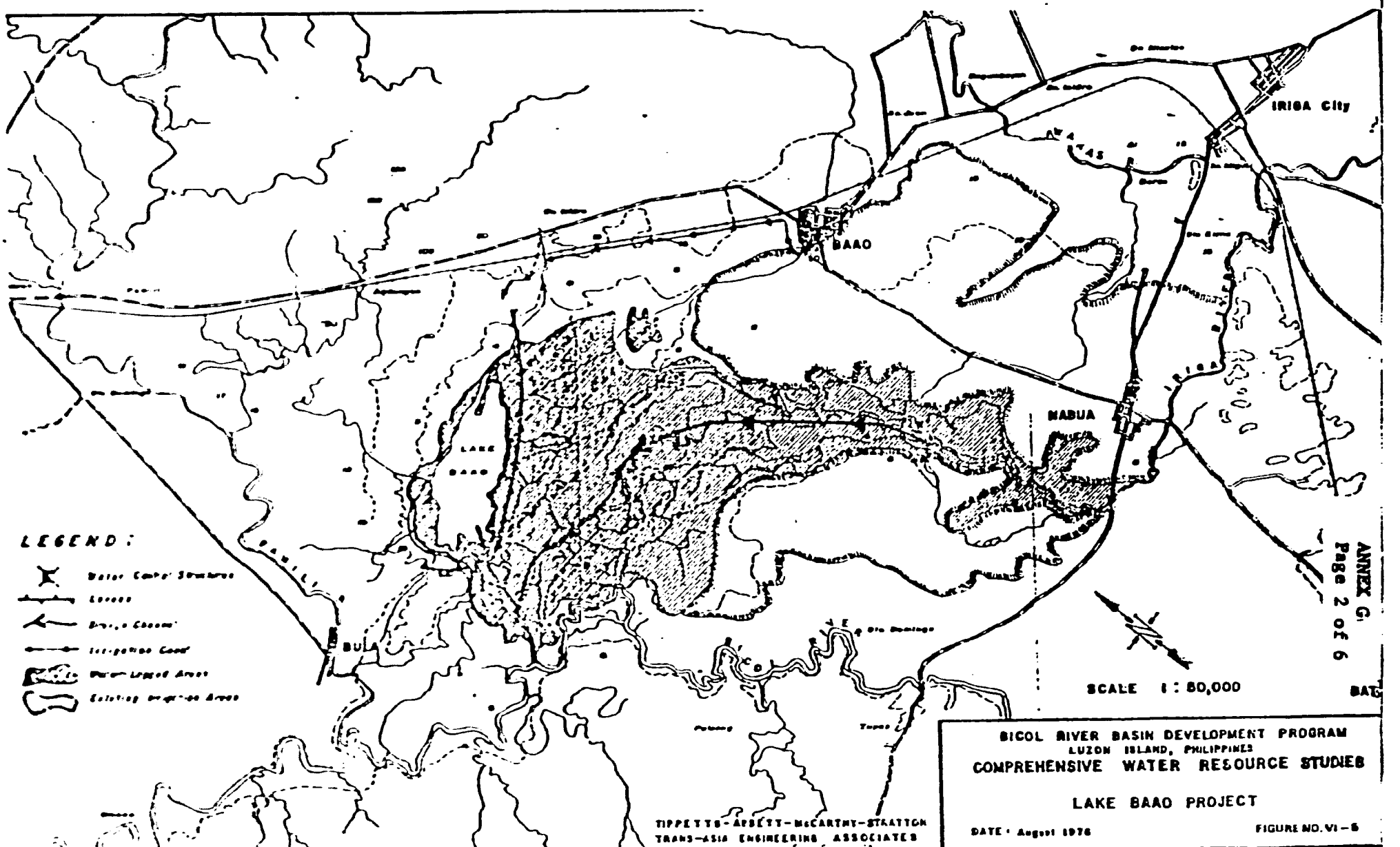
1. Yield Per Hectare	
a. Irrigated Land	25.1 cavans (1.10 MT)/hectare/crop
b. Non-irrigated Land	21.5 cavans (0.95 MT)/hectare/crop
2. Cultivated Area	
a. Area Irrigated	NA
b. Area non-irrigated	5,000 hectares
c. Non-cultivated	NA
3. Crop Intensity	2 crops/year - irrigated
	1 crop/year - non-irrigated
4. Total Production	
a. Irrigated Land	NA
b. Non-irrigated Land	107,500 cavans (4,730 MT)/year
c. Total Production	NA

With Project:

1. Irrigated Land	38 cavans (3.26 MT)/hectare/crop
1. 5,000 has.	380,000 cavans (16,720 MT)/year
2. Non irrigated Land	NA
3. Total Production	Additional Production =272,500 cavans (11,990 MT)/year
4. Cropping Intensity	NA



ANNEX G
Page 1 of 6



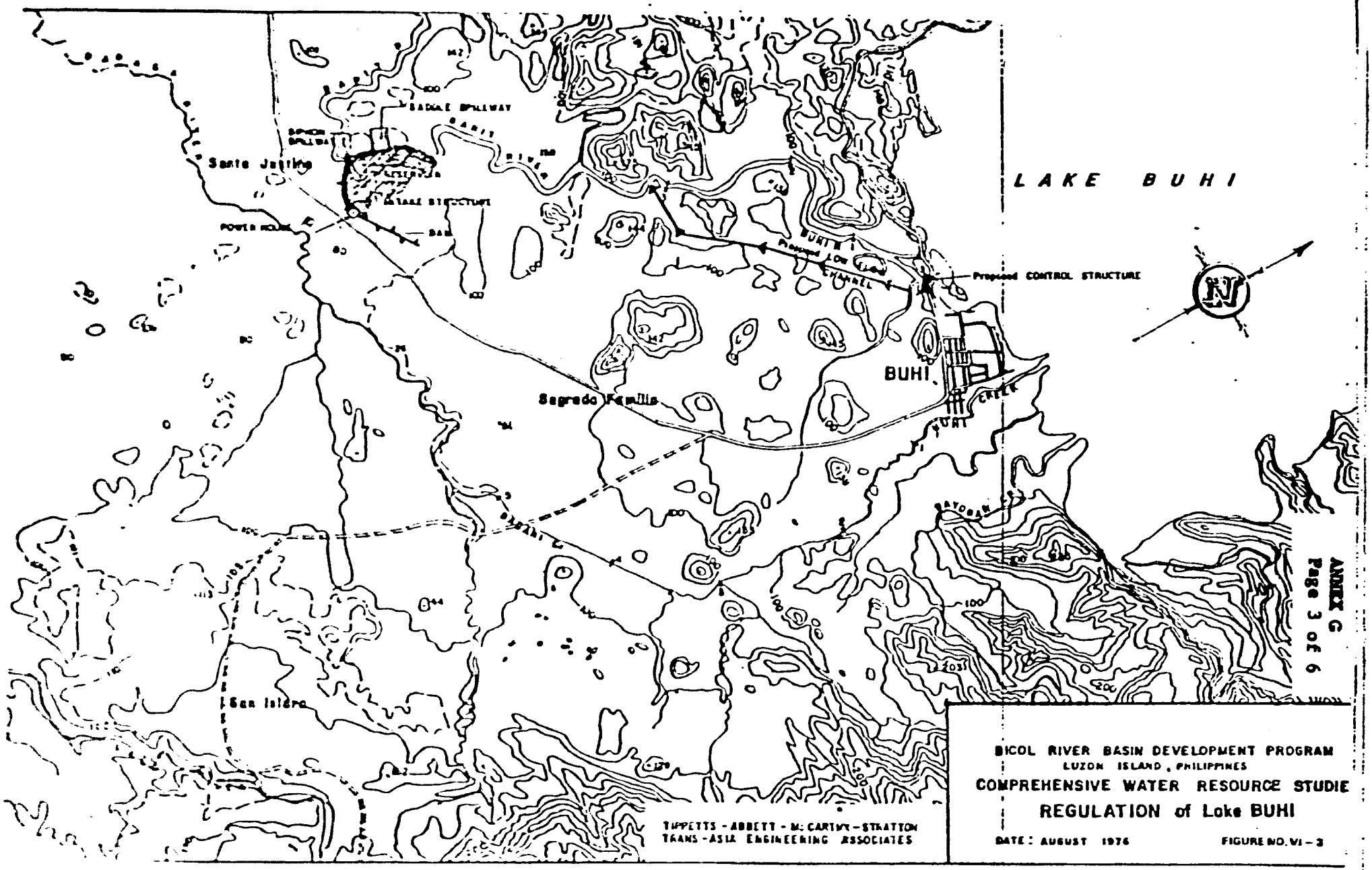
BICOL RIVER BASIN DEVELOPMENT PROGRAM
LUZON ISLAND, PHILIPPINES
COMPREHENSIVE WATER RESOURCE STUDIES

LAKE BAAO PROJECT

DATE : August 1976

FIGURE NO. VI – 5

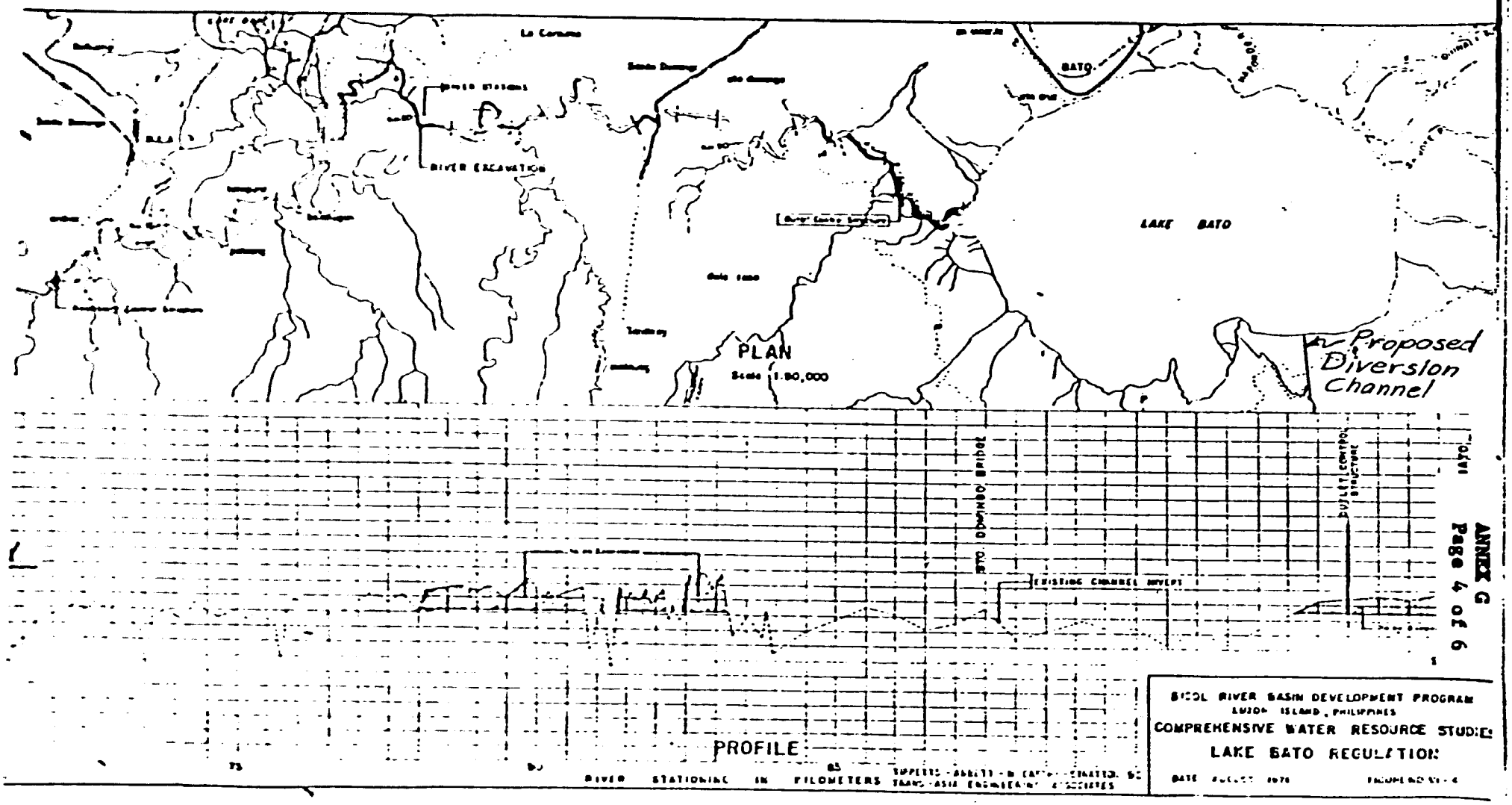
ANNEX G
Page 2 of 6

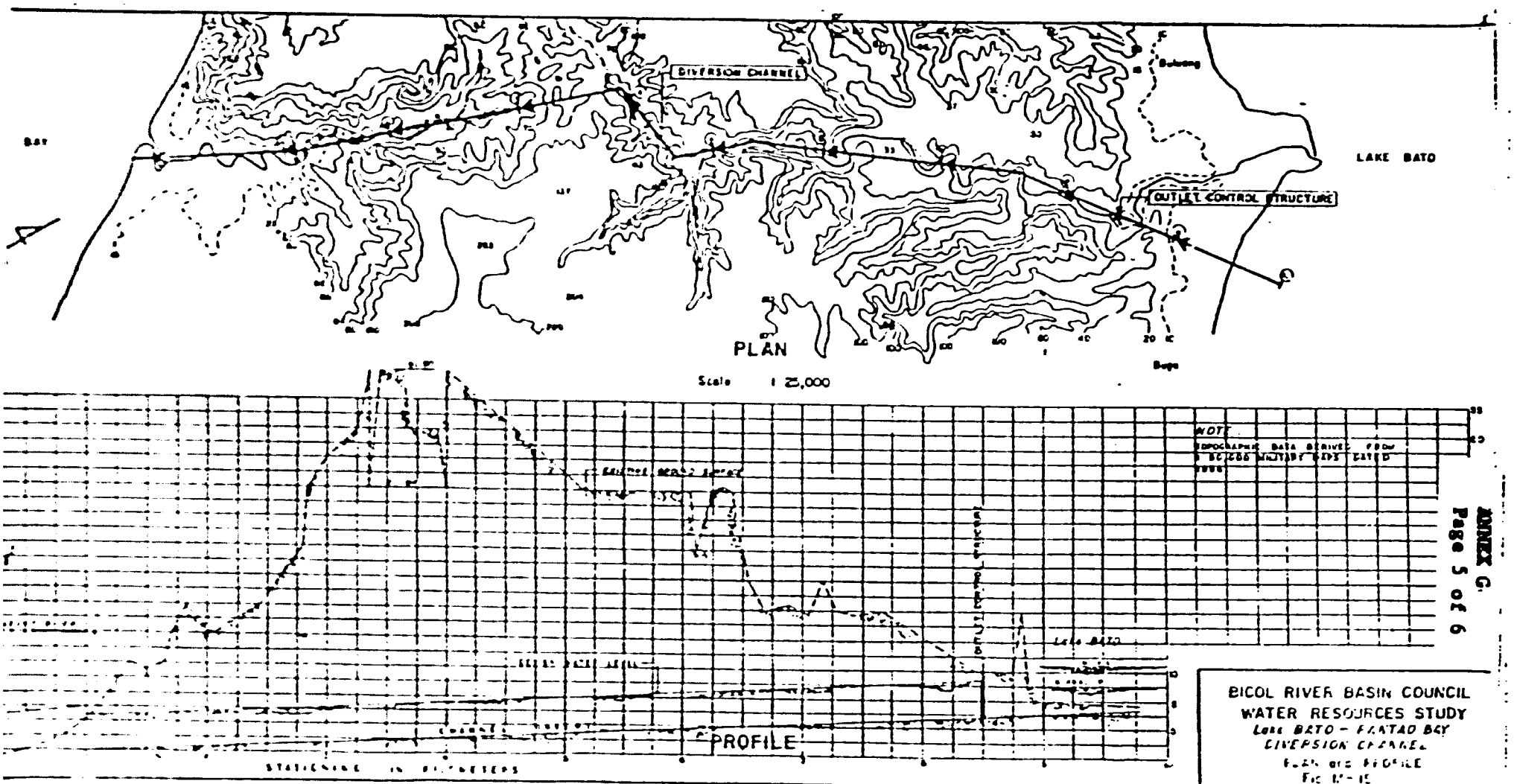


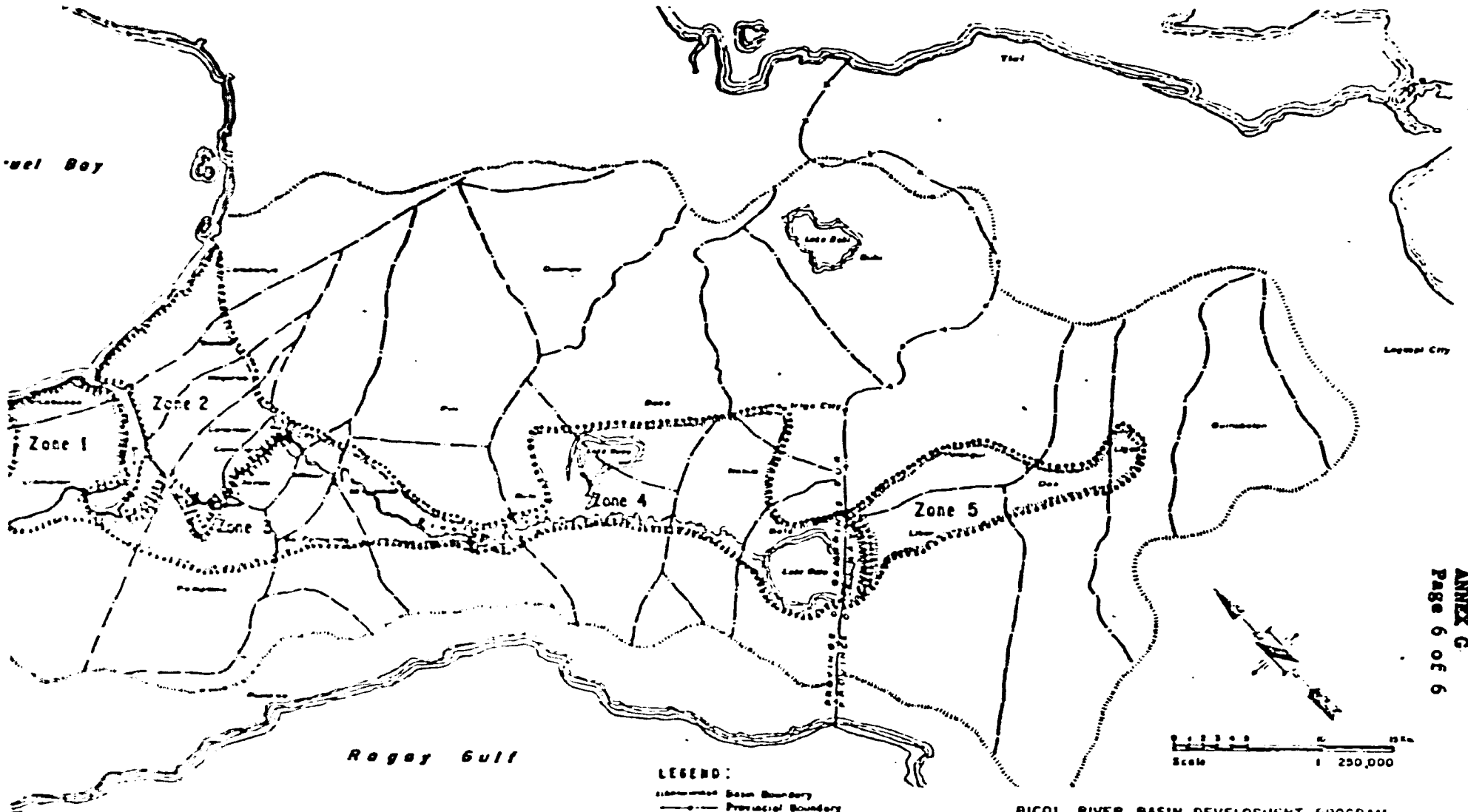
BICOL RIVER BASIN DEVELOPMENT PROGRAM
LUZON ISLAND, PHILIPPINES
COMPREHENSIVE WATER RESOURCE STUDIE
REGULATION of Lake BUHI

TIPPETTS - ABBETT - McCARTHY - STRATTON
TRANS - ASIA ENGINEERING ASSOCIATES

DATE: AUGUST 1976 FIGURE NO. VI - 3


La Carlota
BATO
RIVER EXCAVATION
LAKE BATO
PLAN
Scale 1:50,000
Proposed Diversion Channel
OLD DOCKING BRIDGE
EXISTING CHANNEL INVERT
BULLET CONTROL STRUCTURE
BATO
PROFILE
RIVER STATIONING IN KILOMETERS
BICOL RIVER BASIN DEVELOPMENT PROGRAM
LUZON ISLAND, PHILIPPINES
COMPREHENSIVE WATER RESOURCE STUDIES
LAKE BATO REGULATION


DIVERSION CHANNEL
OUTLET CONTROL STRUCTURE
LAKE BATO
Bay
Bogo
PLAN
Scale 1:25,000
NOTE
PROFILE
LAKE BATO
BICOL RIVER BASIN COUNCIL
WATER RESOURCES STUDY
Lake BATO - PANTAO BAY
DIVERSION CHANNEL
PLAN and PROFILE
Fig. D-15



LEGEND:

- Basin Boundary
- Provincial Boundary
- River / Creek
- Boundary of Floodplain Zones
- Municipal Boundary

TIPPETTS - ABBETT - McCARTHY - STRATTON
TRANS - ASIA ENGINEERING ASSOCIATES

BICOL RIVER BASIN DEVELOPMENT PROGRAM
LUZON ISLAND, PHILIPPINES
COMPREHENSIVE WATER RESOURCE STUDIES
MUNICIPALITIES and FLOOD ZONES

DATE August, 1976 FIGURE NO IV - 1

ANNEX H

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT IDENTIFICATION DOCUMENT FACESHEET

TO BE COMPLETED BY ORIGINATING OFFICE

1. TRANSACTION CODE: A (A = ADD, C = CHANGE, D = DELETE)

PID

2. DOCUMENT CODE: 1

3. COUNTRY/ENTITY: Philippines

4. DOCUMENT REVISION NUMBER:

5. PROJECT NUMBER (7 DIGITS): 49-0289

6. BUREAU/OFFICE: A. SYMBOL: Asia; B. CODE: 4

7. PROJECT TITLE (MAXIMUM 40 CHARACTERS): Bicol Integrated Area Development III

8. PROPOSED NEXT DOCUMENT: A. 2 (2 = PRP, 3 = PP); B. DATE: MM 10, YY 76

9. ESTIMATED FY OF AUTHORIZATION/OBLIGATION: a. INITIAL FY 78; b. FINAL FY 78

10. ESTIMATED COSTS ($000 OR EQUIVALENT, $1 = 7.35)

FUNDING SOURCE		LIFE OF PROJECT
A. AID APPROPRIATED		15,000
B. OTHER U.S.	1.	
	2.	
C. HOST COUNTRY		10,000
D. OTHER DONOR(S)		
TOTAL		25,000

11. PROPOSED BUDGET AID APPROPRIATED FUNDS ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE C. GRANT	PRIMARY TECH. CODE D. LOAN	E. FIRST FY 78 F. GRANT	E. FIRST FY 78 G. LOAN	LIFE OF PROJECT H. GRANT	LIFE OF PROJECT I. LOAN
(1) FN	B253		060		15,000		15,000
(2)							
(3)							
(4)							
			TOTAL		15,000		15,000

12. SECONDARY TECHNICAL CODES (maximum six codes of three positions each): 070 | 030 | 020 | 010 | 050

13. SPECIAL CONCERNS CODES (MAXIMUM SIX CODES OF FOUR POSITIONS EACH): UR | EQ | IX | LAB | NUTR

14. SECONDARY PURPOSE CODE: 100

15. PROJECT GOAL (MAXIMUM 240 CHARACTERS)

To raise the social-economic level of the poor majority in the Bicol River Basin and influence areas to the national average by 1990.

16. PROJECT PURPOSE (MAXIMUM 400 CHARACTERS)

1. Increase agricultural production and productivity
2. Increase employment opportunities
3. Expand and strengthen local public and private organizational/management structure and better integrate it with regional and national level structures.

17. PLANNING RESOURCE REQUIREMENTS (staff/funds)

18. ORIGINATING OFFICE CLEARANCE

Signature: Lawrence A. Marinelli

Title: Lawrence A. Marinelli, Assistant Director for Regional Development

Date Signed: MM 05, DD 15, YY 76

19. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM, DD, YY

AID 1330-2 (3-76)

SOCIAL SOUNDNESS

This section is divided into three sub-sections: (1) the assessment of the socio-cultural environment to show the "fit" of the project to the social landscape, (2) the analysis of the spread effect of the project especially in terms of the diffusion of innovation both within and outside the initial target population, and (3) the assessment of the distribution of social benefits accruing from IAD project.

I Socio-Cultural Feasibility

1. People's Perception of Benefit

The Rinconada farmer, except in a few instances, is no different from the next Camarines Sur farmers. Based on SSRU data, his top priorities are better water management, a chance to own his own piece of land, and more non-farm employment opportunities for additional income.[1/] Other priorities in descending order are: more free high schools, credit for more farmers, more samahang nayons, more roads, more regular bus service, more compact farms, more electricity and more family-planning clinics.

The population at large, however, listed their priorities as peace and order, irrigation and flood control, roads, more employment (non-farm) opportunities, better domestic water supply systems, community organizations, transportation facilities, electricity, health and sanitation program and price control--in that order of priority.[2/]

The mayors of the six municipalities and the one city in the Rinconada area in turn felt roads and bridges are top priority, then drainage, flood control and irrigation, the water supply systems, the health and sanitation programs, and last but not least, more school buildings.

As can be gleaned from the priorities of the population in general,[3/] flood control and irrigation do not sink below second priority. It is of course understandable that farmers think of it as the development activity that will benefit them most. The fact that this priority comes next among other priorities in the mind of the general population and local government heads, merely emphasizes the agricultural orientation of Rinconada's people.

To the question then about probable disposition of the project population to the main activity of the project which is water resource development, the answer is begged: it will undoubtedly be perceived as a direct and positive response to their pressing need. In addition, all other priorities, except electricity, peace and order drives, and price control are directly addressed by the project. The Rinconada IAD

1/ SSRU Report No. 1 1974 (Social Survey Research Unit)
2/ SSRU, Social Soundness Analysis of the BRBDP, 19__
3/ Survey of Priorities Rinconada Mayors, undertaken by Tom Lindsley et.al. Aug. 30, 1976

has (1) a flood control component that benefits Rinconada somewhat, but actually benefits the downstream IADs of Naga-Calabanga, Baliwag-San Vicente and Pili-Bula even more, (2) an irrigation component that brings new land into cultivation and increases productivity on other land from one crop a year to two or more, (3) a drainage component that will reclaim 1,400 hectares or more of rice land for use during the dry season, (4) a social development component covering cooperatives, health and sanitation, extension services, manpower training and tenure improvement, (5) a municipal waterworks system component, (6) a road construction and rehabilitation component, (7) an agribusiness and (8) agricultural development component. Together they can generate the increased number of employment opportunities voiced by the project population.4/

The question of peace and order, rural electrification and price control are not within the scope of the project. A rural electrification program, however, with basinwide coverage is underway. The Tiwi Geothermal project and the ongoing National Electrification program assures that the demand for more and efficient power services will be satisfied. Price control is a national program of the government and measures to protect the Filipino consumer is an ongoing concern. Peace and order is a national issue to which the government has given high priority.

With the exception of the three priorities discussed above, the IAD project directly addresses the various priorities and problems of the people and satisfies the one primary requisite for social soundness--the whole package is explicitly desired by the people.

2. Participation Profile

Because the barrio folks have indicated they would like to have such and such does not necessarily mean they will participate in an undertaking that will produce those benefits. Thus another aspect emerges in the strategy of implementation of the Rinconada IAD: the identification and motivation of the project beneficiary as an active participant. This process considers both the demand for the selection of an immediate group that would be rallied around the project as implementation begins, as well as the targeting of broad sectors of the project population for longer term training. This is to sustain the capability of the project area's manpower to satisfy the anticipated progressively expanding requirements of the project and its consequent activities over time.

In identifying participants, little difficulty is anticipated since the basis of selecting the Rinconada area as an IAD project

4/ At present, increase in employment opportunites cannot be quantified due to absence of specific data. However, rough estimates on the roads component alone promise more than 1000 additional jobs. More accurate and comprehensive estimates will be provided in the PP.

included the presence of a progressive rural community. Empirical studies have indicated that Rinconada farmers, from whose ranks the initial participants will be drawn, are highly responsive to the introduction of improved technology. Relatively few who have become aware of modern farm practices fail to practice them. It has been reported that 75-80 per cent of those aware of modern farming techniques use them in the field.[5] The average literacy level of the project area's farm population is 78%. The agrarian structure is in the process of being reformed, through the land reform program. Presently, close to fifty per cent (50%) of eligible certificate of land transfer (CLTs) tenant-farmers have already received their CLTs and are attempting to make the theoretical ownership of their farms real. SSRU data indicate that only twelve per cent of these CLT holders have expressed the wish to revert to their tenant status.

At this time, it is true that occupational mobility is limited in the case of the farmers in the area. He is as much aware of this as the government planners. For the farmers, however, to indicate more non-farm opportunities as a priority[6] is an indication of a motivation to exploit any such opportunity. The majority of the populace in the area as deduced from SSRU report no. 1, prefer to stick it out in the area despite economic difficulties (68%). In fact, the 32% who expressed a desire to take the more "adventurous" position of getting out belong mostly to the upper socio-economic groupings and high school graduates.[7]

The mobility (travel) rate of the area is hardly differentiated from other major sub-provincial centers in Camarines Sur. It is, in truth, low. And on the assumption that people are the primary channels for the diffusion of innovative ideas, for the present, we cannot expect the project participants-beneficiaries to take a major role in communicating innovation ideas beyond the confines of the project area. However, the travel pattern within the four municipalities of Baao, Nabua, Bato, Buhi and the City of Iriga[8] suggests the possibility of a more rapid spread of innovative ideas within the area early in the project implementation stage.

3. Participators and Projects

At the outset, four groups are targeted to be involved in the project: (1) the farmers and share-tenants in the 11,500 hectares of land immediately affected, (2) the project areas extension workers who will be organized into an integrated extension service system,

5/ Comprehensive Water Resource Study, Report No. IV (p.15)
6/ Iriga respondents markedly pointed this out and Iriga, undoubtedly has one of the most dynamic communities in the Camarines Sur area.
7/ SSRU Report No. 1
8/ SSRU Report No.

(3) barrio volunteers to form part of the project's integrated rural health training program, (4) and the local government officials in the area.

The infrastructure components of the Rinconada IAD will require early involvement of the local governments in the area as well as the population proximate to the proposed roads, water control and the irrigation systems.[9/] The local governments headed by the mayor of Iriga City have in fact already been actively coordinating with IAD planners as early as the project conceptualization stage. Valuable insights were provided during the many discussions with them.

Infrastructure projects will be relatively labor intensive and will draw labor requirements from the area. This policy will be subject to the limitation inherent in a low technology (and skills) area.

The agribusiness program of the project will involve directly two specific groups: the farmers, fishermen* and local investors.

The thrust of this program is to draw the conscious farmers into the mainstream of agribusiness activities. "Conscious" here is understood to mean that the farmers will have been given a basic knowledge of the relevant aspects of agribusiness activities, e.g., marketing systems. Thus, in the organization of area marketing cooperatives, for example, program implementation will leave the management role to the farmers themselves rather than to the traditional management "experts". Presently, the ADC membership includes the private sector and, therefore, some local investors in decision-making. It is envisioned, however, that more specific institutions, e.g., rice mill owners associations, feed mill investors groups, etc., will be set up to establish direct links with local investors. Consonant with this, an investment promotions program, which is basinwide in scope, will hook up the Rinconada IAD and through these institutions promote the participation of local investors in the agribusiness program.

The Agricultural and Social Development aspects of the project are so intermeshed that the participants involved in both are hardly differentiated. The main elements in the agricultural development component of the project are crop, fish and livestock production. Those identified to participate in them at different levels of participation mainly come from two groups: the farmers-fishermen and the extension workers. Social development activities dovetail the former. Consequently, you have at the core of these activities, the same sector.

9/ The ADC mechanism is even at present already operational in the Rinconada area. Even without this, however, the IAD approach demands close coordination with local governments in all of its activities. Area Development Council (ADC)

* Most farmers in the area are also inland fishermen.

Enumerated below is the number of participants in the major social development components of the Rinconada IAD:

1.	Compact Farm Development	- 867 compact farm units to be organized by 1980 covering 13,000 farmers.
2.	Samahang Nayon Movement	- 237 SNs of which already 144 have been organized will be established fully by 1980 covering 8,704 farmers.
3.	Irrigators' Associations	- 12,817 lowland rice farmers, 8,500 of whom are currently involved in the pilot-on-farm water management project. All of them are to be organized by 1980.
4.	Manpower Training	- By 1980, the training of 140 Area Development Team (ADTO members, 4,800 farmers, 530 fishermen, 360 livestock raisers, 738 Irrigators' Association members and 2,405 compact farm and Samahang Nayon members for a total of 8,973 participators.
5.	Integrated Health Training Component	- The special training and deployment of 65 doctors, 61 nurses, 26 midwives, and 17 dentists; as well as the training of 8 Home Management Technicians and 227 paramedics in each of the 227 barrios of Rinconada.
6.	Extension Services	- The 126 extension service cadres envisioned for the project area composed of 48 inter-agency technicians and 78 farmer technician aides.

4. <u>The Rinconada Farmer and the Basic Innovative Units</u>

The Rinconada farmer's mode of producing the farm goods has developed progressively towards the direction of cooperative endeavors. Purely individual work outlooks have been giving way since 1970 to the "damayan" and compact farm organization, and less dramatically the samahang nayon.[10/] While it is true, that there are still many rough edges to smoothen in the compact farm and samahang nayon mechanisms, the steady proliferation and easy operationalization of these units in the general area have gained a momentum that indicates universal acceptance and institutionalization over time.[11/]

10/ SSRU Report No. 2
11/ See Barrameda appendix on the Compact Farm, SSRU Report No. 2

Surely part of the answer for the widespread success of these structures, particularly, the compact farms, is the latent acceptability of cooperative endeavor among Bicol farmers. The Pakikisama and Pakikidamay modes of cooperative activity have been long practiced throughout the area,12/ and all over the Bicol Peninsula for that matter. The compact farm as envisioned by the BRBDP in Rinconada (and elsewhere) will in fact make use of the underlying values of these traditional modes of cooperation. The small membership of the compact farm 8 to 10 members - and the contiguity of their farm parcels parallel the "neighbors principle" in the Pakikidamay system. With these "neighborhood (pakikidamay) atmosphere" in place, members will logically choose their natural leader as the compact farm coordinator and as he functions as such, the interplay of pakikiiba and pakikidamay values in production activities is bound to occur with positive effects and thus used for development purposes.

It is certain that other cultural characteristics will be changed over time. For example, the traditional time duration and pace of work characteristic of farmer's collective activity--which is relatively short and slow--must give way to longer durations of work and at a more rapid pace. We are here, however, touching solely on the cultural characteristic of traditional cooperative activity. In fact, individually, the farmer, once conscious of the need for an innovation, responds positively to it as shown by his receptivity to modern farm techniques13/ even at the cost of veering away from long held practices. The cooperatives development component of the Rinconada IAD program. therefore, hinges on this proven adaptability of the farmer-now-conscious-of- development needs, and really combines these individual receptivities to foster innovative team work.

Basic to the above then, is the concept of the cooperative organizations--the compact farm, the irrigators' associations, the area marketing cooperatives and the samahang nayon--as primary channels for innovations. These organizations will particularly provide three of the five basic elements for the "functional economic area" explained by Mosher, 14/ namely: technology and extension services; local verification of improved farm practices; and credit. These organizational mechanism and the functions they will play are not new to the farmer. Extension workers know for a fact that the essential activities, if not the concepts, have already been informally emplaced (albeit haphazardly perhaps) in various area. What is new is the orchestration or the integrated manner in which these various mechanism are to be donducted in the Rinconada IAD and, of course, the massive government support that will now accompany their institutionalization.

12/ SSRU Report No. 5

13/ His awareness and practice of modern farm technique (which he gains from the extension worker) has been observed as a "universal phenomenon. SSRU Report No. 2, 19__

14/ Mosher, Creating a Progressive Rural Structure, 19__, pp.

II Spread Effects

1. The project's provision of all year round irrigation and improved drainage should promote the development of baranggays within the 12,530 hectares of agricultural land between and around the Buhi, Baao and Bato areas. The project's effect beyond the confines of the project area will be felt in three other proposed IAD areas: Pili-Bula, Baliwag-San Vicente and Naga-Calabanga. The first which presently irrigate 1,080 hectares will find an additional 1,320 hectares of 6,350 hectares where it had only 600 hectares. And the third shall be enabled to water 5,000 hectares where before only 80 hectares were irrigated.[15/] While all the consequent effects of these on all areas have not been quantified we can be sure that their effects both individually (in each area mentioned) and combined (in terms of their effect in the basin economy) will be nothing less than significant.

   In terms of its effect on flooding, a comparison made by comprehensive water resources planners shows the main flood control scheme of the Rinconada project (the Lake Bato-Pantao Diversion) as the most beneficial, reducing flood levels in other parts of the basin area by 30% to 50%.[16/] Undoubtedly this will reduce the annual damage wrought by floods to the human and economic resources in the basin area.

2. With increased productivity, a marketable surplus will flow into other areas in the Bicol basin. Business concerns dealing with seeds, fertilizers, agricultural chemicals, farm machines, and trading of agricultural goods in general will experience a boost. The anticipated increased income on the part of the Rinconada population will increase demand for consumer goods.

3. The SSRU have pinpointed the fact that a significant source of farming practices among farmers are friends, kins and neighbors.[17/] The diffusion of innovation will expectedly be undertaken by many people unconsciously as they go about their normal social activities. In consideration of this, care will be taken in altering the time allocation pattern of the farmer. However, this traditional "information exchange" system, i.e., the transfer of innovative ideas in the process of normal social interaction, shall be built into various formal structures to be institutionalized thru the social development component of the project. These structures will facilitate the dissemination, the absorption and adoption of innovation among the target population.

15/ TAMS/TAE Report No. 22
16/ Ibid
17/ SSRU Research Report No. 3, 1974

a. The Area Development Council/Area Development Team mechanism:

This structure draws optimum participation from all sectors in the area: political, business, civic, government line agencies, farm and non-farm groups, religious, youth and professional organizations; as well as the membership of line agencies operating within the IAD area, constitutes one concentrated forum and communication mode, the multiple linkages of which makes it a decisive structure for innovation diffusion.

Through this mechanism, the project gains facile access to all the sectors in the Rinconada area and any innovative idea that is desired to reach any sector can be speedily done. More than that, it has within itself, a built-in feedback system with the same multiple-communication linkages.

b. The line agencies - SSRU evaluation[18/] points to the segmented, i.e., sectarian understanding of the various personnel of the different line agencies of their respective specialized services in the basin area. It is, in fact, this situation that forms one of the main rationale of the proposed integrated extension services system of the Rinconada IAD project. With the establishment of the integrated extension services project, it is envisioned that the Rinconada extension worker shall now act as an all-around cadre and multi-farm technology source and guide to the Rinconada farmer. Against the backdrop of the farmer's responsiveness to the extension worker, it is expected that he (the farmer) shall now have access to many branches of modern farm practices in his contacts with the extension worker alone.

c. The local governments - The participation of the local governments in the project is already assured in the Area Development Council. However, outside of this membership in the ADC, their functions as municipal or city leaders inevitably prod them to engage in grass roots activities where their status as "daculang tao"[19/] make them a channel for disseminating in their respective communities.

d. Farm level institutions - The various farm level institutions: compact farms, samahang nayons, marketing cooperatives and irrigators' association upon establishment became ready-made institutions for the diffusion of innovation. In fact, the spread of innovation becomes an integral purpose of this component project and towards this, interphasing seminar, workshops and orientation meetings become primary means for disseminating innovation among farmers in the area.

18/ SSRU Research Report No. 3, 1974
19/ SSRU Research Report No. 5, 1974

e. The formal communication media - A basin development communications strategy is currently being conceptualized by the Bicol River Basin Program Office. It will include in its scope, the communications strategy for all IADs. Immediately, however, the project through the ADC can easily tap local media units to play a direct function in the spread of innovative ideas in the project area. Necessarily limited during the initial years of project implementation, the Rinconada IAD communications component as a channel for the spread of innovation, will find a welcoming push from the BRBDP umbrella communications program by 1978.

In addition to all these, periodic evaluation is expected to isolate lessons from project experience which will certainly be of use to the planning and development of other IADs in the basin area. Already invaluable experience and information have been drawn from the Libmanan-Cabusao IAD and other development activities initiated by the BRBDP. This project shall serve to increase that pool of knowledge for consideration in future activities not only in the basin area but in other integrated area development programs in the country.

III Benefit Incidence

A. Access to resources and opportunities

1. In the Rinconada area, the land reform program has been integrated into the IAD project. This component has identified 8,704 farmer-tillers as land reform beneficiaries of whom 1,561 farmers have already been the recipients of certificate of land transfers (CLTs) and another 1,082 farmers have already registered leasehold contracts. The particular tenure improvement component of the Rinconada IAD program shall accelerate land reform activities in the area such that by 1979, all eligible beneficiaries shall have received their CLTs or leasehold contracts. The acceleration process will be boosted some more by an applied research study that has been made an integral aspect of the project's tenure improvement program. This research study will conceptualize as well as apply a strategy that will speed up land reform activities in the area.

2. Corollary to the tenure improvement effort is the provision of improved farm inputs. Chief among these is the availability of the M9 package of inputs made available to the farmers through farm level institutions, particularly the compact farm. Directly benefitting from these are an estimated 12,817 rice farmers. In addition, more credit opportunities are to be made available to the farmers through credit support programs such as the Central Bank/Integrated Agricultural Financing scheme, the proposed Area

Cooperative Bank project, the establishment of a special time deposit fund for small agribusiness projects and the setting up of an Area Marketing Cooperative. Noteworthy in these schemes is their intention to foster the development of multi-farm enterprises in the area. The last, an area marketing cooperative, is designed to institutionalize among the farmer, the capability to handle the marketing aspects of both farm and off-farm inputs and products.

3. Access to technical information will, as gleaned in the preceding pages, be primarily the concern of extension service units and farm level institutions through which they will be channeled. Assured to be made accessible to the farmers in the area are modern on-farm and off-farm technology including management and farm planning techniques. The direct recipients of these are: 13,000 farmers, 530 fishermen, and 360 livestock raisers.

4. One more important component that promotes accessibility is the roads development program of the Rinconada IAD. Here, not only physical accessibility is improved but concomitant with it is the facile flow of goods, services and technological knowhow. The emphasis in the construction of feeder roads serve to open large interstices within the project area to development. As a result of this, the intensive spread of better goods, services and technology is expected to follow thus serving to buttress the accessibility of the necessary facilities for a modern agriculture.

5. Better waterworks will provide access to improved domestic water supply for the project population. In conjunction with the Integrated Health Services component, the incidence of enteric and parasites diseases will be reduced. The various activities themselves of the Integrated Health Services program will increase access to modern medical technology and with the advent of barrio health technicians, provide ready medical advice at all times in the barrio.

B. Employment

The development of new roads and rehabilitation of existing areas will generate secondary employment opportunities for project beneficiaries. The other physical project, i.e., flood control, waterworks, irrigation and the necessary support facility construction activities will afford the same opportunities as the roads development program. Construction activities in the summer period will especially be advantageous for the farmers since it is during this period that they shall be available for secondary employment. Post construction jobs will moreover be generated for irrigation systems as well as road maintenance.

The increase in irrigated land will increase the utilization of farm family labor in the project area and in affected areas beyond, since double cropping then multi-cropping will be realized over time.

Farm mechanization will be encouraged on a selective basis in specific phases of production and post production. Caution will characterize this activity in consideration of its labor displacing consequences. The thrust will not be in absolutely preventing farm labor displacement--development after all will entail farm displacement at some point in time--but in phasing it such that alternative employment is insured as more and more farm surplus labor appears.

As farm mechanization advances over time, less dependence on family labor will occur. This will release farm youth for off-farm enterprise oriented manpower training programs and women for home-centered skills training which in turn will increase the skilled or semi-skilled labor pool in the area.

The unemployment rate of Rinconada stands at 8.1% and the increased employment opportunities generated by the project will not only plug this hole in the employment structure but anticipate population pressure over time. Moreover, the underemployment rate of 20.1% will be reduced by increased employment opportunities.

C. The Role of Women

The project will enhance the role of women in development. Women will have more time to devote to backyard projects and cottage industries. These activities will generate supplementary income for the household. They will also surely form part of the labor force that will be employed in the additional community stores, restaurants, and merchandizing enterprises that will sprout as development occurs in the area. Moreover, women will compose the backbone of the nutrition, family planning and, generally, the rural health activities in the area.

Many studies[20/] have shown that the Filipino women play crucial roles in family decision-making. Their opinion carry equal weight (if not more) in the decisions regarding the economic activities of the farm household: planting, buying land, making loans, etc., and more so with regards social activities. In this light, women can be expected to participate in the decisions (albeit behind the scenes) in the compact farms, the samahang nayons and other development institutions in the area. As they do this, their propensity to share information among themselves will make them innovation channels. More than this, development will increase educational opportunities for women and consequently increase their social and occupational mobility.

20/ Bustrillos, 1961; Feliciano (1965); Guerrero (1966) and Madigan (1969) - to mention some.

Summary:

The Rinconada IAD project conforms to the socio-cultural terrain of the project area. Project components are explicitly desired by the beneficiaries and the institutions envisioned do not run counter against traditional structures. At this stage, there are no indicators that the project will make prematurely heavy demands. Phasing is such that build-up periods are provided to prepare the farmer for the pressures of development activities. More importantly, care has been taken to ensure that the project beneficiary will also be a project participator.

The diffusion of modern rural practices and institutions look promising. The success of improved farm practices by itself serve as cause for dissemination. Following this, many farmers in the course of normal social activities spread innovation. Formal institutions to be set up by the project will make this process more systematic and efficient.

The effects of the project will be felt not only in the area but beyond. Its benefits will rebound primarily to the farmer but will affect other sectors as well. Implicit in this process is a change in the income distribution of the population. It is also expected that the role of women will be enhanced.

Lastly, the Rinconada IAD will contribute more experience and information regarding the planning and management of IAD programs at sub-basin levels. This knowledge will be invaluable if the IAD approach is to be replicated elsewhere.

PROBLEMS AS LISTED BY THE SEVEN MAYORS OF RINCONADA

An Assessment of the Major Problems in Rinconada by the Mayors in Rinconada

The Rinconada Area Development Team (ADT) is composed of seven mayors and their representatives. The Bicol River Basin Development Program (BRBDP) and United States Agency for International Development (USAID) met with the mayors three times during the month of August and as a result of these meetings the mayors submitted data sheets to the BRBDP that defined the major problem areas in each of the municipalities. Each mayor was asked to submit the most recent estimate of their municipal population and the number of Barangays in his municipality (Barangay is the new name for barrio). Each mayor listed the problems that he saw as a major problem in his community and ranked them with the most important problem first and the least important problem last. A form was developed and given to each mayor so that he could fill in data on existing roads, their present condition, what roads needed to be improved and where these roads were located. They also were asked what clinics, hospitals, and existing rural health facilities were available and details about their operations, what elementary schools, high schools and training centers were located in their municipalities and the number of classrooms and students and other data pertaining to their operations and needs. Questions were asked regarding the existing status and the details on the current operation of domestic water facilities and what government technicians worked in the project area. The mayors were also asked to develop a list of projects which they felt the community needed badly, and the mayors provided information on needed social services, infrastructure, agricultural and agri-business improvements, and any other programs they felt were needed in the local area. A summary of these data is shown on the following pages. The seven mayors agreed unanimously with the order of priorities listed below:

1. Roads and bridges
2. Flood control, irrigation and drainage
3. Domestic water supply
4. Health and sanitation
5. School buildings

TABLE J-1

COMMUNITY PROBLEMS RANKED, BY MUNICIPALITY
CINCONADA LAD

PROBLEMS	RANK						
	Baao	Balatan	Bato	Buhi	Bula	Iriga	Nabua
Flood Control	1				2	7	
Drainage	2						1
Roads and/or Bridges	3	1	1	1	1	1	4
Irrigation	4		2		2		
Development of Baao Lake	5						
Water Supply/Waterwork System	6	4	3			4	2
Health and Sanitation			4				
Electricity	7					5	
Nutrition			5				
Completion of Balatan Port		2					
Construction of Hospitals/health Facilities		3		3			
Educational Facilities				4			
Storage of Agricultural Products and Food Stuffs						2	
Cottage Industry						3	
Garbage Disposal						6	
Recreational and Cultural Development							3
Improvement of Nabua-Balatan road	1						
Physical Isolation from National Road, Railways, Water and Air Transportation				1			
Low Employment				2			
INadequate capital resources to support private and public investments. Untapped agriculture, forestry and inland fishing potentials				3			
				4			
Absence of Town Planning and Zoning Ordinances				5			
Inadequate social facilities and services				6			

TABLE J-2 EXISTING ELEMENTARY SCHOOLS BY MUNICIPALITY
RINCONADA LAD

MUNICIPALITY	No. of Schools	No. of Classrooms	No. of Students	No. of Personnel	No. of Barrios without Elementary Schools
Baao	24	143	6,176	191	7
Balatan	15	60	3,241	83	2
Bato	15	144	5,517	175	6
Buhi	31	200	11,388	260	4
Bula	31	171	7,226	186	1
Iriga	41	321	12,319	-	-
Nabua	31	282	9,553	348	4

TABLE J-3 EXISTING SECONDARY SCHOOLS BY MUNICIPALITY
RINCONADA LAD

MUNICIPALITY	No. of Schools	No. of Classrooms	No. of Students	No. of Personnel	No. of Barrios without Elementary Schools
Baao	2	27	1,080	22	28
Balatan	2	10	-	12	14
Bato	4	19	1,974	77	29
Buhi	5	44	1,406	30	1
Bula	8	24	912	26	24
Iriga	8	106	7,936	-	28
Nabua	5	64	4,034	124	26

TABLE J-4

EXISTING
HEALTH FACILITIES BY MUNICIPALITY
RINCONADA IAD

Municipality/ City	RURAL HEALTH UNITS		CLINIC/HOSPITALS		
	Number	No. of Personnel	Number	Bed Capacity	No. of Personnel
Baao	2	10	3	42	13
Balatan	2	8	2	10	4
Bato	2	7	1	3	1
Buhi	2	10	1	2	5
Bula	1	10	1	-	11
Iriga	1	8	22	220	108
Nabua	6	16	5	48	28

TABLE J-5

EXISTING
TRAINING CENTERS BY MUNICIPALITY
RINCONADA IAD

MUNICIPALITY	Imelda Marcos Training Center	Social Action Center	NIA	RIC	TOTAL
Baao	-	-	-	-	0
Balatan	-	-	-	-	0
Bato	-	-	-	-	0
Buhi	1	-	-	-	1
Bula	-	-	-	-	0
Iriga	-	1	1	1	3
Nabua	-	-	-	-	0

TABLE J-6

EXISTING DOMESTIC WATER FACILITIES
RINCONADA IAD

MUNICIPALITY	No. of Families With Pumpwater	Deep Well Existing	Other Services
Baao	500	1,500	1,000
Balatan	500	-	-
Bato	100	2	Ordinary Pump-wells & Continuous flow
Buhi	-	-	-
Bula	-	60	500
Iriga	No data available		Spring, Artesian Well, jetpumps & liftpump
Nabua	25	35	2,025
T O T A L	1,125	1,597	3,525

TABLE J-7

NUMBER OF TECHNICIANS PER MUNICIPALITY
RINCONADA LD

MUNICIPALITY	BAEX	BPI	DAR	DLGCD	NIA	BAI	DOH	PCA	DSW	BS
Baao	9	6	4	2	-	3	-	-	-	-
Balatan	2	1	1	-	-	-	-	-	-	-
Bato	6	2	3	2	-	1	-	-	-	-
Buhi	10	5	4	2	-	1	10	-	-	-
Bula	11	6	4	2	-	7	-	1	-	-
Iriga	4	9	5	4	110	2	-	-	6	2
Nabua	7	3	6	2	38	2	-	-	-	-
T O T A L	49	32	27	14	148	16	10	1	6	2

BAEX-Bur. of Agr. Ext.
BPI-Bur. of Plant Ind.
DAR-Dep't. of Agrarian Reform
DLGCD-Dep't. of Local gov't & Comm. Dev.
NIA-Nat'l. Irrigation Adm.
BAI-Bur. of Animal Ind.
DOH-Dep't. of Health
PCA-Phi. Cocohut Authority
DSW- Dep't. of Social Welfare
BS-Bureau of Soils

TABLE J-8 LENGTH (KMS.) OF ROADS BY TYPE PER MUNICIPALITY
BINCONADA LAD

MUNICIPALITY / ROAD TYPE	IRIGA CITY	NABUA	BAAO	BUHI	BALATAN	BULA	BATO	GRAND TOTAL
I GOOD ROADS								
Concrete	2,277	8.0	1.9	-	-	2.000	2.00	16.177
Asphalt	20.130	6.0	0.3	-	-	-	0.60	27.030
Gravel	40.264	50.5	3.0	-	-	7.274	2.00	103.038
Earth	-	1.0	1.5	-	-	86.307	10.00	98.807
Sub-total	62.671	65.50	6.7	-	-	95.581	14.60	245.052
II BAD ROADS								
Concrete	-	0.5	1.1	-	-	-	0.50	2.100
Asphalt	12.390	4.0	-	-	-	-	1.00	17.390
Gravel	45.801	16.0	1.5	-	-	4.600	4.50	72.401
Earth	79.322	40.0	3.5	-	-	-	22.75	145.572
Sub-total	137.513	60.5	6.1	-	-	4.[illegible]0	28.75	237.463
III TOTAL								
Concrete	2,277	8.5	3.0	0.800	-	2.000	2.50	18.277
Asphalt	32.520	10.0	0.3	1.200	1.000	-	1.60	44.420
Gravel	86.065	66.5	4.5	2.570	6.809	11.874	6.50	175.439
Earth	79.322	41.0	5.0	38.000	35.000	86.307	32.75	244.379
T O T A L	200.184	126.0	12.8	42.570	42.809	100.181	43.35	482.515

TABLE J-9

NUMBER OF MEMBERS IN EXISTING RURAL ORGANIZATIONS
AND NUMBER OF BARANGAYS (BARRIOS) WITHOUT ORGANIZATIONS
RINCONADA IAD

MUNICIPALITY / ORGANIZATIONS	BAAO	BALATAN	BATO	BUHI	BULA	IRIGA CITY	NABUA	TOTAL
1. Samahang Nayors (SN)								
No. of Members	499	-	679	-	1,806	1,182	1,380	5,546
No. of Barangays w/o	18	-	12	-	8	14	30	82
2. Irrigators Associations (IA)								
No. of Members	2	-	-	-	700	-	1,600	2,302
No. of Barangays w/o	28	-	-	-	26	-	12	66
3. Compact Farms (CF)								
No. of Members	590	-	-	-	8	122	-	720
No. of Barangays w/o	-	-	-	-	31	27	-	58
4. Rural Improvement Clubs (RIC)								
No. of Members	100	300	450	1,170	800	1,227	512	4,259
No. of Barangays w/o	-	-	8	-	17	18	8	71
5. Barangay Rural Improvement Clubs (BRIC)								
No. of Members	-	-	-	-	2,370	-	-	2,370
No. of Barangays w/o	-	-	-	-	3	-	-	3
6. OTHERS								
No. of Members	148	-	-	-	-	421	-	569
No. of Barangays w/o	4	-	-	-	-	-	-	4

TABLE J-10 PROPOSED ROADS AND FEEDER ROADS PER MUNICIPALITY
RINCONADA LD

List of Roads & Feeder Roads	Estimated Length (Km.)	Level of Improvement
1. Baao		
a. Etonan Road	1.5	New Construction
b. Buluang to Lourdes	5.0	"
c. Bagumbayan to Pugay	3.0	"
d. All Poblacion Streets to be extended to PJHL	5.0	"
Sub-total	14.5	
2. Balatan		
a. Pararao-Caorasan	8.0	
b. Calabanon-Tomatarayo	5.0	
c. Laganac-Tomatarayo	6.0	
d. Tomatarayo-San Isidro	5.0	
Sub-total	24.0	
3. Bato		
a. Sn. Vicente-Bacolod Road	3.8	New
b. Neighborhood-Cotmon Road	4.5	"
c. Salvacion-Del Rosario-Main Road	10.5	Partly Graded
d. Palo-Mainit Road	2.0	New
Sub-total	20.8	
4. Buhi		
a. Buhi-Tiwi Road	62.0	Construction
b. Poblacion-Sta. Cruz, Ipil, Iraya, Ibayugan & Tambo	40.0	"
c. Pob.-Tawagan-Sagrada Road	5.0	"
d. Cabatuan-Tamban Road	2.0	"
e. Dela Fe-San Ramon-Sta. Justina Road	5.0	"
f. San Vicente-Labawon-Namurabod	9.0	Rehabilitation
Sub-total	123.0	

Table J-10 (continued)

List of Roads & Feeder Roads	Estimated Length (KM.)	Level of Improvement
5. Bula		
a. Larabillo-Panoypoyan-Bagoladio Road	6.693	Rehabilitation
b. Palsong-La Purisima-Inoyonan-Itangon	13.480	Rehabilitation
c. Inoyonan-Bagoladio Road	1.500	Rehabilitation
d. Balaogan-Casugad-Panoypoyan	5.124	Construction
e. Balaogan to Market Site Road	1.500	Maintenance
f. La Purisima To Sn. Francisco	6.120	Rehabilitation
g. Casugad-Inoyonan Road	5.124	Construction
h. Casugad-Bagoladio Road	1.500	Construction
i. National H-way Junction to Sta. Elena	1.040	Construction
j. National H-Way Junction to La Nipga Barrio Site	5.000	Construction
k. Bagoladio to Inoyonan	2.000	Rehabilitation
l. Itangon-Hamoraon	2.000	Construction
m. Itangon-San Roque Knights	4.520	"
n. Itangon-Pasto Caurasan R	4.700	"
o. San Roque Heights-Caurasan Road	3.520	"
p. Fabrica-Causip Bridge	.070	"
Sub-total	63.891	
6. Iriga City		
a. Iriga-Salvacion-Manali	6.5	Concreting
b. Sn.Isidro-Sta. Teresita-Tubigan-Nino Jesus Sagrada Road	17.0	Asphalting
c. Sta. Teresita-San Andres-San Vicente Norte Sta. Isabel-San Rafael-Cristo Rey-San Ramon	8.0	Sub-grading-resurfacing
d. Sn-Jose-Sn. Miguel-San Isidro	3.0	Asphalting

Table J-10 (continued)

List of Roads & Feeder Roads	Estimated Length (KM.)	Level of Improvement
e. Santiago to Pob. via Del Rosario-Sto. Domingo, San Vicente Sur, San Francisco	9.15	Asphalting
f. Iriga-Buhi Road	5.795	Concreting
g. UNEP Parallel with PNR to Sn. Nicolas		
h. San Nicolas to Santiago	5.0	
i. NH to San Juan	.055	Construction
j. Salvacion-Sn.Antonio-La Medalla-Sto. Nino	8.0	Sub-grading & Resurfacing
k. Sn. Miguel-Francia-Antipolo	4.5	
l. Santiago-dela Fe to GSP Camp	5.0	Resurfacing
m. Dama de Noche Rd. to Sn. Francisco Passing the Chapel to Crescini Bridge	0.8	
n. Sta. Maria-Sabang-Nino Jesus	5.0	
o. National Road		
1) Iriga-Nabua	1.470	Concreting
2) Iriga-Baao	3.285	Concreting
Sub-total	82.555	
7. Nabua		
a. Duran-Malawag Rd.	6.8	Rehabilitation
b. Dolorosa-San Vicente	2.5	Construction
c. Angustia-Salvacion-Qui-Gatos	3.0	Construction
d. Mun. Streets (Pob.)	8.0	Rehabilitation
Sub-total	20.3	
TOTAL	327.946	

TABLE J-11

OTHER PROPOSED PROJECTS
RINCONADA IAD

1. Balatan
   a. Fishing

2. Iriga City
   a. Construction of Library
   b. Construction of Sports Complex Building
   c. PNR Tourist Terminal
   d. Penal Farm
   e. Public Market in Sn. Ramon & San Pedro
   f. Construction of 1.5 km. drainage structure & facilities in poblacion area.

3. Nabua
   a. Drainage (Poblacion)
   b. Piped-Water
   c. Improvement of Electric Power

TABLE J-12

PROPOSED SOCIAL SERVICES
RINCONADA IAD

MUNICIPALITY	BAAO	BALATAN	BATO	BUHI	BULA	IRIGA CITY	NABUA
Health Clinics	-	2	-	-	6	-	-
School Buildings	-	-	-	-	12	-	-
Recreational Facilities							
Playgrounds	-	-	-	-	15	-	-
Parks	-	-	-	-	6	-	-
Swimming Pools	-	-	-	-	5	-	-
Cultural							
Public Library	-	-	-	-	1	-	-
Day Care Service Program for Pre-schoolers	-	-	-	-	-	24	-
Day Care for the Aged	-	-	-	-	-	1	-
Man Power Training Center		-	-	-	-	-	1
Gym. Cultural Centers	-	-	-	-	-	-	1
Town Plaza	-	-	-	-	-	-	1
Feeding for Day Care Service	-	-	1	-	-	-	-
TOTAL		2	1		55	25	3