

# Agro-institutional Development Implementation for Crop Diversification at NIA-ARIP

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## Introduction

The National Irrigation Administration (NIA) is constructing an irrigation project in Southern Mindanao as part of the major thrust of the Philippine Government in agricultural development. Designated as the Allah River Irrigation Project - I (ARIP-I), it envisions the construction of two diversion dams across the Allah River to provide irrigation water to 18,812 hectares of rice and corn lands in the provinces of South Cotahato and Sultan Kudarat.

In conjunction with the construction of irrigation facilities, NIA has initiated a program of agro-institutional building among farmers who will be benefitted by the project. Such strategy will encourage farmers' involvement and active participation in a long-term system of maximizing the benefits from and extending the useful life of the project. Involving the farmers in the said project will also prepare them for eventual take-over of operation and maintenance.

Alternative schemes must also be developed to optimize the use of available irrigation water without evolving conflict among farmer clientele.

Experiences at Pilot Testing Demonstration Farms involving farmer-cooperators proved that irrigated crop diversification scheme could be adopted. By promoting agro-institutional development activities, a wider area can be covered and consequently entice participation of more farmers.

## Project Objectives

*General.* The program aims to organize the farmer-beneficiaries into viable, cohesive organizational units capable of operating and maintaining irrigation facilities to improve their standards of living.

*Specific.* The program seeks to attain the following:

- a. Develop viable and self-reliant irrigators' associations as vehicles for group undertakings and as channels for assistance from the government as well as the private sectors;
- b. Develop leadership and skills among members and officers of irrigators' associations to raise the overall efficiency in the operation and maintenance of irrigation facilities thereby maximizing the benefits to the users and extending the useful life of the irrigation system facilities; and
- c. Prepare the farmer-irrigators in the proper administration and eventual management of the irrigation system at lateral level or as joint **NIA-IA** management of the whole irrigation system.

## Experiences and Status Relative to Crop Diversification

### *Pilot Testing and Demonstration Scheme*

Baaed on the Project Appraisal and Loan Agreement, a 150-hectare Pilot Testing and Demonstration Farm (ITDF) as well as its physical facilities was established in March 1980. As early as 1979, the original 92 identified farmer-tillers per approved Irrigation Network boundaries were organized into three farmer-irrigators group based on the three rotational areas and were finally organized into an irrigators' association and registered with the Securities and Exchange Commission (SEC) on 10 October 1982. Operation started in May 1980 in time for the first cropping season, Agricultural engineers, agronomists, agricultural economists, entomologists, social workers

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and other technicians from other support agencies and NIA worked together for nine cropping seasons from 1980 to 1984. A series of activities like seminar-workshops, formal training programs, on-the-job training, and field trips were conducted by the Project staff to acquaint and prepare the PTDF farmer-beneficiaries on irrigation operation, PTDF scheme implementation and for adoption of the planned socio-technical intervention and improvement of the agro-institutional activities in the area.

Aside from agro-institutional activities, the NIA-ARIP-ACD technical staff implemented demonstration and applied research activities on irrigated crop diversification at the one-hectare NIA-ARIP rented farm upstream of PTDF#1 area and paddy-paddy-mungbean demonstration farm at the two-hectare lowland within the PTDF area. Farmer-cooperators were also utilized to demonstrate and implement irrigated crop diversification with free irrigation service fee (ISF) as incentives.

During the PTDF#1 operation, the lower ISF charge for non-rice crops was not yet approved. Moreover, farmers were not interested to join the demonstration activities since most farms were low-lying and near the Allah River bed. Based on the site experience, full implementation of the envisioned PTDF scheme was not warranted (reported by the Project Agro-Institutional Consultant from Economic Development Fund, 1983).

However, to assure implementation of the PTDF-needed support services, all agro-institutional agency heads, field technicians and farmer-leaders were involved as members of the established Project Agricultural Development Coordinating Council Task Force.

Also, to strengthen the ARIP-ACD technical research staff, a Memorandum of Agreement between NIA-ARIP-ACD and USM-SMARC was initiated and researches and demonstration activities were implemented through joint efforts for three cropping seasons (May 1982 to 1983).

After three and one half years of operating the PTDF#1 and testing/implementing the PTDF scheme, it was found that the site was not a representative area to pilot crop diversification due to its topography, soil characteristics, and negative attitude of the farmer-clienteles. Therefore, operation was shifted to paddy-paddy-mungbean scheme and another site for crop diversification was established (Per result of NIA-ADB Review Mission, 1984).

### *Pilot Testing and Demonstration Farm No. 2 (PTDF#2)*

NIA and ADB officials decided to establish another PTDF for crop diversification located at Dam I area which was identified as representative diversified cropland of the project area. Establishment of the PTDF#2 was initiated in 1984 and technical assistance was provided by ADB-IIMI. Operation commenced in mid-February 1985.

*The PTDF#2 Irrigators' Association (Mainuswagon IA).* The site is located at the upstream area of Dam I, lateral A-extra, Dajay, Surallah, South Cotabato with a designed service area of **296** hectares and 154 potential farmer-tillers.

The potential farmer-tillers were oriented and trained on all aspects and objectives of the project and was organized into **10** farmer-irrigators' groups based on the number of turnouts/rotational areas. In 1984, the groups were organized into one irrigators' association (IA). The IA was registered with the Securities and Exchange Commission on 6 March 1986 with 85 members covering an area of 200 hectares and was named Mainuswagon IA.

Extension services and other technical assistance in the area were provided by field technicians and subject matter specialists from various government and private agencies. Training programs, seminars, meetings and field trips were conducted (e.g., farmer classes on water management and crop protection, irrigators' group leaders training, and system management seminar-workshop). Irrigated crop diversification training of farmer-cooperators involved in demonstration work was also conducted through the joint effort of NIA-IIMI-DA. Farmer-participants came from the various irrigators' associations of Dam I area.

PTDF#2 farmers went on educational field trips to Tacurong and President Quirino Area, Sultan Kudarat (about 50 km away from PTDF#2 Site) to observe irrigated crop diversification utilizing pumped irrigation water from shallow wells and rainfall. They also visited and interviewed fellow farmers who operated small sugarcane mills, sugarcane wine factory, and seed storage. Moreover, PTDF#2 IA farmer-members and some farmers from other laterals had regular educational field trips and orientation on the ongoing NIA-IIMI-DA demonstration and research farms on irrigated diversified crops.

The occasion provided an opportunity for discussions among the participants. Irrigation

techniques and other improved cultural practices were discussed by the farmer-cooperators with the NIA, IIMI, and DA-UIARS field staff.

**The PTDF#2 Irrigation Operation.** The PTDF#2 irrigation operation started in July 1985 in time for the on-going wet cropping season, and the first operation utilizing the newly constructed Allah River Irrigation diversion dam and appurtenant structures.

### ***Proposed Cropping Pattern and Irrigation Schedule***

Since the facilities of PTDF#2 were designed for irrigating corn and other non-rice crops, agro-institutional arrangements were made with the irrigators' association to balance the expectations of farmers even before operation started. A series of farmer consultation meetings was conducted by the ARIP technical personnel with IIMI and DA field representatives and finally concurred by the ADB-IIMI consultants. Final agreement reached were:

**Actual Cropping Pattern and Irrigation Schedule.** During the wet season, the existing area of 9.63 hectares suited to rice will be provided with irrigation water and the remaining farms will be planted to non-rice crops. The area planted to non-rice crops could be irrigated whenever necessary. Moreover, farmers' request for irrigation to areas whose facilities could convey irrigation water to farms will be readily granted (topography problem). During the dry season, on the other hand, irrigation water will be enough only for non-rice crops. NIA will not be obliged to supply irrigation water to farmers who plant rice and will not be responsible for the crop's failure due to water shortage.

During the 1987/88 crop year, the PTDF#2 irrigation operation started in June for the wet season and in December for the dry season. This was the approved cropping calendar as a result of the NIA-IA consultative meeting on 22 September 1987.

The program area was 150 hectares rice during the wet season and 125 hectares non-rice crops during the dry season. NIA and IIMI endorsed the modified scheme per request of the IA officers and farmers. Farmers insisted to plant rice during the wet season in order that the area would be developed and ready for crop diversification during the dry season.

Water delivery during land soaking and land preparation was staggered - one week for every 2-3

rotational areas beginning at the tail section of the lateral. This scheme was adopted because of the soil characteristics, excessive soil percolation and limited lateral capacity. The scheme has been observed effective, thus increasing the irrigable area since its first operation. Construction of farm level facilities had also contributed to the increase in irrigated area.

During the 1988 dry season, there were more areas planted to rice than non-rice crops because of the extended water delivery during the wet season which lasted until 31 December 1987. The change in water delivery schedule was agreed upon in a meeting on 22 September 1987. Farmers at lateral B-extra petitioned to extend water delivery beyond 1 November 1987. Cut-off date for all extra laterals was reset to 1 January 1988. Thereafter, flushing exclusively for non-rice crops was allowed only upon request. A total of 29.21 hectares planted to corn and 2.60 hectares planted to soybeans were irrigated by flushing at the PTDF#2.

The effect of simultaneous demonstration and training on diversified crops contributed to the increase in irrigated areas planted to non-rice crops. It is, therefore, recommended that a series of seminars, training, field trips and demonstration on irrigated diversified crop farming be undertaken to encourage more farmers to adopt the technology during the dry season.

### ***Projectwide Agro-Institutional Arrangements***

Agro-institutional arrangements were made with the irrigators' associations, local officials and government and private agencies involved in the Project's development.

During the early years of the project, the Project Agricultural Development Coordinating Council was established to act as policy making body and boost implementation of necessary support services.

To reach, orient and train all potential farmer-clientele, the project conducted formal and informal meetings at the sitio and barangay level. Other forms of mass communication (i.e., radio, bulletin, film showing and local newspapers) were also utilized. Potential farmer-tillers were identified (1980-82) based on the approved Project Irrigation Network and were organized into three farmer-irrigators groups based on rotational area. After the series of farmer consultation meetings the farmer-irrigators groups were organized into an Irrigators' Association.

As a result of the experience in PTDF#1, projectwide assessment, and identified potential constraints for implementation of Irrigated Crop Diversification. Projectwide Land Classification were updated by NIA-PDD and ARIP-ACD technical personnel before the start of irrigation operation. Results are being used by the ARIP personnel and irrigators' association as reference in programming and delineating areas for crop diversification.

Moreover, this cropping season 1988/89, one factor that will influence and encourage bigger diversified crop areas is the institutional arrangement made by the Project personnel with the various IA's regarding the strict implementation of rotational schedule specially during dry season. The rotational schedule will be based on the capability and limitation of the system specifically on the available irrigation water supply at the diversion dams.

Series of IAs meetings revealed that farmers, especially those located in the dual and diversified cropland, were willing to plant irrigated non-rice crops during the dry season if they are informed of the crop diversification scheme and the irrigation water supply limitation. Increasing area for crop diversification are now being observed at the area for crop diversification are now being observed at the PTDF#2. Moreover, support services (production technology, credit and marketing) provided during the development period by the government and private agencies contributed to the increased area.

To sustain the present activities and attain full development of the project. the proposed 5-year Agro-Institutional Development Program must be implemented with full support from the government.

## ANNEX I: BENCHMARK INFORMATION, ALLAH RIVER IRRIGATION PROJECT

### *Per Feasibility and Appraisal (1978)*

- Location: Provinces of South Cotabato and Sultan Kudarat
- Service area: 21,000 ha, (Dam 1 = 8,230ha)  
(Dam 2 = 12,770ha)
- Designed flood discharge of dams:
  - Upstream of Dam 1 \_\_\_\_\_ 621 cms
  - Upstream of Dam 2 \_\_\_\_\_ 823 cms

- Designed discharge:
  - M.C. Headgate Dam 1 \_\_\_ 19.86cms
  - M.C. Headgate Dam 2 \_\_\_ 30.70 cms
- After Silt Ejector discharge:
  - Main Canal - Dam 1 \_\_\_\_\_ **16.55 cms**
  - Main Canal - Dam 2 \_\_\_\_\_ 30.70 cms
- Irrigated area within the service area:
  - 1,100 ha.
  - (Existing Communal Irrigation System)
- Canal System
  - Dam 1 - Main Canal \_\_\_\_\_ 20.12 km.
  - Lateral and Sub-Laterals \_\_\_\_\_ 62.85 km.
  - Dam 2 - Main Canal \_\_\_\_\_ 22.28 km.
  - Laterals and Sub-Laterals \_\_\_\_\_ **89.13 km.**
- Number of Farm Households \_\_\_ 12,000
- Climate \_\_\_\_\_ no pronounced dry and wet season (4th type)
  - Average Temperature \_\_\_\_\_ 27°C
  - Average Annual Rainfall \_\_\_\_\_ 1,800 mm.
  - (mostly from May to October)
  - Maximum Intensity \_\_\_\_\_ 120 mm/hr
  - Average Evaporation \_\_\_\_\_ 4.5 mm/day
  - Outside Normal Cyclone Areas
- Geology and Soil
  - Alluvial deposits of clay, silt, sand and gravel
  - Principal soil type in the project area is sandy loam; low organic matter content and water retention capacity.
- Land Use and Productivity
  - 90% under cultivation
  - 15,000 ha - paddy (10% under double cropping utilizing irrigation water from Communal Irrigation System)
  - 6,000 ha - rainfed corn and other feedgrains

— Average Yield	Rainfed	Irrigated
Paddy	18 t/ha	2.7 t/ha
Corn	1.0 t/ha	- none -
- Cropping intensity of 175% based on physical area of 21,000 ha.

- Agricultural Development
  - Proposed cropping pattern and projected yields.*** Of the total 21,000 hectares irrigable area, irrigated rice area during the wet season is expected to increase from 1,100 to 16,000 hectares. The remaining 5,000 hectares, which is located along the

Allah and Banga rivers, will be programmed for irrigated corn in view of the sandy nature of the soil. During the dry season, 4,800 hectares of rice and 6,300 hectares of corn will be provided with irrigation water and a maximum of 3,200 hectares of irrigated mungbean will be planted as third crop.

Except for the 5,000 hectares which will be planted to corn, the service area of 16,000 hectares will be divided into three irrigation blocks of about 5,300 hectares each for rotational irrigation during the dry season.

NIA has assured the supply of irrigation water on a rotational basis during the dry season in accordance with the proposed cropping pattern.

At full development, the average yield of paddy is expected to increase from 2.1 to 4.5 t/ha and corn from 1.75 to 3.0 t/ha. The average yield of mungbean is estimated at 0.8 t/ha.

**Pilot demonstration scheme.** To enhance the acceptability of the proposed cropping pattern on a rotational scheme, NIA will establish a pilot demonstration scheme not later than two years before the completion of the Project.

The scheme will consist of a training facility and a pilot farm of about 150 hectares located in Bambad, Isulan, Sultan Kudarat. The pilot farm will demonstrate: (i) efficient water management; (ii) proposed cropping patterns and rotational irrigation and, (iii) efficient farming techniques.

- Agricultural Support Services
  - Extension, credit and marketing facilities
  - Land Reform Programs and Farmers Organizations, (establishment of Irrigators' Association in the Project area and collaborate closely with Samahang Nayons (SNs) and participate in the proper operation and maintenance of the project).

**Updated Project Benchmark data and limitation (as of June 1988)**

- Location — South Cotabato and Isulan, Sultan Kudarat

- Service Area — 18,812 ha (7,311 ha in Dam #1 and 11,501 ha in Dam #2)
- Two barrage type diversion Dams 100% completed and Irrigation and related facilities is 97.51% completed and Project Overall physical completion is 92%.

- Irrigated Areas, (ha)  
Projectwide - 11,000 ha (59%)

	Dam 1	Dam 2	Dam 3
Wet Season	5,323.M	5,677.00	11,000.00
Dry Season			
Rice	3,669.96	3,071.18	6,741.14
Non-Rice	29.56		

- Total Farmer-Tillers \_\_\_\_\_ 8,726
- Dam 1 Area \_\_\_\_\_ 3,487
- Dam 2 Area \_\_\_\_\_ 5,239

- Farmer-Tillers Association

	Dam 1 Area	Dam 2 Area
Farmer-Irrigators' Group	196	270
Irrigators Associations	15	26

- Pilot Testing and Demonstration Farms established

- Two sites: 1) Crop Diversification Area
- 2) Rice-Rice-Mungbean Area

- Date of start of Irrigation Operation

- Dam 1 Area \_\_\_\_\_ July 1985
- Dam 2 Area \_\_\_\_\_ June 1986

- Record of Discharge Measurement/Observation

Average Observed Discharge during Operation  
(Based on O&M Unit Canal Discharge Observation)

Season	Dam 1	Dam 2
WS	9.0 cms	9.0 cms
DS	5.0 cms	4.0 cms

Water Supply Availability at Allah River  
(Based on 3-year record [1981-1983], Watershed Development Section [WDS], ARIP)

Item	Dam 1	Dam 2	Remarks
Lowest Flow	10.56	15.52	April
Highest Flow	28.83	43.76	October/November

- Based on available irrigation water during summer at Allah River, the system could support only 40% irrigated paddy and 29% irrigated non-rice areas out of the 18,812 hectares total irrigable area.

# Irrigation Management of Allah River Irrigation Project I

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## Introduction

The first Allah River Irrigation Project (ARIP I) covers a design service area of 18,800 hectares which is expected to be in full operation by 1990. It is served by two dams, one upstream and the other downstream of the Allah River (Table I). It could supply irrigation water for rice during the wet season but could supply only one-third of the area during the dry season. The dry season area may be increased through the introduction of diversified crops.

Hydrophenological studies revealed that Dam No. 1 (Upper Dam) area has more areas (Laterals A-extra, B-extra and portion of C-extra - all located along the Allah River) suitable for diversified cropping. Along this line, The International Irrigation Management Institute (IIMI) in cooperation with the Agricultural Coordinating Division (now Institutional Development Division) of the project, have concentrated their studies and demonstration at Dam No. 1 area.

A portion of the area is under operation/programmed for irrigation. Compared with other systems, irrigation water can be easily conveyed and regulated due to concrete lined canals and steel-gated control points at canals and turnouts. ARIP I personnel (watermasters and ditchtenders) control water from the diversion point (dam) to turnout level, while members of the irrigators association (IA) receive water from turnout and allocate it among themselves. In addition, the IA assumes canal cleaning and minor maintenance of irrigation canals within their branch.

Irrigation cut-off period of a month or more is scheduled between dry and wet seasons to facilitate major repairs, as well as implement the planting schedule. This occurs during the months of February, March and April.

## Operations (Dam I Area)

A tentative *Irrigation System Operation and Maintenance Plan or Cropping Calendar* for the crop year is prepared by NIA two months prior to the release of irrigation water for the dry season. The irrigation system can supply irrigation water to only one-third of the service area or 6,000 hectares during the dry season. Out of the design service area of 7,311 hectares for Dam I, 3,000 hectares is programmed for rice and the remaining areas for diversified crops. Laterals A-extra and B-extra are permanently programmed for diversified crops during the dry season. Other areas are programmed for diversified crops on a rotational basis. Schedule and cut-off of irrigation water from one zone to another in the remaining areas of the 3,655 hectares planted to diversified crops during the dry season is also included in the plan.

The plan is presented for deliberation and finalization during a joint meeting of NIA, presidents of the irrigators association (Ad Hoc committee), municipal officials, barangay captains, representative from the Department of Agriculture, and other government and private agencies involved in crop production. After the plan is finalized, the Ad Hoc committee passes a resolution **adopting the finalized cropping calendar**. NIA personnel then implement the cropping calendar.

All farmer-beneficiaries are informed through farmer classes, meetings of IAs, mass media and by distributing mimeographed copies of the approved cropping calendar. This cropping calendar is also disseminated to all barangay and municipal officials, government and private agencies involved in crop production.

Prior to the first irrigation release, the ARIS personnel see to it that canals and steel gates are functional and flashboards are properly installed.

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During irrigation releases, the watermasters and gatekeepers make necessary adjustments of the steel gates and record daily water discharges and rainfall within the area. These personnel also take charge of helping farmers solve their irrigation-related problems with the help of the irrigation community organizer (ICO). The ICO is under the supervision of the IDD while the watermasters are supervised by the irrigation superintendent.

In case problems arise during the implementation of the plan, the NIA shall not alter the said plan without consulting the Ad Hoc committee

composed of IA presidents. All areas **not** programmed for rice during the dry season but were planted to diversified crops will be served with irrigation water provided the concerned farmer files a written request with the NIA Office and he is willing to pay the irrigation service fee.

After planting, the watermasters and gatekeepers prepare a report on irrigated and planted areas which is submitted for hilling. Billing is served one week before harvest. Irrigation service fees are collected by the watermasters and gatekeepers within their respective areas.

**Table 1.** Statistical profile of the Allah River Irrigation System.

Average Discharge	
a. Dry season .....	9.0 lps
b. Wet Season .....	22.0 lps
Agricultural Support Services	
a. Credit .....	Land Bank, PNB, DBP and Private Lenders
b. Input Supply .....	NFA and Private traders
Watershed and Environment	
a. Drainage Area .....	.936 sq km
b. Physical Condition .....	Denuded
Problem (Major) .....	Water shortage during the dry season due to denuded drainage area

Note: The Bureau of Forest Development (BFD) is undertaking a reforestation on the drainage area as part of the NIA-ARIP Loan.

	<u>Dam I</u>	<u>Dam II</u>
Design Area	7,311 ha	11,501 ha
Canal Capacity	17.88 cms	30.70 cms
Total Length of Lined Canal:		
Main Canal	20.11 km	22.23 km
Lateral	62.53 km	94.35 km
Total Length of Farmditch	Construction of MFD/SFD-on-going	
Soil Type	Sandy loam	Sandy loam
Municipalities Covered	4	3
Number of Farmers	3,520	5,329
Water Requirement	2.44 lps	2.61 Ips
Water Management Parameters:	(For wet and dry seasons)	
Saturation Capacity (Sn)	90 mm	
Evaporation (Ev)	4 mm/day	
Evapotranspiration (Et)	5 mm/day	
Seepage & Percolation (S&P)	16 mm/day	
Farms Waste and Distribution Losses (Fw+Dl)	43% of water requirement	
Conveyance Losses (Cl)	4.29% of available discharge	

# Operation of Banga River Irrigation System

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## Introduction

Banga River Irrigation System (BARIS) is a run-of-the-river irrigation system designed and constructed to irrigate 3,360 hectares covering nine barangays within the municipalities of Banga, Norala, and Sto. Nino in the province of South Cotabato.

Due to siltation of the irrigation canals the service area of the system has been reduced to 2,110 hectares wherein only 1,600 hectares can be irrigated during the wet season and 1,300 hectares during the dry season. The current service area is divided into three watermasters' divisions. There are nine farmers' irrigators associations (FIAs). The nine FIAs were organized into a federation which was registered with the Securities and Exchange Commission. The federation helps NIA in the operation of the system, especially in planning the schedule of water distribution before each cropping season. It also helps in actual water distribution as well as in settling conflicts between farmers. The FIAs assumed the responsibility of clearing vacant canal sections with due compensation from NIA. At present, there are five FIAs maintaining a 17.695-km long canal.

Heavy siltation of the irrigation canals causes shortage of irrigation water. Only 20% of the Banga river discharge can be diverted at the main canal intake; thus, irrigable area is greatly affected. The volume diverted fluctuates from 0.80 to 1.80 cubic meters per second (cms) in spite of daily desiltation of the settling basin.

## Operations

Prior to each cropping, a cropping calendar on water delivery schedule is prepared by NIA. The cropping calendar is presented for deliberation and finalization during a joint meeting of IA federations, barangay officials, Department of Agricul-

ture, lending institutions and other government and private agencies involved in crop production. This meeting is held one month before the release of irrigation water. The plan includes data on water management, irrigation releases, irrigation diversion requirement, programmed area and cut-off period. After thorough evaluation, deliberation and revision, if any, the IA federation passes a resolution approving the adoption of the cropping calendar. The cropping calendar is implemented by NIA personnel. Farmers in areas not programmed for rice or for water cut-off are encouraged to plant corn and other diversified crops. Usually two to three IA areas are scheduled for water cut-off.

Farmers are informed regarding the approved cropping calendar through meetings and by distributing mimeographed copies of the approved cropping calendar and the IA resolution to concerned individuals.

The area programmed for irrigation is divided into either two or three groups. Each group is provided with water for a specified number of days for landsoaking/land preparation up to crop maintenance. The first group is usually one month ahead of the second group, and the second is one month ahead of the third. In case problems arise during implementation, NIA shall not alter the plan without first consulting the IA federation. Canals and turnouts of areas not programmed for irrigation are closed and all unauthorized checks along the irrigation canals are removed by the NIA personnel with the assistance of the FIA officials. Canals are closed to avoid illegal diversion of irrigation water to the excluded areas. Since this method has been implemented over the last five years, problems on irrigation water and farmer's conflicts had been solved gradually.

However, there are areas scheduled for water closure which are not suitable for other crops like corn due to the area's hydrological and topographical conditions. Since most farmers in these

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areas insist on planting rice, NIA and IA agree to provide the area with irrigation water provided the programmed rice areas have been irrigated and with the condition that farmers are willing to pay the irrigation service fee. For areas planted to non-rice crops, farmers are allowed to irrigate their crops, especially during drought as long as the water schedule for the programmed areas will not be affected and they pay their irrigation service fees. In some areas, farmers plant corn or other crops adjacent to rice paddies. These crops can be irrigated through seepage. Such areas will not be billed because farmers claim that they are not directly served with irrigation water. In this regard, NIA is not liable to pay for the damaged crop due to seepage since the area is part of the programmed area for irrigation.

Unequal distribution of irrigation water in the

programmed area is also prevalent. Such situation usually occurs either when the river overflows or when the dam's equipment has broke down. Farmers are then forced to make illegal checks along the irrigation canals. During such situation, farmers located downstream are most affected. NIA and the IA officials therefore, meet to solve the problem.

In 1988, farmers planted wider areas than what was programmed resulting in water shortage during the dry and wet seasons. This shows that crop diversification is really needed in BARIS.

In 1989, NIA plans to irrigate 1,300 hectares during the dry season and 1,700 hectares during the wet season. Training of farmers on crop diversification will continue. Training programs are expected to help maximize crop production and solve the problem of water shortage.

*Table 1.* Statistical profile of the Banga River Irrigation System.

Item	Characteristics
Potential Irrigable Area .....	3,360 ha
Canal Capacity .....	10.0 cms
Total Canal Length	
a. Lined .....	10,746 km
b. Unlined .....	39,229 km
Total length of Farmditch .....	148.65 km
Soil Type .....	Sandy loam
Water Requirement .....	3 lps/ha
Present Service Area .....	2,110 ha
Number of Municipalities covered ...	3
Number of Barangays .....	9
Number of Lots .....	450
Number of Landowners .....	404
Number of Farmers .....	1,358
Water Availability (5-year record)	
a. At the River .....	5,026 Ips
b. At the Canal .....	1,202 Ips
Agricultural Support Services	
a. Credit .....	Land Bank, PNB, DBP and Private Lenders
b. Input Supply .....	Land Bank & Private companies
Processing .....	Private millers and driers
Marketing .....	NFA and Private traders
Watershed and Environment	
a. Area .....	324 sq km
b. Physical condition .....	Denuded
Major Problem .....	Water shortage due to heavy siltation