BIBLIOGRAPHIC DATA SHEET	1. CONTROL NUMBER PN-AAH-818	2. SUBJECT CLASSIFICATION (695) AP12-0000-G732

3. TITLE AND SUBTITLE (240) Recommendation on the improvement of the Barit River irrigation system, Bicol River Basin, Philippines; volume II, annex A: Production and incomes of farm households in the Barit River irrigation system

4. PERSONAL AUTHORS (100)

Wang, Jaw-Kai

5. CORPORATE AUTHORS (101)

Hawaii Univ. College of Tropical Agriculture

6. DOCUMENT DATE (110)	7. NUMBER OF PAGES (120)	8. ARC NUMBER (170)
1977	52p.	RP627.52.H389

9. REFERENCE ORGANIZATION (130)

Hawaii

10. SUPPLEMENTARY NOTES (500)

11. ABSTRACT (950)

12. DESCRIPTORS (920)		13. PROJECT NUMBER (150)	
Bicol River, Philippines	Philippines		
Rice	Production planning		
Agricultural production	Economic analysis	14. CONTRACT NO.(140)	15. CONTRACT TYPE (140)
Agricultural engineering	River basins	AID/ea-C-1099	
Irrigation	Drainage	16. TYPE OF DOCUMENT (160)	
Farm income	Irrigated land		

AID 590-7 (10-79)

RECOMMENDATION ON THE IMPROVEMENT OF THE BARIT RIVER IRRIGATION SYSTEM Bicol River Basin Philippines

Volume II, Annex A

PRODUCTION AND INCOMES OF FARM HOUSEHOLDS IN THE BARIT RIVER IRRIGATION SYSTEM

Final Report Submitted to the

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

In Partial Fulfillment of

CONTRACT NO. AID/EA-C-1099

Submitted by

JAW-KAI WANG, PRINCIPAL INVESTIGATOR

Agricultural Engineering Department

College of Tropical Agriculture

UNIVERSITY OF HAWAII

AUGUST 1977

PROJECT PERSONNEL

UNIVERSITY OF HAWAII

Jaw-Kai Wang, PhD, Principal Investigator

Ross E. Hagan, MS, Research Associate (Principal Irrigation Engineer)

T.K. Fine, PhD, Research Associate (Principal Drainage Engineer)

William J. Staub, PhD, Research Associate, Food Institute, East-West Center (Principal Agricultural Economist)

Betty O.T. Hu, BS, Research Associate (Programmer)

In cooperation with
BICOL RIVER BASIN DEVELOPMENT PROGRAM OFFICE
Irrigation Planning Team

Engineering Group

Engr. Felizardo Alarkon, Jr., Team Leader
Engr. Roberto Rada, Assistant Team Leader
Engr. Augustus Durante, Civil Engineer
Engr. Francis Autor, Civil Engineering Aide

Economics Group

Mr. Napoleon E. de Sagun, Team Leader
Mr. Beda Priela, Jr., Asst. Team Leader
Mr. Salvador Aguilar, Research Assistant
Miss Rosalina Aquino, Research Assistant
Miss Gracia Belgira, Research Assistant
Mr. Jaime Leo, Research Assistant
Miss Charito Malonda, Research Assistant

Supportive Services

Mr. Francisco Imperial, Secretary/Clerk Typist
Mr. Glicerio Panganiban, Driver

National Irrigation Administration

Engr. Ursolino Ramirez

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDIX TABLES

GLOSSARY OF ACRONYMS

BRIS	-	Barit River Irrigation System
NIA	-	National Irrigation Administration
DAR	-	Department of Agrarian Reform
OFWMP	-	On Farm Water Management Project
BRBDP	-	Bicol River Basin Development Program
IRRI	-	International Rice Research Institute
CWRS	-	Comprehensive Water Resources Study
SSRU	-	Social Survey Research Unit
IAD	-	Integrated Area Development

UNITS OF MEASURE

1 cavan	=	50 kilograms = 110 pounds
1 hectare	=	10,000 square meters = 2.47 acres
$ 1 U.S.	=	7.5 Pesos

INTRODUCTION

This report describes several characteristics of households and related farm management characteristics of households which cultivate land within the project area of the Barit River Irrigation System (BRIS), Nabua, Camarines Sur, Philippines. The information contained in this report is primarily descriptive, and is intended for use by development planners who are working in the Bicol River Basin. This study was conducted as part of a larger study which was designed to produce a preliminary plan for water distribution and drainage in the BRIS.

BACKGROUND FOR THE STUDY

Public investments to improve irrigation and drainage services to small farmers have increased substantially within the last 20 years. It is generally well accepted that such investments are necessary in many areas to increase production and income opportunities of small farmers and to satisfy national goals for increasing food production. For example, the Asian Development Bank (ADB) reports that in many areas in Asia, which are subject to monsoon rainfall patterns, rice production under rainfed conditions is not likely to exceed one metric ton per ha.[1] With irrigation services rice production can be expected to increase to about 2.5 tons per hectare without significant use of fertilizers and chemical pesticides. Production can be expected to increase to 3.5 tons per hectare when irrigation services are available and significant quantities of commercial production inputs are used. These general estimates correspond to but are somewhat lower than those described by researchers at

---

[1]Asian Development Bank, Regional Workshop on Water Management, 1973, Manila, p. 5.

the International Rice Research Institute (IRRI).[2]

While these types of benefits are accepted in general, there remains substantial uncertainty among the community of professionals who must design and support investments in irrigation and drainage development concerning the magnitude and type of facilities and water management systems to install. It has been generally recognized that many past investments in irrigation and drainage development have not yielded benefits as quickly as expected. There are many reasons for this. A primary cause has been the lack of distribution facilities and farm level water management organizations which are required to ensure that water which is potentially available is actually delivered to the potential water users.

This has led to the incorporation of in-field delivery systems into many irrigation projects which are developed. Perhaps the most sophisticated of these types of designs are those which include land consolidation and canal alignment of a rather precise nature. The pilot irrigation projects at Sappaya and Channasut, Thailand are examples.

Since 1974 the results of research, conducted in the Philippines by the National Irrigation Administration (NIA) and the Water Management Department at IRRI, raise additional questions about the type and magnitude of facility development which would yield the greatest benefits per unit of investment.[3]

---

[2] Herdt, Robert and Thomas Wickham, "Explaining the Gap Between Potential and Actual Rice Yields in the Philippines." Paper no. 74-6 revised. International Rice Research Institute, Los Banos, 1974.

[3] Lazaro, Rogelio C. and Thomas Wickham. "Improvement of Irrigation Systems Facilities: Technical and Management Concepts," in Implementing Public Irrigation Programs, William J. Staub (ed.), East-West Food Institute, East-West Center, Honolulu, Hawaii, 1977.

Experiments were conducted to measure the differences in rice production of farms which received irrigation via continuous flow vs. rotational distribution at the farm ditch. Facilities to provide the former types of services are much less expensive to construct and require less sophisticated management than do the latter types of services. In general, experimenters were unable to discern substantial differences in rice production between the two types of water management systems. They conclude by suggesting that improved and creative managerial techniques for distributing water to farmers and a main system which is capable of delivering reliable supplies of water to farmers may be a more economical method of improving irrigation delivery services than is the construction of expensive and intensive farm-level distribution structures.

These experiments are suggestive and have not been widely replicated.[4] However, they have stimulated additional thought and questioning among the community of persons who are involved in irrigation development planning. See Wang and Hagan.[5]

Relationship to Water Resources Development in the Bicol River Basin and the Barit River Irrigation System

Water resource development and management is one of the primary methods by which development planners in the Bicol River Basin Development Program (BRBDP) except to accelerate economic development and growth in this area of the Philippines. On the basis of recommendations from a reconnaissance grade study by Tippets-Abbet-McCarthey-Stratton/Trans-Asia Engineering Associates (TAMS/TAE) the Bicol River Basin was disaggregated into several zones (Integrated Area Development; IAD's). Development projects will be prepared

[4] Lazaro, Rogelio C. and Thomas Wickham, "A Proposal for Comparative Studies of Intensive and Extensive Systems of Irrigation," a draft proposal prepared for the A/D/C-SEARCA-IRRI Water Management Seminar, Los Banos, Philippines, June 22-25, 1976.

[5] Wang, Jaw-Kai and Ross E. Hagan, "A Review of Factors Important to Irrigated Rice Production System Design," paper presented at Institute-wide Special Seminar, International Rice Research Institute, Los Banos, Philippines, June 16, 1977.

and implemented in each of the IAD's. In-field distribution systems and water distribution schedules will be included in each of the proposed projects.

The Barit River Irrigation System is included within the area to be covered by the Rinconada IAD, the second of the IAD's for which development projects are being prepared. The irrigation development and rice production planning study conducted by the University of Hawaii and the BRBDP provides for the layout design of irrigation and drainage systems and a cropping and water distribution schedule for the BRIS. As a part of this study, the cooperating investigators agreed to conduct an examination of factors influencing the distribution of income among farmers within the BRIS.

Objectives of the Study

There were two general objectives of the study. The first was to prepare descriptive information concerning the household characteristics, farm production, and income situation of households which cultivated land within the BRIS. The second objective was to examine the influence of several factors on farm production and household income. These factors included 1) farm size, 2) tenure, and 3) access to irrigation and drainage services.

Subsequent analysis revealed that farm size would not likely be an important variable because farms were small (0.69 ha) and there was not a wide variation in farm size within the study area. Tenure was eliminated as a variable for analysis because it was not possible to obtain information from enough lease's. Within the budget and time constraints it was necessary to choose between 1) a sampling stratification which would include a sufficient number of share-tenants and 2) one which differentiated among respondents according to the accessibility to irrigation services. A samp-

ling procedure which was based on water management criteria was chosen.

THE STUDY AREA

The BRIS provides irrigation services to a net irrigated area of about 3,260 ha.[6] The nominal command area of the system includes about 4,000 ha. See Table 1 and Figure 1. Some 21 barrios are included in the system's command area. These include 15 barrios in the municipality of Nabua, four in Iriga City, and two in Baao. All of the land which receives irrigation services is used for rice production.

Table 1. Land Devoted to Major Crops, BRIS Area

CROPLAND	AREA (Ha.)	PERCENT
Rice	3,470	87.0
Irrigated	3,160	91
Non-irrigated	40	1
Upland	270	8
Corn	350	9.0
Abaca	5	0.5
Sugarcane	5	0.5
Others	170	3.0
ALL	4,000	100

Source: Irrigated Rice (1975): BRIS Office, Nabua, Cam. Sur
Others: Barrio Screening Survey (1970)

The system consists of one main canal and several lateral canals. Farm ditches have been constructed--some by the National Irrigation Administration

[6] These figures (3,160) differ from the estimates used for design purposes (2,809) because the estimates used for design purposes and the estimates reported above were derived from different sources.

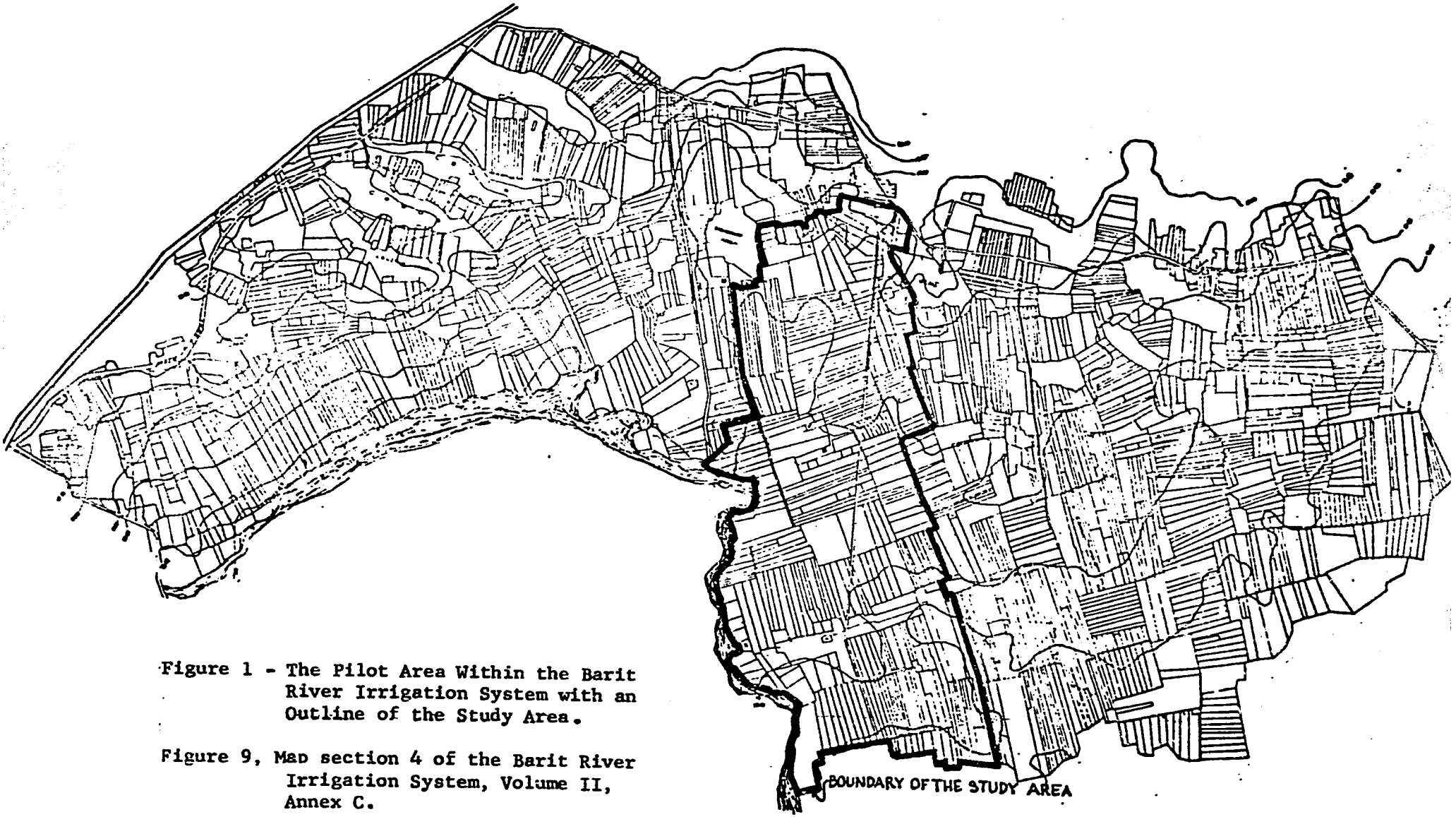

Figure 1 - The Pilot Area Within the Barit River Irrigation System with an Outline of the Study Area.

Figure 9, Map section 4 of the Barit River Irrigation System, Volume II, Annex C.

most of them by the water users. Water for the BRIS comes from Lake Buhi. Irrigation water management within BRIS is hindered by the fact that the outflow from Lake Buhi is regulated according to the requirements of hydroelectric power generation.

Some 6,297 farm households cultivate parcels which receive irrigation services from the BRIS. The Department of Agrarian Reform (DAR) estimates that 62 percent of these households are owner cultivators, 36 percent are share-tenants, and 2 percent are leasees.

As of 1975 there were some 33,585 persons residing within the boundaries of the BRIS. See Table 2.

Table 2. Total Population, BRIS Area, 1975

MUNICIPALITY	POPULATION
Baao	382
Iriga City	8,425
Nabua	24,776
TOTAL	33,583

Since its opening the BRIS has been both beneficial and problematic to a significant number of farmers. Many have derived substantial production and income benefits from the irrigation services. However, many farmers cultivating parcels in low lying areas have experienced more serious inundations during the wet season due to the absence of adequate drainage facilities. The DAR estimates that about 1,020 ha. of land within the BRIS is waterlogged during the wet season. See Table 3. Some of the drainage problems encountered were caused by private construction of diversion dams by farmers wishing to

obtain access to irrigation services.

Table 3. Waterlogged Portions within BRIS, 1975

Municipality/Barrio	Area
Nabua	
Sta. Lucia	50
San Antonio	100
Sta. Barbara	150
Sto. Domingo	200
La Purisima	300
San Vicente Ogbon	100
Santiago (Old)	15
San Antonio Ogbon	15
San Jose	25
La Opinion	30
San Ramon	25
Iriga City	
Sta. Cruz	10
San Vicente	10
TOTAL	1,020

Source: Department of Agrarian Reform, Nabua, Camarines Sur

Survey within BRIS; The Pilot Project Area

A special survey was conducted among a sample of farmers within a BRIS pilot project area (Figure 1.) to obtain data required to examine the impact of variations in the quality of irrigation services on farm production and income. This pilot project area includes some 533 ha. within BRIS. All farms in the s tudy area receive irrigation water from a single lateral canal

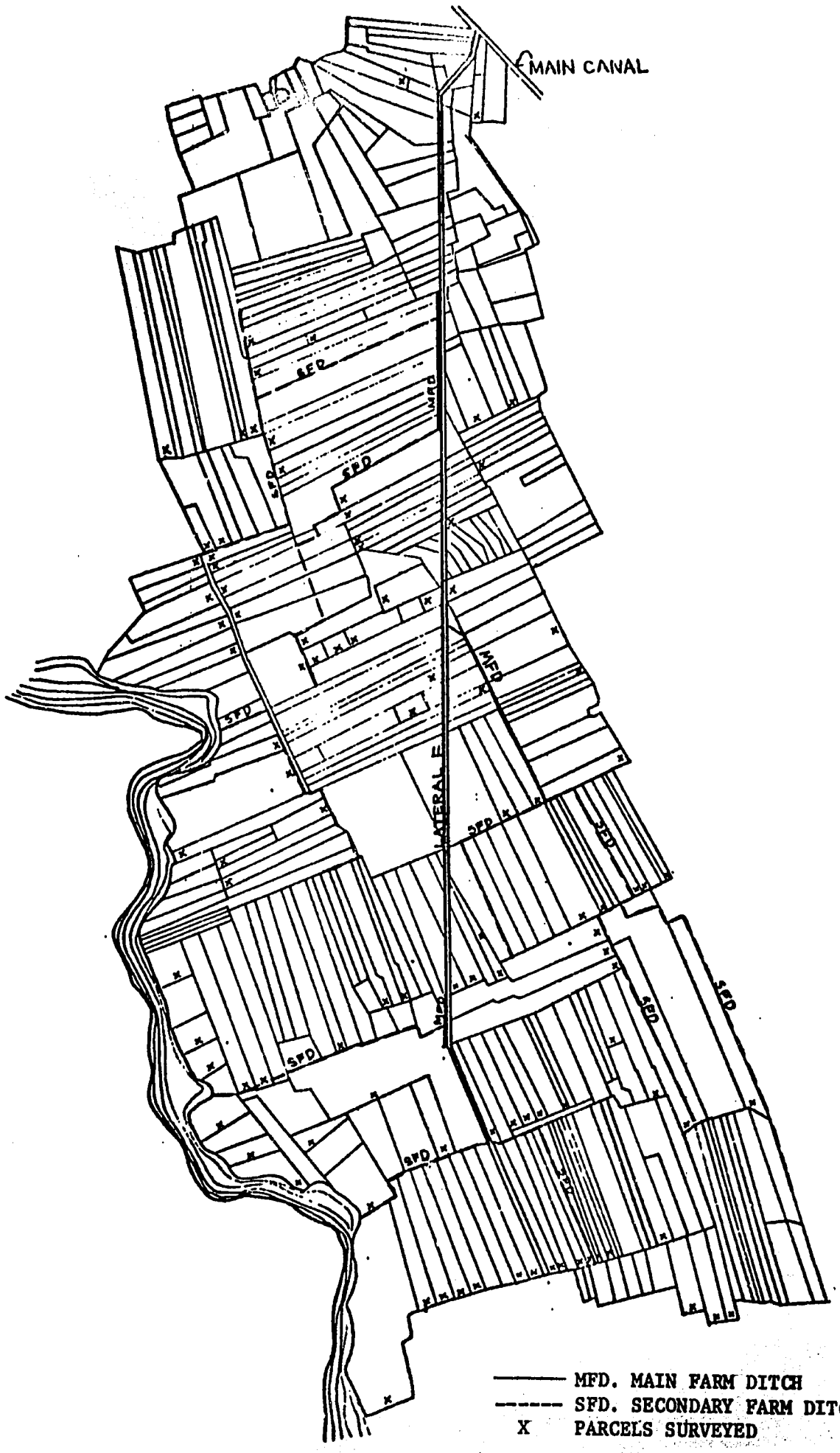

FIGURE 2. THE STUDY AREA

(Lateral F). See Figure 2. The pilot area is distinguished from other areas in BRIS by two features. First, the study area contains a greater density of farm ditches than exists elsewhere in BRIS. Second, beginning in 1974, the On-Farm Water Management Project (OFWMP) was initiated to educate and organize water users into groups which may serve as prototypes of organizational units of a system-wide water users association.

Selection of Households Data were obtained from interviews conducted on 84 households which cultivated parcels in the study area. While data was obtained as it pertained to the entire household, the parcel was identified as the primary unit of information and analysis. This unit of information and analysis was deemed to be more appropriate than the household because the parcel is the basic unit of farm management decision making and is the basic unit of water management.

Farms in the study area generally consist of one or more non-contiguous parcels. While farmers must coordinate their farming operations and investment decisions within the context of the total number of parcels in the farm, the parcel is the basic unit to which farm management decisions are applied.

Also irrigation water is delivered by the NIA to parcels. While the NIA maintains records, for billing purposes, of the parcels to which it delivers water, the agency does not maintain records of the entire land holdings of persons to whom it delivers water. Since irrigation services are provided to parcels and not to farms as an aggregate unit, factors influencing income distribution and employment which relate to variations in the quality of irrigation services must also be examined at that level.

Parcels in the study area receive water directly or via cross-paddy flow from one of four farm ditches or six supplementary farm ditches. The farm ditches convey water from Lateral F and the supplementary farm ditches distribute water from the farm ditches to a point closer to the respective parcels.

Data were collected from households which cultivated parcels on each of these ditches. The population of parcels receiving irrigation services from each ditch was identified. From this population, ten parcels were selected by a random selection procedure. Data were collected about the farm parcel of primary interest and about the social and economic characteristics of the entire household which cultivated the parcel. Of 96 interviews which were taken, only 84 contained sufficient information to warrant analysis and the others were discarded. The findings contained in this report are based on information from these 84 households.

Some households cultivated more than one parcel. For these households, detailed information was collected from each additional parcel. While the study contains information from 84 households, it contains information on 106 parcels.

Accessibility to Water Supply Parcels were distinguished according to the mode of water entry. That is, parcels were distinguished in terms of whether they received water directly from a farm ditch or via cross-paddy flow. This differentiation was made for two reasons. First, theoretically parcels which receive irrigation directly from a ditch obtain more reliable irrigation services during the dry season than do parcels which receive water via cross-paddy flow. These higher quality services are expected to be reflected during the dry season in the form of 1) increased productivity and 2) greater short term investments (seed, fertilizer, pesticides, and labor) than on farms which receive water via cross-paddy flow.

Second, inundation hazards during the wet season are likely to be less frequent and less severe on parcels which receive water directly from a ditch. On average, they would be located "up slope" from parcels which receive water via cross-paddy flow. Parcels in this latter category would receive

drainage and runoff from the parcels which receive water directly from a ditch. If inundations are a serious problem during the wet season, the differential impact would be expected to be reflected in differences in production, input use, and income derived on these two categories of parcels.

Inferences drawn from analyses based on these data will be suggestive rather than definitive, however. Data were collected from selected households in May and June 1976. Because of time requirements to complete the study, investigators were required to collect data from farmers which related to the wet season period of May to December 1975 and for the dry season period from January to June 1975. Because it was necessary to depend on records rather than avail of current information, it was not possible to obtain records of the amount of water which farmers actually received from BRIS or to measure the amount of inundation which farmers may have suffered.

Such physical measurements are extremely important in conducting water management related research which will produce conclusive rather than suggestive information.

General Farm Characteristics of Households within the Pilot Area

On the average, farms in the study area consisted of about 1.7 parcels. See Table 4. Some 43 households had one parcel, 25 cultivated two parcels, 11 cultivated three parcels, and five cultivated four parcels. Six households also cultivated one rainfed parcel which was outside the BRIS.

The average farm consisted of 0.69 ha. See Table 5. This estimate is substantially smaller than are other estimates of farm size in the Bicol River Basin or the Rinconada IAD. The 1971 Census of Agriculture estimates average farm size to be 2.5 ha. However, this estimate includes rainfed

Table 4. Number of Parcels per Household by Type of Land,

Type of Land/ No. of Parcels	Number of Households	Number of Parcels
Irrigated		
One Parcel	43	43
Two Parcels	25	50
Three Parcels	11	33
Four Parcels	5	20
TOTAL	84	146
MEAN		1.73[1/]
Rainfed		
None	78	0
One Parcel	6	6
TOTAL	84	6
MEAN		1[2/]

1/ Mean computed by dividing the number of irrigated parcels by the number of households cultivating irrigated parcels (146/84).

2/ Mean computed by dividing the number of rainfed parcels by the number of households cultivating rainfed parcels (6/6).

Table 5. Mean Size of Farm by Tenure Category.

Tenure Category	Number of Observations	Mean Farm Size	Mean Size of Irrigated Holding	Mean Size of Rainfed Holding
Owner-Cultivator	47	0.66	0.56	1.26 (4)[1/]
Share-tenancy	24	0.52	0.50	0.50 (1)
Lessee	2	0.89	0.89	0.00 (0)
Mixed Tenancy[2/]	11	1.14	1.04	1.00 (1)
Number of Observations	84	84	84	6
MEAN		0.69	1.04	1.09

1/ Numbers in parenthesis refer to the number of households in this tenure category which cultivated rainfed land.

2/ Mixed tenancy includes farmers cultivate more than one parcel of land under different tenural statuses. All farmers who were of "mixed tenure" operated at least one parcel as an owner-cultivator and another as a share-tenant.

lowland areas as well as upland area devoted to rice production. The Social Survey Research Unit (SSRU) reported that the mean size of irrigated farms in the Rinconada IAD was 0.8 ha., and the mean size of rainfed farms was about 1.0 ha. See SSRU, SS12.01.

The mean parcel size of farms in the study area was 0.37 ha.

Of the parcels included in the survey 66 received water directly from a farm ditch; 40 received water via cross-paddy flow. See Table 6.

Table 6. Number and Mean Size of Parcels in Study Area by Mode of Water Entry.

Mode of Water Entry	Number of Parcels	Number of Parcels as a percent of total (%)	Mean Parcel Size (Ha.)	Total Area (Ha.)
Farm ditch (direct)	66	62.3	0.43	28.4
Cross-Paddy Flow (Indirect)	40	37.7	0.28	11.2
TOTAL	106	100.0	0.37	39.6

Parcels which received water directly from a ditch were substantially larger than those which received water via cross-paddy flow (0.43 and 0.28 respectively).

Tenural Status of Households Most farmers (47) owned the land which they cultivated. Many (24) were share-tenants. Several (11) cultivated more than one parcel and held different tenural rights to these parcels. Two farmers were lessees. See Table 5. Holding leasehold rights to land was not common in the Philippines until the implementation of the Agrarian Reform program in 1972. The small number of leaseholders in the pilot area relative to share-tenants occurs because of the interim status of the implementation of the program of the Department of Agrarian Reform at the time data was collected.

LAND USE INTENSITY, RICE PRODUCTION, AND INPUT USE ON PARCELS IN THE PILOT AREA

This section reports on the intensity of land use, rice production, and the use of inputs on parcels in the study area. Data are also presented in a format which distinguishes and allows comparisons among parcels which receive water via cross-paddy flow vs. parcels receiving water directly from a ditch. As indicated before, inferences drawn from these comparisons are suggestive but should not be considered as definitive.

Land Use

Land use intensity is measured with two basic indices: 1) the portion of the number of parcels which are cultivated and 2) the portion of the physical area contained within these parcels which is cultivated.

Unforseen calamities may cause farmers to be unable to harvest crops from land which is planted. These hazards may include drought, inundation, rat damage, and insect damage. To examine the impact which these types of hazards may have on the portion of area harvested relative to the are which is planted, "area cultivated" was measured in terms of 1) area planted and 2) area harvested. Land use intensity indices were calculated for area planted and area harvested.

Relative to the total amount of land, farmers cultivated about 88 percent of the land in the wet season, and 90 percent in the dry season. Over the span of two seasons they cultivated an area equivalent to 1.77 times the size of the land area to which they held cultivation rights. This corresponds with an SSRU estimate of 2.0 for 1R irrigated land, 1.80 for 2R irrigated land, and 1.33 for 3R irrigated land.[7] According to SSRU the

[7]The land classification codes correspond to those used in the Economic Land Classification in the Bicol River Basin by the Bureau of Soils and the United Nations Development Program.

reported differences in land use intensity among land classes derives from variations in cultivation intensity during the dry season.

Farmers cultivating parcels which received water directly from a ditch cultivated a greater portion of their land during both seasons than did farmers cultivating parcels which received water via cross-paddy flow.

Parcels Planted and Harvested A slightly larger portion of the parcels were planted in the dry season (93.4%) than in the wet season (92.4%). See Table 7. Farmers not planting parcels during the dry season cited fear of drought as the reason for not planting; fear of inundation was cited as the reason for not planting parcels during the wet season.

During the dry season, a slightly larger portion of the parcels receiving water from a ditch (95.5%) were planted relative to parcels receiving water via cross-paddy flow (92.5). No such differences appear during the wet season.

During the dry season, all parcels which were planted were harvested. However, during the wet season about 5.5 percent of the parcels which were planted and received water via cross-paddy flow were not harvested. All parcels which received water from a ditch and were planted during the wet season were harvested.

Area Planted and Harvested During both seasons a larger portion of the area which received water from a farm ditch was planted relative to the area which reeeived water via cross paddy flow (91.9% and 81.2% respectively during the wet season and 93.9% and 80.3% respectively during the dry season). See Table 8.

Farmers cultivating parcels which received water from a ditch obtained substantially higher land use intensities than farmers cultivating parcels which received water via cross-paddy flow (185% and 162% respectively). These

Table 7. Parcels Planted and Harvested and Percent of Parcels Planted and Harvested by Mode of Water Entry, Wet and Dry Season

Mode of Water Entry	Number of Parcels			Percent of Parcel Planted (%)	Percent Harvested as Percent of Parcels Planted (%)	Parcels Harvested as Percent of Total Parcels (%)
	Total	Planted	Harvested			
				Wet Season		
Ditch	66	61	61	92.4	100.0	92.4
Cross-Paddy Flow	40	37	35	92.5	94.5	87.5
MEAN	106	98	96	92.4	98.0	90.6
				Dry Season		
Ditch	66	63	63	95.5	100.0	95.5
Cross-Paddy Flow	40	37	37	92.5	100.0	92.5
MEAN	106	100	100	94.3	100.0	94.3

Table 7. Parcels Planted and Harvested and Percent of Area Planted and Harvested by Mode of Water Entry, Wet Season, Dry Season and Annual

Mode of Water Entry	Area Total	Area Planted	Harvested	Percent of Area Planted (%)	Area Harvested as Percent of Area Planted (%)	Area Harvested as Percent of Total Area (%)
			Wet Season			
Ditch	28.4	26.1	26.1	91.9	100.0	91.9
Cross-Paddy Flow	11.2	9.1	8.6	81.2	94.5	76.8
MEAN	39.6	35.2	34.7	88.9	98.6	87.6
			Dry Season			
Ditch	28.4	26.5	26.5	93.3	100.0	93.3
Cross-Paddy Flow	11.2	9.0	9.0	80.3	100.0	80.3
MEAN	39.6	35.5	35.5	89.6	100.0	89.6
			Annual			
Ditch	28.4	52.6	52.6	185.2	100.0	185.2
Cross-Paddy Flow	11.2	18.1	17.6	161.6	97.2	157.1
MEAN	39.6	70.7	70.2	178.5	99.3	177.3

numbers express land use intensity as the total area planted as a percent of the total physical land area to which the farmer held cultivation rights.

The difference in land use intensity is even greater when land use intensity is expressed as the total area harvested (not planted) as a percent of the total area to which the farmer held tenural rights (185% and 157% respectively). This occurs because about 5.5 percent of the parcels which receive water via cross-paddy flow and were planted during the wet season were not harvested.

Palay Production

Palay yields obtained during the dry season (57 cavans) were about 50 percent greater than those obtained during the wet season (38 cavans).

Yields obtained on parcels which receive water via cross-paddy flow were substantially greater than those obtained on parcels which receive water from a farm ditch during both seasons. See Table 9. Yields per area harvested on parcels receiving water via cross-paddy flow were 45.1 and 70.9 cavans per ha. during the wet and dry seasons respectively during the wet and dry seasons. Yields per area harvested on parcels receiving water from a ditch were 36.1 and 52.7 cavans per hectare during the wet and dry seasons.

Total annual palay production per hectare was also greater on parcels receiving water via cross-paddy flow than on parcels receiving water directly from a ditch. This was because the substantially greater yields on parcels receiving water via cross-paddy flow were more than sufficient to compensate for the lower intensity of land use on these parcels. These unanticipated findings are partially explained in the next section by the relatively greater use of modern seeds, fertilizers, and chemical pesticides on parcels receiving water via cross-paddy flow.

Table 9. Production per Hectare by Mode of Water Entry, Wet Season, Dry Season, and Annual

Mode of Water Entry	Total Production (cavans)	Yield per Area Planted (cavans)	Yield per Area Harvested (cavans)	Prdduction per Total Physical Area (cavans)
		Wet Season		
Ditch	942.2	36.1	36.1	33.3
Cross-Paddy Flow	387.7	42.6	45.1	34.6
MEAN/(total)	(1329.9)	37.8	38.3	33.6
		Dry Season		
Ditch	1396.6	52.7	52.7	49.2
Cross-Paddy Flow	638.7	70.9	70.9	57.3
MEAN/(total)	(2035.3)	57.3	57.3	51.4
		Annual		
Ditch	2338.6	--	--	82.4
Cross-Paddy Flow	1026.4	--	--	91.6
MEAN/(total)	(3365.0)	--	--	85.0

Material Inputs Used

Almost all farmers used modern seeds, and about 80 percent used chemical pesticides in both seasons. See Tables 10 and 11. Most expenditures for chemical pesticides were for insecticides. Hand weeding is the most commonly practiced form of weed control.

Less than one-half of the farmers (43%) used commercial fertilizer during the wet season, and slightly more than one-half (59%) used commercial fertilizer during the dry season. Farmers using commercial fertilizers

Table 10. Materials Inputs Used per Hectare by Mode of Water Entry, Wet Season

Items	Improved Seeds	Fertilizer	Chemical Pesticides	Total
		From Ditch		
Percent of Farmers Using 1/	98.3	49.2	82.5	--
Quantity (Kg.)	90	32.5 2/	--	--
Value (₱)	126.03	162.84	83.37	372.24
$ Value	33.9	43.7	22.4	100.0
		Cross-Paddy Flow		
Percent of Farmers Using	100.0	33.3	88.9	--
Quantity (Kg.)	130	22.9	--	--
Value (₱)	183.91	119.87	120.53	424.81
$ Value	43.3	28.3	28.4	100.0
		Weighted Average		
Percent of Farmers Using	98.9	43.4	84.8	--
Quantity (Kg.)	106.5	29.8	--	--
Value (₱)	147.19	150.85	97.53	395.57
% Value	37.2	38.1	24.7	100.0

1/ Percent of farmers using were calculated on the basis of the number of parcels for which complete data records were available. Of the total number of parcels (106) complete records were contained for 94 parcels.

2/ Kilograms of nitrogen.

Table 11. Materials Inputs Used per Hectare by Mode of Water Entry, Dry Season

Item	Improved Seeds	Fertilizer	Chemical Pesticides	Total
		From Ditch		
Percent of Farmers Using 1/	100.0	65.1	88.9	--
Quantity (Kg.)	100.0	32.1	--	--
Value (₱)	131.78	178.10	85.77	395.66
% Value	33.3	45.0	21.7	100.0
		Cross-Paddy Flow		
Percent of Farmers Using	100.0	48.6	89.2	--
Quantity (Kg.)	155	31.3	--	--
Value (₱)	223.65	146.35	109.53	479.53
% Value	46.6	30.5	22.8	100.0
		Weighted Average		
Percent of Farmers Using	100.0	59.0	89.0	--
Quantity (Kg.)	120	31.8	--	--
Value (₱)	166.12	168.42	94.58	429.11
% Value	38.7	39.3	22.0	100.0

1/ Percent of farmers using were calculated on the basis of the number of farms for which complete data records were available. Of the total number of parcels (106) complete records were contained for 94 parcels.

tended to use about the same amount during both seasons. These findings correspond with those reported by the SSRU (See SS.12). The major deviation is that farmers using fertilizers in the pilot area reportedly use about 50 percent more than was reported by SSRU. See Appendix Tables 1 and 2. Also, farmers on better quality land, as specified by the Economic Land Classification, tended to use commercial fertilizers more frequently and in greater quantities than farmers cultivating land of inferior quality.

Implications for Development Planning While these findings are consistent with the results of farm surveys conducted in other areas, they suggest development strategies which differ somewhat from those based on the results of agronomic trials conducted under experimental conditions. The results of agronomic trials indicate the agricultural development strategies should heavily depend on the increased use of commercial fertilizers. The data presented above is prima facie evidence of farmers preference to invest in materials which reduce losses (pesticides) than in materials which emphasize increases in production (fertilizers). While the use of commercial fertilizers and pesticides are not mutually exclusive options, the foregoing evidence suggests that greater emphasis might be placed on investments which reduce crop losses at the farm level than on investments which increase production but leave the farmer exposed to hazards of losing the increase in production. From the point of view of development planning, it appears useful to consider development strategies which emphasize loss minimization at the outset and production increases at an appropriate subsequent stage.

Inputs Used by Mode of Water Entry As indicated on Tables 10 and 11 farmers cultivating parcels which received water via cross-paddy flow tended to make larger expenditures for material inputs in both seasons than farmers

cultivating parcels which received water directly from a farm ditch. In the wet season, farmers cultivating parcels which received water via cross-paddy flow spent ₱424.81 for material inputs, while farmers cultivating parcels which received water directly from a farm ditch spent ₱372.24. In the dry season, farmers cultivating parcels which received water via cross-paddy flow spent ₱479.53, while farmers cultivating parcels which received water directly spent ₱395.66.

These differences are accounted for by the greater use of seeds and pesticides, in both seasons, by farmers receiving water via cross-paddy flow. Farmers cultivating parcels which received water via cross-paddy flow tended to use about 50 percent more seed during both seasons. In the wet season these farmers spent about 45 percent more for chemical pesticides, and about 28 percent more for chemical pesticides in the dry season.

However, farmers cultivating parcels which received water directly from a farm ditch had a greater incidence of fertilizer use and used greater quantities of fertilizer during both seasons. Some 49 percent of the farmers cultivating parcels which received water directly from a ditch used commercial fertilizer in the wet season, while only 33 percent of the farmers cultivating parcels which received water via cross-paddy flow used fertilizer. During the dry season the incidence of fertilizer use was 65 and 49 percent respectively. Farmer cultivating parcels which received water directly from a ditch tended to use about 42 percent more commercial fertilizer during the wet season and about the same amount during the dry season relative to farmers cultivating parcels which received water via cross-paddy flow.

The data collected for this study are not sufficient to explain the variations in the incidence and amount of material inputs used in the two categories of land. However, several intriguing questions emerge which, if answered, might provide additional insight into the benefits to be derived

from improved irrigation and drainage services. Some of these questions are as follows. Why do farmers receiving water via cross-paddy flow use substantially more seed in both seasons than farmers who cultivate parcels which receive water directly from a ditch? Under normal circumstances, farmers should not deviate substantially in the amount of seed which is used. Why do farmers who cultivate land which receives water via cross-paddy flow use substantially greater quantities of pesticides? Why do farmers who receive water directly from a ditch use substantially more fertilizer in the wet season relative to farmers who cultivate parcels which receive water via cross-paddy flow? Why doesn't the same difference exist during the dry season?

Labor Input Cost

This section describes the magnitude and types of expenditures for hired labor and implement services. Table 12 describes the type of labor and implements (if any) and the form of payment for hired labor services for ten major operations which are performed in the course of rice production.

In general, all operations which require that the person performing those operations exercise some managerial judgements are exclusively performed by family labor. These operations include 1) repair of ditches and dikes, 2) seedbed preparation, 3) irrigation and drainage, and 4) drying.

Land preparation, the 1st plowing and the 2 subsequent harrowings are sometimes performed by family members and sometimes by hired labor. Weeding is also partially performed by family members and by hired labor. Transplanting and harvesting are almost exclusively performed by hired labor. Of the labor which is hired, only the harvestors are paid in kind. That is, they receive a share of the harvest. All other labor is paid a wage or is paid on a contract basis.

Table 12. Prevailing Practices of Labor and Equipment Use for 10 Major Operations in Processing Rice

Operation	FAMILY			HIRED		
	Man	Man-Animal	Man-Machine	Man	Man-Animal	Man-Machine
Repair of Dikes and Ditches	√					
Seedbed Preparation	√					
1st Plowing		√	√		√ (C)[1]	√ (C)
1st and 2nd Harrowing		√	√		√ (C)	√ (C)
Transplanting				√ (C)		
Weeding	√			√ (C)		
Irrigating and Draining	√					
Harvesting				√ (N-C)[2]		
Handling and Hauling				√ (C)	√ (C)	
Drying	√					

[1] (C) is cash wage.

[2] (N-C) is non-cash wage.

Farmers tend to spend more per hectare for hired labor and equipment services in the dry season than in the wet season. See Table 13. In the wet season, farmers spent the equivalent of about ₱922 per hectare for labor and equipment services. Of this, about ₱450 were cash expenses and ₱474 were paid in-kind. During the dry season, they spent about ₱1029 per hectare, and about ₱495 was paid in cash and ₱533 was paid in-kind. The total labor and equipment service costs for the two seasons was about ₱1951.

These estimates are about 35 percent greater than those reported by the SSRU in SS.12. SSRU reported that expenditures per hectare for labor and equipment services amount to about ₱678 in the wet season and ₱775 in the dry season. See Appendix Table 2.

Farmers cultivating parcels which received water via cross-paddy flow tended to spend more for hired labor and equipment services in both seasons than did farmers who received water directly from a farm ditch. See Table 14. The reasons for these variations are not apparent from inspection of the data.

Implications for Short Term Financing The data presented in the tables on material and labor utilization indicate the magnitude of short term financing which farmers require. When considered on a "per hectare basis", farmers require about ₱850 to finance the material inputs and labor and equipment services at utilization rates specified in Tables 9 and 10 during the wet season. About ₱930 are required to purchase material and labor and equipment services used during the dry season, at current utilization rates. These estimates do not include in-kind payments which are made to harvest laborers.

If one considers that the average farm size in the BRIS is about 0.7 ha (Table 3) the advance cash requirements which are needed to purchase

Table 13. Expenditure for Hired Labor and Equipment per Hectare, Wet and Dry Season and Annual.

Type of Expenditure	Wet Season	Dry Season	Annual
	(pesos)		
Cash	448.03	495.48	943.51
Non-Cash	474.24	533.54	1007.78
Total	922.27	1029.02	1951.29

Table 14. Expenditures for Hired Labor and Equipment per Hectare by Mode of Water Entry, Wet and Dry Season and Annual.

Type of Expenditure	From Ditch	Cross-Paddy Flow
	(pesos)	
	Wet Season	
Cash	415.71	482.85
Non-Cash	439.91	548.61
Total	855.62	1031.46
	Dry Season	
Cash	454.74	611.41
Non-Cash	488.41	686.54
Total	943.15	1297.95
	Annual	
Cash	870.45	1094.26
Non-Cash	928.32	1235.15
Total	1798.77	2329.41

material inputs and labor and equipment services at current utilization rates is about ₱600 during the wet season and ₱650 during the dry season.

Advance cash requirements to finance material inputs and labor and equipment services are likely to increase in the future. Expenditures per hectare for seeds and pesticides may not increase significantly in the near future. However, baring substantial changes in the relationship between palay prices and fertilizer prices, it is likely that fertilizer use will increase both in terms of quantity used and number of farmers using fertilizer. Also,since labor requirements vary somewhat as a function of yield (particularly for harvest labor which is a large component of the farm labor bill) and since, in the future there may be a shift in payment of harvest laborers (from in-kind to cash payment) the cash requirement for these items may be expected to increase.

HOUSEHOLD INCOME

On average, households which cultivated parcels in the study area earned about ₱3500 per year. See Table 15. Most of this (61%) was derived from the palay enterprise. "Other sources" contributed 36 percent, and 3 percent came from other crops.

Most of the income derived from the palay enterprise was "non-cash" income. Farmers sold about 17 percent of the palay produced and consumed the remainder. Income derived from palay production was about 50 percent greater in the dry season than in the wet season. See Table 16.

Most of the income derived from "other sources" was in cash. Income from "other sources" includes all income earned by family members which was contributed to the family treasury. Income from "other sources" was the primary source of cash income to the family. See Tables 15 and 17.

Table 15. Annual Family Income

Item	Cash	Non-Cash	Total
	----------Pesos----------		
Palay Enterprise	351.56	1782.37	2133.93
Other Crops	55.05	61.91	116.96
Other Sources	1226.19	20.07	1246.26
Total	1632.80	1874.35	3497.15

Table 16. Annual Income from Palay Production, Wet and Dry Season

Item	Cash	Non-Cash	Total
	----------(Pesos)----------		
Wet Season	137.23	744.93	882.16
Dry Season	214.33	1037.44	1251.77
Total	351.56	1782.37	2133.93

Table 17. Annual Income from Other Farm Enterprises and Other Sources

Item	Cash	Non-Cash	Total
	----------(Pesos)----------		
Other Crops	55.05	61.91	116.96
Other Sources	1226.19	20.07	1246.26
Total	1281.24	81.98	1363.22

Other crops, such as bananas and vegetables accounted for only 3 percent of the total family income. About 47 percent of these crops were sold for cash; the remainder were consumed by family members.

The SSRU, however, reports that farmers cultivating land in the Rinconada IAD earned substantially more from their palay enterprise than is indicated by the data reported above. See Appendix Table 5. According to SSRU receipts from the palay enterprise in 1975 amounted to ₱1872.10 in the wet season, ₱2925.40 in the dry season, and ₱4797.50 for the entire year. The reason for these discrepancies are not clear as of this writing.

Net Farm Earnings

Perhaps the most accurate source of data describing net farm earnings in the Rinconada IAD is the SS.12 by SSRU. In the report of those investigations, they report that average earnings per farm on a per ha basis were ₱478.30 in the wet season, ₱1230.10 in the dry season and ₱1708.40 for the combination of the two seasons.

The SSRU study does not report on income derived from other sources. Consequently, definitive estimates of total net income per household are not available. However, if other farm households in the Rinconada IAD derive as much income from "other sources" as do households in the study area, net earnings per household may be substantially larger than that derived from the farm enterprise. Further investigation is required to determine the incidence of households which derive additional income from "other sources."

DEMOGRAPHIC AND SOCIAL CHARACTERISTICS OF HOUSEHOLDS IN THE STUDY AREA

Households in the study area consist of 4 to 5 persons--a husband and wife and two or three residing children. See Tables 18 and 19. Two households consisted of one member; one had more than eleven members.

Most heads of households (78%) were engaged eclusively in farming; about 19 percent did not farm but were involved in non-farm occupations; and about 2.4 percent were occupied in both farming and non-farming enterprises. See Table 20.

Table 18. Total Members per Household

Number of Members	Number of Observations	Relative Frequency (percent)	Cumulative Frequency (percent)
1	2	2.4	2.4
2	6	7.1	9.5
3-4	24	28.6	38.1
5-6	31	36.9	75.0
7-8	14	16.7	91.7
9-10	6	7.1	98.8
11-over	1	1.2	100.0
TOTAL	84	100.0	

Table 19. Number of Living Children per Household

Number of Children	Number of Observations	Relative Frequency (percent)	Cumulative Frequency (percent)
0	13	15.5	15.5
1	14	16.7	32.1
2	13	15.5	47.6
3-4	27	32.1	79.8
5-6	12	14.3	94.0
7-8	4	4.8	98.8
9-over	1	1.2	100.0
TOTAL	84	100.0	

Table 20. Occupation of Respondent

Occupation	Number of Observations	Relative Frequency	Cumulative Frequency
Farming	66	78.2	78.6
Non Farming	16	19.0	97.6
Farming plus Non Farming	2	2.4	100.0
TOTAL	84	100.0	

Less than 23 percent of the heads of households had received formal education beyond elementary school. See Table 21. About 22 percent had not received any formal education, and 54 percent had at least some elementary school education.

Table 21. Education of Respondent

Education	Number of Observations	Relative Frequency (percent)	Cumulative Frequency (percent)
None	19	22.6	22.6
Elementary Undergraduate	28	33.3	56.0
Graduate Elementary School	17	20.3	76.2
High School Undergraduate	7	8.3	84.5
High School Graduate	9	10.7	95.2
College Undergraduate	0	0.0	95.2
College Graduate	4	4.8	100.0
TOTAL	84	100.0	

Almost 80 percent of the spouses were engaged exclusively in housekeeping. See Table 22. About 17 percent had received formal education beyond elementary school; 26 percent had not received any formal education; and 57 percent had some or had completed education in elementary school. See Table 23.

Table 22. Occupation of Spouse

Occupation	Number of Observations	Relative Frequency (Percent)	Cumulative Frequency (Percent)
Housekeeping	56	78.9	78.9
Housekeeping and Non Farming	1	1.4	80.3
Farming	3	4.2	84.5
Farming and Housekeeping	1	1.4	85.9
Non Farming	9	12.7	98.6
Non Farming and Farming	1	1.4	100.0
TOTAL	71	100.0	

Table 23. Education of Spouse

Education	Number of Observations	Relative Frequency (percent)	Cumulative Frequency (percent)
None	20	26.3	26.3
Elementary Undergraduate	16	21.1	47.4
Elementary Graduate	27	35.5	82.9
High School Undergraduate	2	2.6	85.5
High School Graduate	6	7.9	93.4
College Undergraduate	1	1.3	94.7
College Graduate	4	5.3	100.0
TOTAL	76	100.0	

SUMMARY

The major findings of this study which are of significance for developing plans to improve farm incomes in the BRIS are as follows:

1. As much as 25 percent of the area within the BRIS is subject to serious waterlogging. This study has not attempted to locate these areas. However, it appears that the initial development of the BRIS may have contributed to the number of hectares which are currently classified as being waterlogged. Plans to improve water management in BRIS should consider possibilities for improving the internal drainage network within BRIS and drainage from the project area.
2. The average farm in the study area within BRIS consists of about 0.69 ha and one to two parcels. The average parcel size was found to be less than 0.4 ha.
3. Most farmers in the study area appear to be "owner-cultivators". About one-third of the households surveyed were share-tenants, however. Some farmers, about 10 percent, were owner cultivators, but had expanded the size of their farming operation by acquiring share-tenancy rights to an additional parcel of land.

4. Virtually all farmers used improved sees, and most, about 80 percent used chemical pesticides. However, only about one-half of the farmers used commercial fertilizers. And those which used fertilizers used considerably less than has been recommended.
5. Over the period of an entire year farmers in the study area, by means of double cropping tend to cultivate an area which is equivalent to 1.77 times the geographic area to which they have tenural rights. They tend to cultivate about 88 percent of the land in the wet season and 90 percent in the dry season.
6. Farmers receiving water directly from a ditch cultivated a greater portion of their land during both seasons than did farmers who received water via cross-paddy flow.
7. While crop losses occur in the study area, these losses tend to be partial losses and are not complete. That is, there appears to be little difference between the amount of area planted and the amount of area harvested.
8. Farmers cultivating parcels receiving water via cross-paddy flow tended to obtain greater yields than did farmers which received water directly from a farm ditch. The differences in yields were more than enough to compensate for the lower intensity of land use on parcels which received water via cross-paddy flow. These findings conflict with a priori expectations.
9. Farmers cultivating parcels which received water via cross-paddy flow tended to spend more for purchased material inputs (seeds, fertilizers, and pesticides) than did farmers which received water directly from a farm ditch. Farmers in the former category spent more for seeds and pesticides but less on commercial fertilizers

than did farmers in the latter category. The variations in expenditures for commercial inputs may but do not necessarily help to explain why farmers cultivating parcels which receive water via cross-paddy flow obtained higher yields than did farmers which received water directly from a ditch. Further examination is required to obtain a definitive explanation of the apparent variation on productivity between the two categories of land.

10. Farmers in the study area spent about ₱920 for labor and equipment services during the wet season, and about ₱1030 during the dry season. About one-half of these expenditures were made in cash, and about one-half were paid in-kind. These estimates exceed those made by the SSRU by about 35 percent. The reason for this discrepancy is not known at this time.

11. Farmers in the study area earned about ₱3,500 per year. About two-thirds of this was earned in the palay enterprise, and almost all of the remainder came from non-farm employment. The SSRU reports that farmers cultivating land in the Rinconada IAD earn about ₱5,000 per year from the rice enterprise. The reason for this discrepancy is not known at this time. Also, the magnitude of income derived from "other sources" was not anticipated and should be investigated further.

12. After deducting farm production expenses from receipts from the palay enterprise, average incomes to farms on a per hectare basis are about ₱1700 for the entire year. These findings were derived from the SSRU survey of the Rinconada IAD.

CONCLUDING REMARKS

While the results of this study describe the production and income characteristics of farm households which cultivate parcels within the BRIS and elsewhere in the Rinconada IAD, the findings of the study are inconclusive with respect to the impact of mode of water entry on production and incomes. There may be several reasons for this. It was not possible to collect supplementary data which describes drought or inundation conditions which farmers in the pilot area may have experienced. The study area was probably not the most suitable location to conduct an experiment to seek such answers. Within the study area, the minimum distance which water had to travel via cross-paddy flow to reach a parcel was 420 meters, and the mean distance was about 110 meters. Given the level of terrain which exists within the BRIS in general, it is probably necessary to have a significant number of parcels which receive water via cross-paddy flow for distances which exceed 300 meters before it is possible to discern differences in productivity and income.

The second factor which should be emphasized is that more information is required about the magnitude, cause, and consequences of inundations experienced by farmers in the BRIS. While the results of experiments conducted by the Water Management Department at IRRI provide important and useful insights for assessing the impact of water stress and developing guidelines for investments which can reduce water stress from dought, there is a notable vacuum in our understanding about the consequences of inundations.

The most valuable conceptual handhold and planning tool which relates to inundations is the Economic Land Classification of the Bicol River Basin which was conducted by the Bureau of Soils, the United Nations Development Programme, and the Social Survey Research Unit. If subsequent analyses are

to be conducted to examine the income distribution pattern of farm households in the Bicol River Basin for purposes of generating information for planning irrigation and agricultural development programs, investigators might be well advised to construct such studies in a fashion such that the results of those studies increase the power of the Economic Land Classification as a planning tool.

Appendix Table 1. Percent of Farmers Using Nitrogen, Fertilizers, Pesticides, Herbicides and HYV's and Quantity Used Per Hectare by Farmers Using these Inputs for Irrigated and Non-Irrigated Land by Land Classification Category, Wet Season, 1975.

Item	1R		2R		3R		All Farms	
	Irri.	N-Irri.	Irri.	N-Irri.	Irri.	N-Irri	Irri.	N-Irri.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Nitrogen Fertilizer								
Percent of Farmers Using	(60.8)[a]	(23.2)	(49.3)	(15.3)	(21.5)	(9.8)	(49.2)	(16.1)
Kgs. of Nitrogen	24.7	16.4	16.7	22.7	8.6	24.5	20.5	20.5
Pesticides								
Percent of Farmers Using	(85.6)	(85.2)	(88.7)	(73.5)	(73.8)	(77.6)	(84.8)	(79.0)
Fl. Oz. of Pesticides	46.7	24.4	34.5	30.8	26.3	23.2	38.3	25.8
Herbicides								
Percent of Farmers Using	(73.2)	(75.9)	(81.3)	(72.0)	(67.7)	(78.0)	(75.5)	(75.4)
Fl. Oz. of Herbicides	31.1	23.2	27.4	28.3	23.8	28.8	28.7	26.3
High Yield Varieties								
Percent of Farmers Using	(98.0)	(95.8)	(92.7)	(91.0)	(90.8)	(95.3)	(94.6)	(94.2)
Kgs. of Seed	94.1	81.1	91.8	90.6	88.3	84.9	91.7	84.3

[a] Percents in each column, 1 to 8 respectively, are calculated from the following denominators: 153, 216, 150, 189, 65, 214, 368 and 619.

Source of data: Social Survey Research Unit, Land Classification Study, January 1976, Tables LC:01 and LC:21.

Appendix Table 2. Percent of Farmers Using Nitrogen Fertilizer, Pesticides, Herbicides, and HYV's and Quantity used Per Hectare by Farmers Using these Inputs for Irrigated and Non-Irrigated Land by Land Classification Category, Dry Season, 1975.

Item	1R		2R		3R		All Farms	
	Irri.	N-Irri.	Irri.	N-Irri.	Irri.-	N-Irri.	Irri.	N-Irri.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(7)
Nitrogen Fertilizer								
Percent of Farmers Using	(58.7)[a]	(16.1)	(45.1)	(14.1)	(28.2)	(11.3)	(46.0)	(13.7)
Kgs. of Nitrogen	25.1	17.5	18.3	14.8	18.1	19.6	21.5	16.9
Pesticides								
Percent of Farmers Using	(82.7)	(78.1)	(78.4)	(71.1)	(75.8)	(73.6)	(79.3)	(74.5)
Fl. Oz. of Pesticides	45.3	22.1	37.4	30.6	43.2	23.7	41.7	24.9
Herbicides								
Percent of Farmers Using	(75.3)	(71.4)	(83.0)	(67.1)	(63.6)	(82.1)	(75.4)	(74.3)
Fl. Oz. of Herbicides	32.6	24.8	33.5	29.2	35.8	29.0	33.5	27.4
High Yielding Varieties								
Percent of Farmers Using	(93.3)	(92.7)	(92.1)	(85.9)	(97.0)	(97.6)	(93.8)	(92.8)
Kgs. of seed	95.7	95.8	92.1	89.5	93.1	88.5	93.4	93.4

[a] Percents in each column, 1 to 8 respectively, are calculated from the following denominators: 150, 192, 153, 149, 99, 212, 402 and 553.

Source: Social Survey Research Unit, Land Classification Study, January 1976, Tables: LC:01 and LC:20.

Appendix Table 3. Average Farm Receipts, Farm Costs, and Net Farm Earnings per Hectare and per Farm for Farms Cultivating Palay in the Rinconada IAD, 1975.

Budget Item	Wet Season	Dry Season	Annual
	per hectare		
Total Receipts	2632.10	3685.10	6317.50
Total Farm Costs	1817.30	2118.90	3936.20
Net Farm Earnings	814.80	1566.50	2381.30
Net Farm Earnings from Palay Production	478.30	1230.10	1708.40
	per farm		
Total Receipts	2040.90	3000.10	5041.00
Total Farm Costs	1405.90	1725.10	3130.00
Net Farm Earnings	635.00	1275.00	1911.00
Net Farm Earnings from Palay Production	365.90	1005.00	1371.80

Source: SSRU, Tables SS.12.24 and SS.12.25.

Appendix Table 4. Average Production Costs per Hectare for Farms Cultivating Palay on Irrigated Land in the Rinconada IAD during the Wet and Dry Seasons, 1975.

Items	Wet Season	Dry Season	Annual
a. Labor Costs	798.80	901.30	1700.10
Operator and Family	204.10	215.90	420.00
Hired Labor	516.70	598.00	1114.70
Meals and Cigarettes	78.00	87.40	165.40
b. Rents	279.20	481.70	760.90
Land	254.80	449.70	704.50
Machine	15.40	20.30	35.70
Animal	9.00	11.70	20.70
c. Other Inputs	315.80	312.30	628.10
Seeds	97.00	98.40	193.40
Fertilizer	94.40	94.40	188.80
Chemicals	65.40	61.80	127.20
Fuel and lubricants	59.00	57.70	116.70
d. Decrease in Investment	-	-	-
e. Purchase of Inventory Foods	348.60	348.70	697.30
f. Total Depreciation	74.90	74.90	149.80
TOTAL COSTS	1817.30	2118.90	3936.20
Palay Production Costs	1393.80	1695.30	3089.10

Source: SSRU, Tables SS.12.15, SS.12.16, and SS.12.17

Appendix Table 5. Average Farm Receipts per Hectare for Farms Cultivating Palay on Irrigated Land in the Rinconada IAD during the Wet and Dry Seasons, 1975.

Items	Wet Season	Dry Season	Annual
CASH FARM RECEIPTS	-	-	2029.70
Palay Sold	564.50	929.40	1493.90
Livestock Sold	-	-	535.80
NONCASH FARM RECEIPTS			4287.80
Palay Consumed at Home	707.00	977.20	1684.20
Palay Shares	600.60	1018.80	1619.40
Livestock Consumed	-	-	180.80
Increase in Investment	-	-	803.40
TOTAL FARM RECEIPTS	-	-	6317.50
Receipts from Palay Production	1872.10	2925.40	4797.50

Source: SSRU, Table SS.12.23