Participatory management of irrigation systems in the Philippines: An impact assessment

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ABSTRACT

Increased national food production is an objective underlying irrigation development in the Philippines. As the population increases, so does food demand. Irrigation is an integral component of agricultural development to meet this growing food demand. Farmer participation has been shown to be a key factor in the successful development of irrigation, although other factors must be combined with participation in order to ensure successful outcomes. This study attempted to find out how farmer-managed irrigation systems impacted on the socio-economic conditions of rural people in the Iloilo Province of the Philippines.

Two levels of respondents were interviewed for the study: 15 representatives of Irrigator Associations (IAs) and 144 farmers from four of these associations in the Iloilo Province. The surveys was conducted in January and February 1996. The survey data were evaluated relative to a conceptual model that comprised four sets of factors (socio-economic/demographic, physical, management and attitudinal) to explain the area under irrigated rice, a proxy variable for management participation.

The farmers in all four irrigation systems had an average age of 49 ± 12 years. The farm size was generally small (1.07 ± 1.51 ha) but the area of irrigated rice owned and leased by farmers averaged to 1.23 ± 0.25 ha. Rice farming provided more than 80% of the household income in the study area. This helped to support 3.8 ± 2.3 children per household. Socio-economic/demographic and physical factors were significantly ($P<0.05$) associated with management and attitudinal factors. Variables included in a multiple regression model collectively explained 53% of the variation in the irrigated rice area. Other than farm size, distance of the homestead from the main water source, participation in resolving conflicts with officers of the IA and attendance of IA meetings were significant explanatory variables in the model. It is recommended that similar studies of other regions where irrigation is widely used be undertaken and that this include situations where participatory approaches are not adopted. The role of women in irrigation activities should be quantified, as it was not actively explored in the current study.

Keywords: Irrigation development, participation, factors, irrigated rice area.

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Chapter 1 Introduction

The Philippines is an archipelago with a total land area of 30 million hectares. Out of the 10 million ha. classified as arable land, 90% is devoted to agricultural production (3.1M ha in rice, 3.2M ha in cash crops and 2.7M ha in commercial crops like coconut, sugarcane and abaca). The potential area for irrigation development is about 3.14M ha. At the end of 1989, 47 % of the potential area under irrigation was provided with water distribution facilities and, like other developing countries, investment in irrigation was considered crucial to the further economic development of the country's agriculture. In 1996, approximately 650,000, 700,000 and 160,000 ha. were covered by large scale national systems, small-scale communal systems and pump systems, respectively. The area irrigated amounted to 20 % of the total cultivated area. The Philippine government aims to expand the current irrigated area by 50 % by the year 2000.

Agriculture, being less dependent on imports than the industrial sector, is still the prime mover of the Philippine economy. Approximately 40 % of the gross domestic product (GDP) is generated by agriculture. In recent years, the gross value added from this sector has increased at a rate of over 3 % annually, being 3.5 % in 1988, 4.6 % in 1989, and 2.3 % in 1990. Almost two-thirds of the labour force is employed in agriculture which is characterised by extensive land use, intensive labour use, relatively low yields and low per capita incomes of its farmers.

1.1 Background and Statement of the Problem

Irrigation has long been recognised as a powerful tool for intensifying agricultural production. It has played a key role in helping agricultural producers meet the growing world demand for food. As one of the principal inputs to food production in South Asia, irrigated agriculture continues to play a crucial role in achieving food security and poverty alleviation as well as improving the quality of life for rural residents (Campbell, 1995). Irrigation projects primarily increase the productive capacity of agricultural land by assuring a steady supply of water during the crop growing season.

In the Philippines, irrigation development dates back to early history (Gonzales, 1993). For example, the indigenous people of the northern mountain areas built an estimated 25,000 ha of paddy field terraces on steep-sloped mountain land in order to grow rice, their staple food crop (Bagadion, 1988). This paddy area is widely praised and regarded as one of the seven wonders of the world (commonly known as 'Ifugao rice terraces'), and is ranked equal to the maize field terraces on the steep land of Nepal. In the lowland areas of the country, farmers also built systems, either individually or in groups. The systems were physically simple, with dams being made of logs and stones, and the canals dug from the earth. It was only during the Spanish colonial period that masonry dams, some of which still remain in use today, were built. Though irrigation practices started long ago, the pace of development has been slow. It has only been during the last two decades, that the Philippines has made impressive progress with irrigation development. This can be attributed to the creation of the National Irrigation Administration (NIA) in 1964 which has systematically hastened the construction of both large scale communal and pump irrigation systems (Salguero, 1995).

Just like many other developing countries, the Philippines, has been actively involved in rural development activities. Development of new irrigation projects and rehabilitation of existing schemes, have been among the major thrusts of the government in its rural development efforts. This has become a necessity since the amount of land available for cultivation has become limited, while the demand for agricultural products (cultivation) continues to rise. This situation is also true on a global scale. In fact, according to Alicante (1991) global food security in the light of rapid population growth and a corresponding increase in food demand depends largely on the continued expansion of irrigated agriculture until at least the year 2000, and on the improved operation and maintenance of existing irrigation systems.

The expansion and upgrading of irrigation infrastructure is an important requisite for improving land productivity because these actions will augment the current land supply as well as enhance per hectare yield (Olavides, 1993). In 1996 the domestic demand for agricultural products in the Philippines was largely met through national production; this success could not have been achieved without the last half-century's investment in

irrigation by the government through concessional loans from the World Bank (Campbell, 1995).

The National Irrigation Administration (NIA) is mainly responsible for the development of irrigation systems in the Philippines. Its responsibilities include both the national system and the communal systems which are owned, operated, maintained and managed by both the government and farmers. A national irrigation system typically serves more than 1,000 hectares, while a communal or farmer-managed irrigation system usually covers 50 to 1,000 hectares.

The NIA serves each of the country's three types of irrigation systems in a different way. For large irrigation systems called "nationals", the NIA's role is to construct the physical facilities, manage the system and collect irrigation fees from the farmers utilising the system. Examples of this type are the Upper Pampanga River Integrated Irrigation System (UPRISS), which services an area of 103,000 ha, and the Bicol River Basin Integrated Systems. Both are located in the central part of Luzon. For smaller irrigation systems, that serve groups of farmer, called "communals", the NIA seeks to involve farmers from the very initiation of the project. After construction and commissioning has been completed, these systems are handed over to the farmers through their respective associations. Small scale irrigation systems involve the participation of the local community where a small group of farmers organise into an "irrigator association" and actively participate in the overall operation and management of the local system. The operation and maintenance of the system remains the sole responsibility of the irrigator association. For irrigation systems built and managed by single individuals, called "private" systems, the NIA's role is restricted to providing technical advice upon request.

Due to the increasing of operating and maintaining existing large irrigation systems, policy makers are now directing investment funds into smaller irrigation systems which are potentially more productive and more cost effective than their larger counterparts. Small scale irrigation projects, such as the Small Water Impounding Projects (SWIP), are gaining greater attention because of the relatively low capital investment needed for the construction of small reservoirs compared to the larger national projects (Salguero,

1995). The establishment of the SWIP scheme is seen as a means to prevent possible regional disparities and better serve isolated areas, particularly those in depressed regions of the country which have yet to benefit from national irrigation systems. The SWIPs are also attractive because they encourage the active and on-going participation of the local community and as such tend to be easier to manage.

Participatory management has been the most widely adopted policy for managing both small and large irrigation systems in South and Southeast Asia. The development of farmer organisations in the form of irrigation associations seeks to increase their capacity for participation in the decision-making process (Raby, 1991), and to encourage farmer involvement in the layout and design of the new canals and structures so that their knowledge of the local area and their desires can be incorporated into construction plans (Cernea, 1991). The objective of participatory management of irrigation systems is to increase land productivity and the income of its immediate beneficiaries, the farmers. Participatory management in the Philippines is most successful in the context of smaller (approximately 50 hectares) systems under NIA supervision. With larger systems, such as UPRIIS, farmer participation is limited to the collection of service fees rather than active management (Raby, 1991).

The current (1996) government emphasis on small irrigation projects suggest that new performance parameters will be needed to assess the effectiveness and efficiency of irrigation systems. Therefore, there is a need to describe the overall management efficiency, group dynamics and extent of farmer participation in irrigation projects and to quantify the socio-economic benefits of alternative management approaches for irrigation systems. This is an important focus of this study.

1.2 Objectives of the Study

This study was conducted to assess the impacts of farmer-managed irrigation systems on the socio-economic conditions of rural people in the Iloilo Province of the Philippines. Specifically, the study aimed to:

1. examine the management of different types of small scale irrigation systems operating in the area;
2. compare and contrast the impact of the different small scale irrigation systems which are operational in the area;
3. describe the socio-demographic characteristics of water-users in the study area; and
4. identify socio-economic and management constraints faced by individual farmers in relation to farmer-managed irrigation systems.

The conceptual model through which these objectives were addressed is outlined in Chapter 3. The prepositions rested within this framework are also outlined in the same chapter.

1.3 Types of Irrigation Systems

Irrigation systems vary in size from a few hectares to over 100,000 hectares. In the Philippines, there are three types of irrigation systems: the National Irrigation Systems (NIS), the Pump Irrigation Systems (PIS) and the Communal Irrigation Systems (CIS). National Irrigation Systems are constructed by the government and operations are under NIA supervision. Irrigation systems of this type range from 1,000 to 100,00 ha in size. The NIS is most intensive in terms of infrastructure per unit of area serviced. Structures consist of an appropriately-sized concrete dam, service roads, intricate irrigation and drainage canal networks, and other structures for controlling water distribution.

Under (PIS) water can be sourced from rivers, creeks, canals or underground (e.g. deep wells). These systems are constructed and managed by an individual to irrigate their land and sometimes a few neighbouring fields. The only role of the NIA is to provide technical advice.

The Communal Irrigation Systems (CIS) are small gravity systems and are mostly of the 'run-of-the-river' type. The basic structure of this system is an appropriately-sized concrete or earth fill dam and a simple network of irrigation canals for water distribution. The size of each system is less than 1,000 ha (Wijayaratna & Vermillion, 1994). These systems are owned and managed by farmer irrigation associations. They

are either constructed by a farmers' association or by NIA and are turned over to the farmers through their respective farmer associations after completion, and thus, operated and maintained by them. The operation and maintenance of these systems is not a burden to the government as it is undertaken by the farmer irrigation association concerned. This arrangement is classified as a 'smaller irrigation system.' It serves a group of farmers. Combined, the systems are usually known as "communals." The role of NIA is to assist farmers in planning and constructing their physical facilities. The focus of this study was mainly on this type of irrigation system.

1.4 Irrigation Organisation and Management

The National Irrigation Administration (NIA) is a government-owned and controlled corporation created under the Republic Act No. 3601 on June 22, 1963 (Zapanta et al., 1995). As a semi-autonomous public corporation, its responsibilities relate to irrigation development in the Philippines, that is, to plan, construct, operate and maintain all National Irrigation Systems. Another NIA task is to investigate and study all national water resources for irrigation purposes. It is focused primarily on the technical aspects of water distribution, system maintenance and physical rehabilitation.

The NIA was created to achieve optimal and diversified utilisation of water through integrated irrigation projects. It hopes to bring about the "Irrigation Age," or to achieve a situation where the maximum possible number of unirrigated farmland in the country will be placed under irrigation for higher productivity, thus ensuing an adequate food supply for the population.

In order to achieve its mission - to develop water resources for irrigation and provide physical and technical services for the development program - the NIA has the following priorities, thrust and strategies: (a) project development; (b) systems operation and maintenance; (c) financial management; and (d) administrative services (NIA, 1989).

The NIA is organised as a hierarchical pyramid structure, with authority concentrated in the Central Office (Zapanta et al., 1995). The NIA organisation is structured so that

there is a functional specialisation among the different sectors, divisions and departments from the national to the provincial level. It is governed by a board of directors that includes the Ministers of Public Works, Agriculture and Economic Planning, the NIA Administrator and the General Manager of the National Power Corporation (Small et al., 1989). The NIA Administrator is appointed by the President of the Philippines, and has the authority to collect water charges from the beneficiaries of the irrigation service it provides. All corporate work is under the authority of the administrator who is guided by policy objectives.

Initially, when the agency concentrated on engineering and construction, minimal attention was given to participatory management. Farmers were not yet adequately organised for effective representation through a CIS operation. It was not until the early 1970's that senior NIA management first became seriously concerned about problems with the operation and maintenance of irrigation systems. Out of this arose a concept that farmer organisations were a crucial element in effective irrigation management. However, at that time, NIA had little capacity to develop and support stronger irrigator associations that could assume a more active role in irrigation management (Korten & Siy, 1988). Thus, it was not until 1976 that the NIA established its first participatory approach with two pilot communal irrigation projects to solve irrigation management problems. With help from another agency, the Farm System Development Corporation (FSDC), NIA was able to organise potentially strong irrigator associations.

Under this new participatory approach, the NIA attempted to maximise the participation of farmers from the grassroots level in: (a) decision-making within the irrigators' association; (b) planning the improvements and expansion of the irrigation system; (c) securing the water rights; (d) obtaining right-of-way for canals and other facilities; (e) constructing the irrigation facilities; and (f) controlling construction costs. The pilot projects served as "learning laboratories" for the agency to further develop processes for maximising the participation of farmers and to learn about the problems and effects of such an approach (Bagadion, 1988).

1.4.1 Government's Role in Irrigation

The Philippine government recognises the crucial role that irrigation plays in the total development efforts of the country (Leuterio, 1977). The NIA has been provided with broad powers and objectives to investigate and study all available and possible future water resources in the Philippines, primarily for irrigation purposes and to construct multiple-purpose water resources designed principally for irrigation, but also for hydraulic power development and/or other uses such as flood control, drainage, and domestic water supply.

As the population increases, food requirements also increase, and irrigation development has steadily become a growing national concern. As a consequence, successive governments have initiated an Irrigation Development Programme in co-ordination with the development programmes of other government agencies, as part of an overall national development plan aimed primarily at achieving self-sufficiency in food production. A study in three other countries namely: Indonesia, Thailand and Malaysia revealed that so far, 90 percent of the irrigated area in Thailand and Malaysia, and 80 percent in Indonesia has been implemented through government programmes for irrigation. In Thailand, the export of rice is an additional objective and the financing of irrigation construction is usually arranged through a mix of foreign loans and domestic funds (FAO, 1987).

1.4.2 The Provincial Irrigation Office (PIO)

The Iloilo Provincial Irrigation Office (IPIO) is one of the 67 provincial units of the NIA and oversees the operation of the NIA-assisted Communal Irrigation systems (CIS) in the Iloilo Province. The office is the lead agency in the development of communal irrigation systems in Iloilo. As a field unit of NIA, the IPIO is responsible for the construction, operation and maintenance of all CIS in Iloilo. It is also tasked to provide institutional support for farmer irrigators through the establishment of Irrigator Associations in different *barangays* (villages) served by respective CIS.

The IPIO, as the lead unit in the overall co-ordination of administration of communal projects in the provinces, has the responsibility to organise Irrigator Associations as well as to identify and investigate projects and carry out technical planning (Zapanta et al., 1995).

Organisational Set-up

The IPIO office is headed by a Provincial Irrigation Engineer (PIE). It is divided into three sections namely: Engineering, Irrigator Development and Administration (Zapanta et al., 1995). The Irrigator Development Section prepares plans and programmes for the organisation and development of Irrigator Associations (IA's), conducts institutional feasibility studies of the proposed projects, facilitates the organisation of farmer beneficiaries into functional and viable IAs, conducts training programs for farm-leaders and users, monitors and evaluates the functionality and viability of IAs, co-ordinates with other government agencies for other assistance to be given to IAs, collects amortisation payments and prepares necessary institutional reports. The primary function of this section of IPIO is to attend to the operation and maintenance of completed CIS (NIA, 1989). The IPIO organisation, has only one managerial layer, at the level of the Provincial Irrigation Engineer (PIE). Its three sections, except for the Administrative Section, directly serve the irrigation clientele while performing staff provide assistance to the PIE. This provides for fast information flow, 'speedy' decision making and more individual satisfaction (client and employee). Another task that has to be mastered by the PIE is the managerial dimension, since it involves the complexities of handling people and the organisations in which they operate (Zapanta et al., 1995).

The horizontal co-ordination within the IPIO is made possible through these three sections, each being highly specialised but interacting with each other in construction repair, establishment and development of IAs and in revenue collection and support services. The role of supervising water distribution management, is given to the external groups of the IAs, known as the water tender. However, there is a unit within the Irrigators' Development Section that coordinates with IAs to manage water distribution and to oversee their operation and maintenance needs. Overall, the Provincial Irrigation Engineer (PIE) directs the annual planning and budgeting processes and work programmes and supervises and monitors the performance of irrigation systems.

1.5 Importance of the Study

Increases in agricultural production, labour employment and income can all lead to a better quality of life for farmers. Good irrigation management and facilities make it possible for a farmer to plant up to three crops per year using the new high yielding varieties of rice. The construction of the irrigation system itself generates employment for a number of rural people and associated farm production activities have flow-on impacts to the marketing, transport and milling sectors.

The development of farmer organisations increases their capacity to participate in the decision-making processes of the systems they manage. As such groups of farmers, organised as an irrigator association, participate actively in the operation and management of the systems in an effort to improve land productivity in a manner which will eventually increase the contributing farmers' income. Despite their success, there remains a need to develop new performance parameters to improve the efficiency and effectiveness of these organisations. This study attempted to look at the performance of irrigation systems at the participatory level of management from both the perspective of providers and users.

The results from this study are expected to increase our understanding of farmer-managed irrigation systems in the Philippines. The findings will provide guidance to policy makers, programme managers, farmer irrigator groups and farmers, as well identify means to develop better management systems. After all, it is the farmers that are the key to successful irrigation development and the benefits from irrigation programmes depend to a large extent on their "know how" and experience, and ability to apply irrigation practices and modern agricultural techniques. Finally, this study will add to the extensive body of literature on irrigation management and stimulate further research dialogue amongst the practitoners of irrigation management.

1.6 Limitations of the Study

This study was undertaken in the Province of Iloilo, Philippines to determine how different small scale irrigation system are managed. The study was limited to small-scale irrigation systems (communal irrigation systems, CIS) operated and maintained by the irrigators association and NIA-assisted "communals" that use a participatory approach to management. As such the study reflects the situation at one point in time and for one part of the Philippine's irrigation programme.

1.7 Thesis Outline

This chapter has provided a brief overview of irrigation systems development in the Philippines. The study problem was then identified and the objectives were defined. The review of literature follows in the next chapter. This discusses relevant studies on irrigation management and emphasises aspects of participatory management within farmer-managed irrigation systems. It provides a review of irrigation management, farmer participation and factors associated with the management of an irrigation system. The methodology used in the study is outlined in Chapter 3. This includes a description of the conceptual framework and the research design used. The location of the study area is presented and the type of data collected is discussed. The results of the study are presented and discussed in Chapter 4. Tables are presented to generate a clearer understanding of the various irrigation systems. The closing chapter summarises the results from the study and conclusions are drawn. A set of recommendation and related areas for further research are also presented.

Chapter 2 Literature Review

In this chapter studies of irrigation management particularly those with an emphasis on participatory management of farmer-managed irrigation systems are reviewed. While the review is not exhaustive, but the areas of relevance to the Philippine situation are covered.

2.1 Management of Irrigation Systems in Developing Countries

Government institutions play different roles in developing and managing irrigation systems in developing countries. In many instances, governmental agencies are directly responsible for the management of irrigation systems. In other instances, they play a more indirect role such as promoting irrigation development through the provision of credit and technical assistance services to farmer groups or individuals; assisting in the rehabilitation and construction of the systems owned and operated by farmers; and helping to improve operation, maintenance and management standards (IIMI, 1989; World Bank, 1993). Initially, they play a direct role in the development, construction and management of irrigation systems, and later they provide support services to farmers either independently or in groups, who are responsible for managing the irrigation systems.

Irrigation, being one of the largest public investments in many developing countries, is a primary area of international assistance. The World Bank has played an important role in financing irrigation investments internationally, with total lending of 29 billion US dollars in 1991 (Campbell, 1995). Asia has been the major recipient of World Bank lending for irrigation, receiving 70 percent, with India being the largest client with 27 percent of irrigation borrowing.

Water and irrigation administration in most Asian countries may be classified into two broad categories: (a) direct control by government water authorities and (b) control by water users such as farmer irrigator associations. It has been common for several

separate government agencies under different ministries, to facilitate the effective operation of irrigation systems in many Asian countries. In Nepal, for example, two agencies are directly involved in small-scale irrigation development: the Agricultural Development Bank of Nepal and the Department of Irrigation (Pradhan, 1989). The Pithuwa Irrigation System located in Chitwan, was constructed in 1968 by the Department of Agriculture and was expanded later. Though the physical facilities are still the property of the government, management for operations and maintenance has been turned over to the irrigators (Yoder, 1994). The government now promotes "farmer" management as a way to improve irrigation performance and to reduce the financial burden on the government for developing and operating irrigation systems (World Bank, 1993)

Management of irrigation systems in a particular country varies depending on the nature of the project. Most large irrigation projects are dual managed, where the principal management responsibility is exercised by government agencies with farmers playing a subsidiary role. For small-scale irrigation projects, most management activities and decisions are carried out by farmers themselves with the government providing technical support (Chambers, 1988; Manor & Chambouleyron, 1993). In the Peoples Republic of China, almost all irrigation systems are managed by irrigator associations which, though organised by farmers, are under the strict supervision and guidance of the government (Asian Productivity Organisation, 1977).

In Indonesia, irrigation systems are classified by the government into four categories: "technical", "semi-technical", "simple" or "*sederhana*" and "village". The first three are constructed and managed by the government, while the fourth (village irrigation system) is constructed and managed by farmer groups. In Java, Indonesia, the local government is technically in control of small irrigation systems (Yoder, 1994). The larger "technical" and "semi-technical" systems are subjected to more rigorous feasibility studies and technical requirements, while "simple" or "sederhana" systems are less complex and easily constructed using labour intensive methods and do not exceed 2,000 hectares. All of these government constructed systems, once completed, are the responsibility of a provincial government to operate and maintain in order to ensure the

main system delivers water to farmer groups. The farmers' responsibility is limited to the operation and maintenance of the irrigation systems at the farm level (FAO, 1987).

Irrigation management in Pakistan, falls into one of two categories: the farmer-managed irrigation systems and agency-managed irrigation systems. A study of the differences between these two systems located in northern areas of Pakistan, revealed that it is critical for the government to link up with people in order to improve the performance of irrigation systems. However, the government is constrained by its financial and human resources, and cannot succeed without the participation of communities (Hosain, 1991). Furthermore, Byrnes (1992) found that the process of organising farmers had a significant impact in terms of mobilising the labour and funds required to design and implement projects. Once water user groups are formed, Byrnes (1992) established that they continue to be active in facilitating the organisation of farmers and their participation in irrigation management (operation and maintenance) and other functions essential for agricultural and rural development.

In Thailand, irrigation systems are also classified into two general categories: government irrigation systems and "people" irrigation systems. The former systems are constructed and managed by the government under its Royal Irrigation Department (RID), while the latter are constructed and managed by farmers with the assistance of the government. Government systems are usually large and medium scale projects, built to increase rice production in order to stabilise the domestic price of paddy and to enable the country to maintain its rice export position. The people's irrigation systems are mostly small scale and are rehabilitated or improved by the government to assist small farmers (FAO, 1987).

Almost all of the irrigation systems in Malaysia have been transferred into government schemes since the late 1930's, so that the Irrigation and Drainage Department of the Ministry of Agriculture operate and maintain the main water delivery systems, while farmers look after the farm-level system. Planning and construction is undertaken by the federal government, with some foreign loans being used in the case of large systems. Upon completion, the irrigation systems are turned over to the state governments for operation and maintenance purposes and the state only charges an annual irrigation fee.

An exception to the usual arrangements for irrigation in Malaysia, is the Muda irrigation system which is being managed by the Muda Agricultural Development Authority (MUDA). This system, serves 96,000 hectares and all irrigation activities are integrated under one agency (MUDA). Farmers are organised into numerous Farmer Associations (FA) and every FA is divided into Small Agricultural Units, each of which cover one or more villages. A Farmers' Development Centre (FDC) is constructed within the village area which serves all farmers whether or not they are member of the FA (FAO, 1987).

In the Philippines, large irrigation systems are agency-managed. The National Irrigation Administration (NIA) is given authority by the government to develop, operate, maintain and regulate irrigation activities although some of the activities now are performed by irrigators in terms of managing irrigation delivery. For communal irrigation, the systems are turned over to the irrigators for operation and maintenance to be fulfilled.

While irrigation development in the South Asian region over the last few year has enjoyed a considerable degree of success, some problems are yet to be resolved satisfactorily. The problems usually do not relate to the hydraulics of irrigation, but most frequently to the poor management of water resources. This is due not only to inadequate finance but also to weaknesses in institutional, technical and managerial aspects of irrigation systems. These important factors frequently constrain good system performance (World Bank, 1988).

In recent years, many irrigation systems have been transferred to local management in many countries. The early success of local management prompted the initiation of programs to turn systems over to local management, rather than be operated and maintained by central irrigation agencies.

2.2 People Participation

In the recent past, considerable interest has been focused on the concept of people participation which ". . . . is regarded both as a means to development, as well as an end in itself" (FAO, 1990). This particular interest is based on the idea that people participation is ". . . also essential for an effective rural development program" (Castillo, 1988) in as much as it better meets the needs and basic human rights of those involved than central management and organisation. This was further supported by D'Silva (1992) who claimed important indicators of success of a project are the degree to which it responds to the needs of beneficiaries and the degree of opportunity for the intended beneficiaries to participate in the project.

Benjamin Bagadion of NIA (as mentioned by D'Silva,1992) defined participation as the "sharing of tasks and responsibilities in the planning, construction and management of a project." FAO (1990) also noted that participation involves an active partnership between policy makers, planners and officials, and the target beneficiaries of the programme. The concept of people participation (as cited by Caayupan, 1987) refers to the process where the intended beneficiaries of development are afforded the opportunity "to make use of and share what they have, express what they feel, articulate what they want and combine all these to continue action designed to arrive at what, where and how they would like," with reduced assistance from the development agencies. While the targets of people participation are the large number of the rural poor and the institutional constraints to production and inequality, it also aims to complement specific projects such as irrigation improvement, rather than becoming a large heavily-funded national bureaucracy with local field agents, as was the case with community development (Castillo, 1988).

Participatory management as mentioned by Raby (1991) " . . . . is a managed process and, as such, it is fastened and nurtured through strategy, planning, evaluation of structures and procedures, and above all, training of participants." The style of worker participation varies between organisations. In irrigation, there are three ways in which farmers may participate, as follows: (a) top down - government initiated and formally

organised as practised in the Philippines (larger schemes); (b) bottom-up-spontaneous organisation that result in participation and management by farmers (the communal system); and c) facilitator - known as the "third part" approach, is a combination of (a) & (b). The latter are the most prevalent in the Philippines and amongst the irrigation systems under the Irrigation Management Division (IMD) of Sri Lanka.

With respect to the development process, Uphoff (1992) indicated that a participatory strategy for promoting sustainable agricultural and rural development proceeds on the assumption that rural people have more to contribute in terms of ideas, management skills, technical insights, and organisational capabilities that are needed for development, than just money or labour power. They are to be regarded as partners and not as "beneficiaries" or "target groups". Uphoff (1988) believes that farmer participation may be viewed both in kind and in degree. The kind of responsibilities discharged, depend on the situation, and the extent of their participation in these activities differs as well.

The infusion of this concept in development has paved the way to a new model and brought to the fore the "bottom-up" strategy. At the moment, various programmes have been designed, or are being designed, to secure better participation of the rural poor in planning and implementation through group action. The goal is to develop viable groups imbued with a group responsibility and spirit of self-reliance (Alicante, 1991).

Rural development strategies can realise their full potential only through motivation, the active involvement of people and organisation at the grassroots level of rural poor (Alicante, 1991). The involvement of the poor should include the least advantaged strata, in conceptualising and designing policies and programmes, and in creating institutions for implementing them. However, Oakley (1991) mentioned that in some sectors, there is a little evidence of widespread and clear-cut participation by people in the key aspects of project practice, for example, design, decision-making and management. He further stated that participation is not being used as an educational process in which local people are helped to develop the capabilities and skills to assume greater responsibility. Instead participation is viewed as an input, which can be managed and planned at the projects' convenience.

Korten & Siy (1988) also claimed that it is rare to find major programs that actively involve local people and even rarer still to find such programs carried out by large government agencies. In this respect, the programs of the Philippine National Irrigation Administration are an exception. The NIA sought to involve farmers from the very start of the project which include planning, laying-out and constructing the structures. The agency encouraged the farmers' irrigation association to develop skills in decision-making, resource mobilisation and conflict resolution that are needed for the effective the operation and maintenance of irrigation systems.

Participation of farmers is a key factor in the successful development of irrigation (FAO, 1987). Obviously, the participation of farmers in itself does not remedy poor irrigation performance; other components must be combined with participation. This includes "capacity building" of farmers and their irrigation associations, encouraging the adoption of appropriate policies by the irrigation agency, and ensuring farmers' attitudes are consistent with programme objectives. Participation, is, however, the key to attaining and sustaining improved performance through water resources because the government by itself cannot handle all of the tasks of irrigation development.

2.2.1 Elements of People Participation

Castillo (1988) reported four indices of participation: (a) performance in meetings; (b) involvement in planning, implementation and maintenance of projects; (c) attendance of meetings; and (d) number of hours devoted daily to the project and its associated activities. In a similar vein, FAO (1990) reported five elements of participation as follows: (a) number of members; (b) average attendance at meetings; (c) labour contribution; (d) participation in training; and (e) leadership. Zapanta et al. (1995) cited only three elements of people participation: (a) frequency of attendance of irrigators' meetings; (b) the number of training session attended; and (c) the frequency of involvement in the maintenance and repair of the communal irrigation system.

Essentially, active involvement/participation of farmers in irrigation activities ensures a better chance of project success. This allows group expertise and knowledge to be

developed and applied. Given all of the information on the elements and benefits of participation there seems to be no reason for irrigation development of this type not to succeed. However, this is not always the case as discussed later in this review.

2.2.2 Effects of Farmer Participation

D'Silva & Bysouth (1992) in describing an evaluation carried out by the Institute of Philippine Culture at the Ateneo de Manila University in 1985, indicated the following effects of farmers participation:

a. stronger and more responsive Irrigator Associations;
b. the irrigation systems were more responsive to farmers needs and therefore better utilised;
c. higher crop production;
d. better water distribution;
e. higher annual amortisation in the communal systems;
f. increased counterpart contributions from the farmers to the cost of construction of the communal systems;
g. a decrease in operations and maintenance expenses by as much as 50 percent in national systems under joint management with Irrigators Associations.

According to de los Reyes & Jopillo (1988), farmer participation produced consistently positive results. The canals and structures built were viewed by the farmers as more functional and the systems were more productive, with greater increases in rice yields and the area irrigated in the dry season than those not managed by farmers. Irrigator Associations developed with the use of participatory methods, had more leaders and better developed sector units. Furthermore, members had a greater equity of water access and used sound financial management. In the same context, IIMI (1990) cited positive results of farmer participation as: (a) rapid completion of physical works; (b) substantial cost savings; (c) mobilisation of farmers' resources for completion of physical improvements; (d) increased sense of ownership or awareness; (e) improved ability to mange irrigation activities; and (f) intensification of irrigated agriculture and the expansion of the number of beneficiaries receiving access to irrigation.

Oliva (1991) discussed benefits of the changes attributed to participation in terms of a) attendance in meeting; b) planning and decision-making; c) implementation of project activities; and d) sharing of benefits. She further revealed that in order to have active local participation in the project, it is important to help local people both define their needs and identify their level of technological knowledge and skills. In essence, people are more likely to support a project that they have helped to implement.

2.3 Factors Associated with the Management of Irrigation Systems

2.3.1 Physical and Environmental Factors

The physical environment like topography and weather, were found by Alicante (1991) to affect farmer participation. Furthermore, he stressed that farm size and distance from the main canal showed a greater influence on farmers' participation in activities related to the operation of the projects than in water availability. Farmers who had larger farms tended to participate more actively in tasks related to the project than those who had smaller farms. Moreover, the author also mentioned that the level to which people are motivated to participate in any program depends on how they receive benefits from the program. Accordingly, the more members benefit, the greater their participation. It must be recognised that the size of benefits received from irrigation is greatly determined by the size of one's farm, and this is likely to explain the observation that farmers with larger properties are more active participators than those with small holdings.

Results of the study undertaken in four South Aian countries, of government irrigation programmes, showed an average farm holding of 4 ha in Thailand, 2 ha in Malaysia and the Philippines, and between 0.4 ha and 3 ha, depending on the island, in Indonesia. Since land tenancy is prevalent in the Philippines and land reform has been effected, the area a farmer can own for cultivation is 3 hectares for irrigated and 5 hectares for unirrigated areas. Remaining land is government owned and distributed to tenants (FAO, 1987).

Lowdermilk et al. (1978) identified that farms located at water course tails had irrigation efficiencies 15 % lower than those farms located at heads of common reaches. Furthermore, rice and cotton yield of farms located at the head reaches of water courses were higher than those of farms located at the tail reaches due to reductions in water supply. The effect of farm location on yields relative to the source of water was further supported by a study in Northeast Thailand (as cited by Alicante, 1991) by the International Rice Research Institute which found that 12 % of the farmer-respondents received insufficient irrigation due to an unfavourable position of the farm, i.e. at the tail end of the system or not adjacent to the canal.

Wickman and Valera (1976) stated that farms located far from their supply turnout were at a disadvantage compared to those located near the canal. This was due to the diminishing supply of water, brought about by the water passing over the closer fields first, as well as possible obstruction or diversions of flow by other farmers. However, Yoder (1994) stated that in the Pithuwa Irrigation system in Chitwan, Nepal, water is distributed continuously to all 16 of the branch canals most of the time, and during periods of water shortage, irrigation supply is rotated amongst the branch canals according to a pre-determined allocation schedule. As a result, farm location effects on crop yield are reduced.

2.3.2 Socio-economic and demographic factors

As mentioned by Alicante (1991) both social and psychological forces influence the attitudes of people toward participation, and these are manifested only when opportunities for participation are afforded to them. Several factors were assumed to influence people participation as follows: (a) variables such as age, size of the family, tenurial status, educational attainment, household income and attendance in various management and training programs; (b) perceived satisfaction over the functionality of community organisations being used as vehicles to generate people participation; and (c) perceived satisfaction over the consequences of their involvement in the various project management activities.

Olano, W. (1981) claimed that age, socio-economic status, educational attainment and other job-related training and affiliations affected people's participation in voluntary schemes. He contended that those who were at mid- life and who had higher economic status, as well as those who had formal schooling and job-related training and those who were active in organisational activities, were also active participants in co-operative programmes. Thus, the extent of people participation appears to be directly related to socio-economic position. Accordingly, the higher the socio-economic status of the individual, the greater is one's ability to get involved in development activities such as an irrigation project.

A study in the Philippines by Salguero (1995) on the distributional impact of irrigation on production factors and amongst earners, concluded that irrigation has a positive effect on both the average levels of income and on the redistribution of income among factors of production. These finding are further supported by research in Indonesia and Thailand (IFPRI, 1986). Moreover, these studies show that aside from the fact that irrigation substantially increases the income to all factors of production, most of the gains to land-use accrue directly to small owner -operators.

De Leon (1986) also reported that owner-cultivators tended to have a higher level of effectiveness in decision-making than tenants on rented properties. The author attributed this to the ability of owner-cultivators to make independent decisions and, therefore, to be able to participate readily in any activity if they wanted to do so.

The success and failure of irrigation projects cannot be fully attributed to the socio-economic standing of the farmers in the project, although they may be a part of it. There are other indicators of social and economic development, that if combined together, help to generate targets outputs for farm productivity and farmer income.

2.3.3 Management Factors

In most developing countries, the major thrust of the government is to facilitate the direct involvement of local people in development projects. The inclusion of farmers in the decision-making processes for the management of irrigation systems is necessary not

only for the effective operation and maintenance of the systems, but also to optimise resource use and to increase farm productivity as well as farmer income (Raby, 1991; Sinha, 1996). Further study by the FAO (1987) revealed that farmer's (water users) participation in irrigation development should begin at the planning stage of the project.

A study by the government of India (as cited by Mitra, 1993) endorsed the policy to involve farmers progressively in various aspects of the management of irrigation systems, particularly with respect to water distribution and the collection of water rates. This was supported by Hilton (1992), who showed that in order for the maintenance of irrigation systems to be successful, farmers must be involved in water allocation and distribution. Furthermore, Nijman (1992) pointed out that of all the areas of management concern and opportunities for improvement of irrigation systems, the highest priority should be enhancing the decision-making processes for water management.

In the Central Nepal hill region, the method for irrigation distribution amongst farmer-managed systems varies from system to system depending on the crop grown and the water supply available over the growing season. Farmers growing rice in the hot, low valleys of the central Himalayan hills prefer an irrigation supply that allows the water to flow continuously in the field canal so that they can divert it into their rice field at any time and in any quantity. They conclude from their experience that rice grows best when there is a continuous flow of water into the paddy. However, if the irrigation supply is insufficient for continuous distribution on all or most fields, rotational distribution of water is also used. Although rotational distribution is easy to monitor, the cost of managing the water in the field is higher than under continuous supply. In addition, during rotational distribution, farmers need to be present in the field during their turn, day or night, or else they lose their opportunity for irrigation (Yoder, 1994).

Unson (1978) noted that the success or failure of an irrigation system depends on the quality of the organisation and the willingness and participation of its members.This was further attested to by Oliva (1991), who mentioned that one important reason for the failure of many rural development projects is the lack of co-operation and support from the very people (i.e., water users) the project is supposed to benefit. This often results

from taking the local people for granted and not giving them opportunities to participate in planning. The Indian experience over the last decade shows that so long as farmers actively participate in irrigation management, there is a marked improvement in water utilisation (Mitra, 1993).

There is a growing consensus that farmer participation in irrigation development and operations is important for the effective operation and maintenance of irrigation systems (Bagadion & Korten, 1991). The policy makers and administrators now recognise the importance of farmers' participation in irrigation development. Hence, people participation has become a popular element of irrigation development.

2.3.4 Attitudes/Perception of Farmers

An attitude can be best defined as a set of beliefs coupled with an effective evaluation (positive and negative) of those beliefs (Smith, 1982). Fishbein and Ajzen (1975) described attitudes as a " . . . . . learned predisposition to respond in a consistently favourable manner with respect to a given object, message or person". Learned predispositions, however are based on past experiences. Attitudes, therefore, are formed by past experiences being coloured by individual values (Alicante, 1991). Fitzimmons & Freedman (1981) further defined an attitude as ". . . . . .a relatively enduring organisation of beliefs around an object or situation predisposing one to respond in some preferential manner." A basic operating assumption is that people form attitudes towards the community in which they live on the basis of their experiences in that community.

Pleasant and unpleasant experiences elicit favourable and unfavourable attitudes, respectively. Normally, attitudes manifest some consistencies ". . . . among the feelings, beliefs and overt action called forth by the objects of such attitudes" (Hilgard and Atkinson, 1971). Consistency becomes more prominent when the objects of an attitude evokes pleasant feelings (Hilgard et al., 1971).

On the other hand, perception, is defined as the process of becoming aware of objects, qualities or relations by way of the sense organs (Oliva, 1991). It is the training or

refining of moral and intellectual faculties and can be acquired from a given culture. Oliva further stated that perception may be affected by several factors such as: the individual's needs and personal values, past experiences and group influences.

Proper implementation of the participatory approach requires some fundamental shifts in the norms and attitudes of NIA personnel (Bagadion & Korten, 1988). Since the participatory approach requires a partner relationship between the NIA and the irrigators' association, technical personnel need to respect the knowledge and traditions of the farmers, while recognising the limitations of that knowledge.

According to Soltes (1981), attitudes, along with other factors, affect the operation and maintenance of an irrigation system. Furthermore, this author found a high correlation between knowledge and participation in irrigation activities. This was confirmed by Parveen (1989) who established that the knowledge level of participants was significantly correlated with the level of technology adoption. As the farmer's level of knowledge increased, so did technology adoption.

2.4 Gaps in the Literature

Although the concept of irrigation is not new, because it has been practised in some form or the other for many centuries, in recent years it is being considered anew in terms of farmers' participation. There are a number of communal irrigation systems in Asian countries today. A thorough understanding of the principles involved in their successful maintenance and operation is necessary because they provide the potential to significantly improve the efficiency of irrigation.

There is, however, relatively little information published on irrigator associations and farmers involvement in the operation and maintenance of communal irrigation systems. Most importantly, the optimum mix of government and local community responsibilities in creating and sustaining small-scale irrigation facilities remains unclear. A study of the extent of farmer's participation in irrigation-related activities is relevant in this regard. Furthermore, it is important to identify management and other factors which may enhance irrigation development.

Chapter 3 Methodology

This chapter contains two parts: an outline of the conceptual framework for the study and a description of the research design used. The processes used for data collection are described in the later parts of this chapter.

3.1 Conceptual Framework

In the Philippines, like other developing countries, obtaining self-sufficiency in food production, particularly for rice, has been the foremost objective of irrigation development (FAO, 1987). Irrigation, as one of the most productive inputs for agriculture, especially in arid regions, can lead to a six-fold increase in the yield of cereals and a four-to five- fold yield increase in root crops, compared with rainfed agriculture (Olavides, 1993). Therefore, irrigation plays a vital role in meeting the food requirements of the country. It increases both the stability and efficiency of the major cropping systems. One of the reasons why irrigation allows for increased agricultural production is that it makes it possible for rice farmers to grow an average of 2.5 crops per year or up to three crops per year when good irrigation facilities are used in conjunction with new high yielding varieties and improved farming technologies. With improved management of irrigation systems and maximum use of the irrigated rice farms, production and income disparities amongst farmers can be reduced.

The relationship amongst the variables considered relevant to this study, as supported by the literature reviewed, is shown in Figure 1. The four sets of factors considered in this study and assumed to be associated with the area of irrigated rice, a proxy variable for farmer participation in irrigation-related activities, were as follows: (a) socio-economic and demographic characteristics, (b) physical resources, (c) management and (d) attitudinal factors. The reasons for including each of these variables in the conceptual model are outlined briefly in the next Section.

3.1.1 Socio-economic and Demographic Characteristics

In the past the focus of irrigation development has been almost entirely on the engineering aspects (See Section 1.4). Now, much greater attention is being given to socio-economic factors when designing and constructing public works to ensure that the system's operation is effective and potential increases in agricultural production are achieved. In the conceptual model shown in Figure 1, socio-economic factors are assumed to influence farmer participation in irrigation-related activities as well as their attitudes toward the management of irrigation systems. As outlined in Section 2.3, socio-economic factors such as age, sex, number of children, educational attainment, number of years as water-users and household income are important determinants of farmer involvement in any project. Farmers who get involved in irrigation-related activities are relatively older, likely to have been a water-user for a long period of time, and to have a larger farm than those who are less actively involved. As water- users, it's often the males rather than the women who are considered. For example, a study of irrigation development in Africa showed that women and men may be differentially motivated to invest labour and other resources to irrigated crop production and as a result of new irrigation interventions, women lost access to land and to the proceeds of harvests in favour of their husband and male relatives (Zwarteveen, 1995). In terms of farmer education, the greater the number of years they spent at school, the more likely it is that they will expand their irrigated rice farm. Also, as the number of children in the farm family increase so too does the area of irrigated rice. Household farm income reflects the area in irrigated rice: the greater the area, the greater rice production and hence net income, is likely to be.

3.1.2 Physical Factors

Physical factors such as farm size, water availability and farm location are also important determinants of a farmer's involvement in irrigation-related activities (Alicante, 1991). Farmers with a larger irrigated area tend to participate more actively in irrigation activities. The importance of farm location is beneficial in the sense that, those farms located near the supply turnout can access water more readily to irrigate their

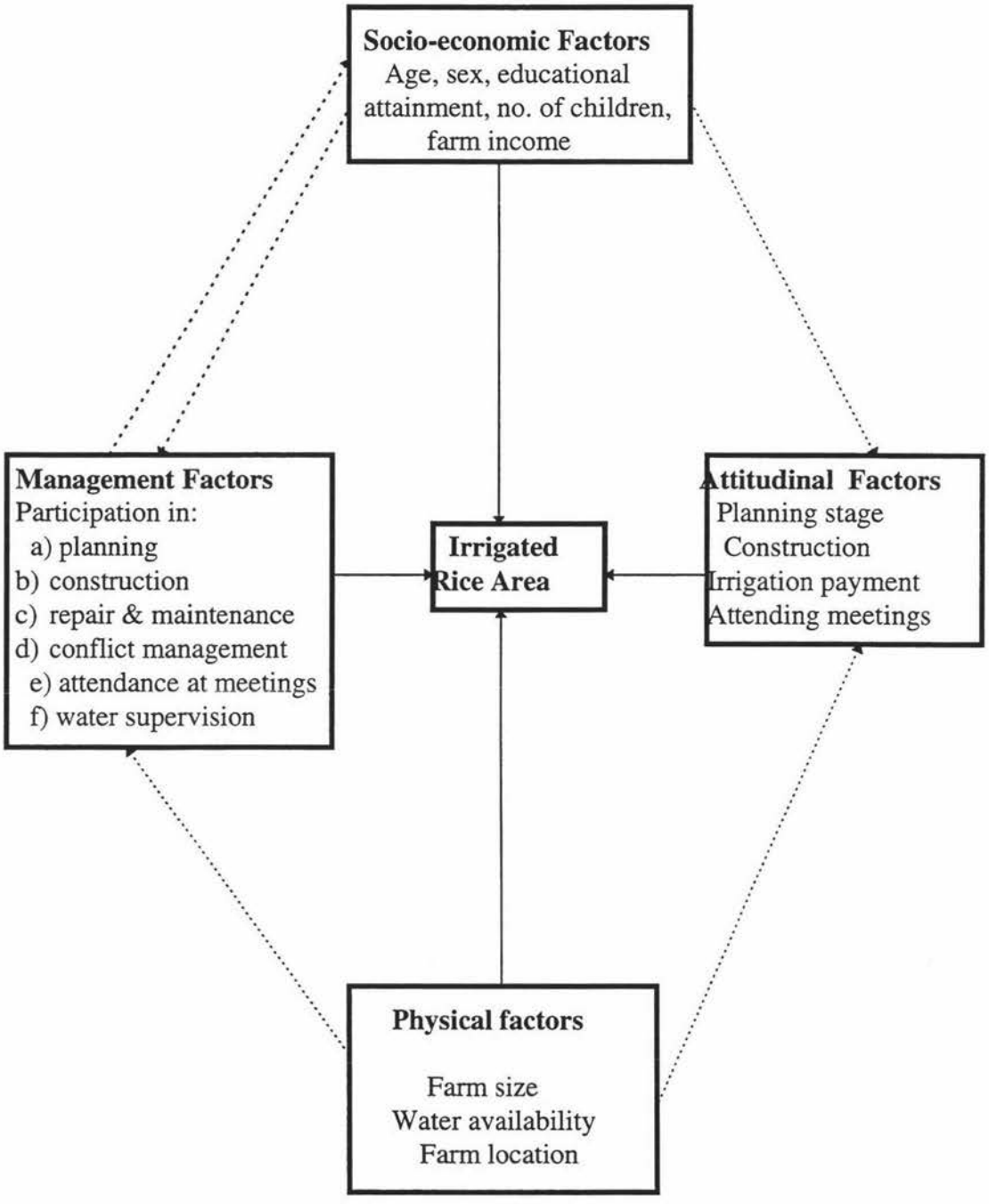

Figure 1. Conceptual framework for the research design demonstrating factors associated with the area under irrigated rice, a proxy variable for farmer participation in irrigation activities.

farms compared to farms located far from the canal. The latter farmers are more likely to experience restrictions in water supply (Lowdermilk, 1978). Farms near the supply turnout are therefore likely to have a larger area of irrigated rice, *ceteris paribus*..

3.1.3 Attitudinal Factors

The attitudes and the motivation of farmers and the level of their capabilities are all likely to influence their willingness to take part and sustain their participation in an irrigation association (Oliva, 1991). In this respect, the ability of local government to provided incentives, resources and support services is also important. The more positive a farmer's attitude to irrigation system management, the more likely it is that s/he will increase the area of land under irrigation.

3.1.4 Management Factors

In the conceptual model it is proposed that the management factors associated with the use of irrigation are influenced by socio-economic, demographic and physical factors. It is also likely that farmers, regardless of their economic status, will participate actively in irrigation activities because of the production advantages that these provide. Nevertheless, prior evidence suggests that the greater the farmer's input into system planning, the more likely they are to expand the area in irrigated rice farming (Hilton, 1992). In addition, the larger the farm size, the more likely it is the farmer will get involved in irrigation activities. Direct involvement of farmers in system construction (i.e. contribution to labour, financial and materials), is more likely to increase their understanding of irrigation practices. Also, farmers who actively participate in repairs and maintenance will realise the importance of these inputs to irrigation system performance more than those who are inactive. Overall, the more farmers participate in irrigation management, the greater the benefits they are likely to derive from improved access to water for crops. Finally, it is proposed that the reliability of the officers of IAs for water supervision is likely to increase the area that farmers are able to irrigate.

3.2 Research Methods

3.2.1 Location of the Study

The study was conducted in the Iloilo Province of the Philippines, which is considered to be the food "bowl" of the Western Visayas (Figure 2). It is currently one of the leading rice-producing provinces in the country. Iloilo was selected as a study area because although participatory irrigation management programmes have long been practised in the Philippines, NIA's focus of study has not been on the Iloilo Province. In order to add to the body of literature on irrigation management in the Iloilo region, the researcher primarily focused on the nature and extent of farmer involvement in irrigator associations and the characteristics of the farmers and their farms linked with these.

Iloilo occupies the south-western side of Panay Island. It is mountainous in the western part and hilly in the north. Iloilo has a total land area of 1.2 million hectares and a population in 1992 of 1.765 million. Strategically located in the center of the Philippines, Iloilo City is the hub of trade, commerce and industry in the Western Visayas. Crops commonly grown in the area are rice, corn and mungbean. Farmers usually double crop each year with the exception of a few who achieve three crops per year. The latter farms are fully irrigated and have all the inputs needed to sustain intensive crop production. Farmers most often adopt a double cropping pattern of: (a) rice-rice; (b) rice-corn; and (c) rice-mungbean.

Four different municipalities are located in the Province of Iloilo, namely: Barotac Viejo, Dingle, Anilao and San Joaquin. These were taken as sampling areas for the study. Each municipality was represented by its respective irrigator association (Figure 2). The irrigation systems concerned have been operational from as early as 1975.

Figure 2. Iloilo Province showing the four study areas.

3.2.2 Sampling Procedure

Three levels of respondents were used in this study: the individual farmer, the irrigators' association and key informants. Fieldwork for the study was conducted in the Philippines for a period of two and a half months from January to March 1996.

Two sets of questionnaires were developed: one for individual farmers and the other for representatives of the irrigator associations. Both questionnaires utilised open-ended and closed questions. It was designed and structured to elicit the data needed to meet the objectives of the study as outlined in Section 1.2 and summarised in the conceptual model (Figure 1) in Section 3.1. The interview schedule was pre-tested using 12 water-users from a communal irrigation project not included in the final study sample. Only minor revisions were made after the pre-test before implementing the survey instrument. The final version of the farmer questionnaire is included in Appendix 1.

A total of 144 farmers were interviewed from the four different project sites. The sites namely, Siwaragan, Lipata, Palaypay and GIPA were randomly selected from the list taken from the Provincial Irrigation Office. Thirty six (36) farmers were again randomly selected to represent each of the four sites to provide a total sample of 144 farmers. The four sites included in the sample represented different municipalities of the Iloilo Province (Section 3.2.1). Fifteen irrigator associations were also randomly selected from all of the projects operational in the Province of Iloilo. Each of the irrigators interviewed represented one association. The study was limited to the NIA-assisted communal irrigation systems.

3.2.3 Data Collection

Both primary and secondary data were used in the study. The primary data were derived from the survey responses of the individual farmers and the irrigation representatives. Secondary data were derived from the NIA's project reports, Asian Development Bank (ADB), Department of Agriculture (DA) and other documents. The interviews with the key informants, which were supposed to be administered by the researcher, did not

materialise because of the unavailability of the officials concerned, and in their place reading materials were obtained from the ADB library and Department of Agriculture.

A letter from the thesis supervisors to introduce the researcher was prepared to explain the purpose of the research. This was presented to the different agencies who were contacted by the researcher during the research. An arrangement was made with the supervisors before she left to send regularly details by facsimile of accomplishments and problems encountered.

Before the field interviews were administered, intensive consultations were held with the National Irrigation Administration Provincial Irrigation Office about the study. Two field enumerators, each with a baccalaureate in agriculture, were employed to assist with data collection. They were trained in interviewing techniques and in the correct procedure for filling in the questionnaire. Three to five interviews were completed each day, with each interview taking an average of 45 minutes. The distance between households limited the number of interviews which could be completed in a day. The interview schedule was written in English and was only translated by the interviewer into the local native dialects during the interview. The initial interviews with farmers posed a few difficulties in a few cases because the farmers were hesitant to answer some of the questions. After further explanation of the reasons for the research, they became co-operative, although a few questions still remained unanswered in several interviews.

Three days after the survey started, the researcher undertook a random check of the questionnaires administered by the enumerators to identify questions that had not been fully understood by either the enumerator or the farmer-respondents. Further follow-up checks were not possible because the survey areas were physically far from each other and the city (Iloilo) was the only practical meeting place.

The interviews with the irrigator associations occurred at the same time as the farmer interviews. They were conducted with the head of the association or with a representative of the association. A semi-structured questionnaire containing both open and close-ended questions was used (see Appendix II).

The data collection extended beyond its planned time schedule because of delays caused by local rain and typhoons.

3.3 Data Editing, Coding and Analysis

The questionnaire data were edited, tabulated, coded and entered into a computer file using an Excel spreadsheet. The open-ended responses for each questionnaire were coded and categorised at the completion of the survey. Open-ended questions posed some difficulties in coding, because most respondents provided a unique answer.

The data were entered into the spreadsheet and analysed using the SAS computing package (Delwiche et al., 1995). Data analysis included statistical techniques such as descriptive statistics, cross tabulation and regression analysis.

Responses to the questions on the socio-demographic characteristics and physical factors of farmers were first categorised, then the frequencies and corresponding percentages for the categories were determined. Responses to open-ended questions were likewise categorised before the frequencies were calculated and the percentage in each category was computed.

The analysis of farmer participation in irrigation management under the categories of planning, construction, repairs and maintenance, and resolving conflicts were classified, based on their responses, on a scale of 'very high', 'high', 'moderate', 'low', 'very low', and 'no participation' using numerical values of 5, 4, 3, 2, 1, 0, respectively. These numerical values were further coded into two categories, with 5 and 4 as 1 and 0, 1, 2, 3 as 2 in order to simplify data presentation. Farmer attendance at meetings was entered as the number of meetings attended, while water supervision was based on the individual(s) or organisation representative who supervised it.

The responses to the attitude questions concerning aspects of irrigation (see Questions 1 to 4 of the farmer attitudes, Appendix I) on the scale 'strongly agree', 'agree',

'undecided' , 'disagree', 'strongly disagree', and 'no opinion' were converted into corresponding ordinal values of 5, 4, 3, 2, 1, 0, respectively.

After initial explanatory descriptive statistics had been calculated, bivariate and cross tabulation of variables was employed. This analysis was completed for each irrigation system. To determine the association between the variables included in the study, correlation analyses was undertaken using Pearson's correlation coefficient. Lastly, a multiple regression analysis was carried out to determine the relationship between the area in irrigated rice (dependent variable) and the sets of factors (Figure 1) included in the study.

Chapter 4 Results and Discussion

In this Chapter the irrigator associations and the attributes of the individual farmer and their farming practices are described. Discussion about the Irrigator Associations focuses on: organisation and management of the irrigation systems, repairs and maintenance, water allocation and distribution, payment of irrigation fees, attendance of meetings and training seminars, conflict management and resolution, and problems faced by the association. The second part includes details about the farmers and their farm characteristics, farmer participation in irrigation activities and the inter-relationships amongst various factors associated with irrigation management in the Iloilo Province.

4.1 Irrigator Associations

4.1.1 Organisation and Management of Irrigation Systems in Iloilo Province

According to the 1996 updated operation and maintenance (O & M) records, obtained from the NIA-assisted Communal Irrigation Systems (CIS) in Iloilo, 31 operational irrigator associations (IAs) were located in the Province. Fifteen of the 31 were randomly selected from the list to represent the study area; each IA represented an irrigation area. Of the fifteen IAs, seven had been operational for 20 years and active since their establishment. The majority of the operational CIS had been rehabilitated (Zapanta et al., 1995).

The majority (53%) of the IAs were organised by the National Irrigation Administration-Iloilo Provincial Irrigation Office (NIA-IPIO) in collaboration with the now defunct Farm System Development Corporation (FSDC). The remaining IAs were organised by the NIA-IPIO with the help of the Irrigators' Development Officer (IDO) assigned to the province. The size of membership of each association varied and included both active and inactive members. Although information on the length of farmer membership in the IA was not collected, the age of individual associations can be estimated from the

maximum number of years of membership for some farmers. This is because farmers usually become members when the association is first established.

Almost all (93%) of the respondents said that they had been involved during the planning stage of the irrigation scheme. In this respect they performed a variety of tasks including commenting on the location of diversion work, survey activities, right of way negotiations, determination of the availability of water sources and preparation of legal rights. Slightly more than half (53%) of the respondents mentioned that the survey activities and/or the tasks associated with locating diversion work were mostly carried out by the members. All but one of the IA respondents had participated in the design and layout of the local irrigation system and four-fifths of them had been actively involved in the construction of the system.

There was a general consensus amongst the respondents that the irrigation systems had been established under the Participatory Programme, with farmer participation occurring in terms of the survey activities, location of structures and canals, and right-of-way negotiations. They believed that this had contributed to more effective system design.

4.1.2 Involvement in the Repairs and Maintenance of the Irrigation Systems

Irrigation structures and facilities, such as irrigation pump units and canal structures, breakdown and become unusable after some years of operation. Thus, it is imperative that this task is taken seriously by the association because repairs and maintenance are needed to ensure the consistent and efficient delivery of water to the farms. System maintenance, particularly minor repairs, was always completed with the NIA's technical assistance. To maintain "their" systems, all of the members contributed labour and materials. Less than half of the respondents (46%) reported having contributed cash. In the case of the CIS, maintenance was carried out through the co-operative efforts of members.

An important activity in system maintenance is the clearing of silt deposits caused by floods or landslides from the canals. In the sample IAs, 86% of the respondents claimed that the head or an officer of the association was responsible for ensuring that local

irrigation facilities were maintained. In some (27%) IAs responsibility for 'tending' the water was given by the Head of the Association who was also required to oversee the maintenance of the canal structures. After the water tenders reported their findings to the Head of the Association, the Head in turn called for the *dagyao or tawili* (i.e. like a "working bee"). This Hiligaynon term refers to an activity undertaken by group labour. A *dagyao* was also called for the maintenance of the main canals. Farmers were responsible for maintaining the irrigation lateral structures which went to their farms.

4.1.3 Water Allocation and Distribution

The allocation and distribution of water is a complex activity that demands careful planning and proper implementation. Questions such as, how much water is required at the different parts of the system and whether the water available is adequate for the irrigation needs of the farmers need to be addressed. Furthermore, the distribution of water needs to be timely and equitable, and should satisfy the water requirements of the crops planted by the farmers. The Head or officers of the association distributed water simultaneously during wet croppings and rotationally for dry croppings. Rotational watering was done during the dry crop (i.e. summer period) so that farmers could obtain a timely and even distribution of water. For rice water-users, the rotation method was the most common means used by the IAs to allocate and distribute water. The farmers received water according to the schedule assigned to each sector or this could be varied depending on the practises used by the IA. Water distribution took place under the supervision of the Head of the IA.

Almost (93%) of the IA officers mentioned that they encountered problems with water distribution. These normally occurred during the dry season because of an inadequate water supply. Some of the problems encountered by the respondents were: poor irrigation facilities, conflicts in water scheduling, favouritism and insufficient water availability during the dry season.

The results suggest that, in general, most respondents are not satisfied with the way water is distributed. This was probably because the members desired to have a continuous and abundant supply of water throughout the year, despite the limited

availability of water, particularly during the dry season. The lack of suitable alternative sources of water to meet the demands of farmers will restrict the opportunity to increase crop yields on some properties (e.g. in the Palaypay irrigation) and the potential to expand the area under irrigation. This suggests that systems to improve the efficiency of water utilisation need to be developed.

4.1.4 Payment of Irrigation Fee

The majority (66%) of the respondents reported that farmers paid an irrigation fee on the basis of both the number of crops grown and the area irrigated. The irrigation fees were set by the NIA and for 1995/1996 season this was equivalent to 2 cavans (more or less 80 kg) of rice (or its equivalent in cash) per hectare. Fees are collected in cash by IAs that have no crop storage facilities. The Head or officer of the Association was responsible for collecting fees. To avoid delinquent payments, the NIA encouraged IAs to provide incentives and awards/recognition for outstanding performance in amortisation collection/payments. These were widely used by the IAs.

4.1.5 Attendance of Meetings and Training Seminars

Three types of meeting were organised by the IAs in the study region: a meeting of the governing Board, a General Assembly and individual Sector Meetings. The Board Meeting was attended by the officers of the IA, while the General Assembly meeting was attended by both the officers of the IA and the farmer members. The Sector Meeting was held as needed, and involved farmers within the local sector (around 7 or 10 members). During the General Assembly and Board Meetings, operational issues such as activities to be undertaken by the IA, problems confronting the association, payment reminders, conflict resolution and reports were discussed. During the General Assembly officers of the IAs are elected.

The General Assembly meetings were critical for process of collective decision- making within the IA. The association meetings were well attended by members, although half of the respondents only met annually and one-third met twice in a year. The Board of Directors (BOD) meeting were supposed to be held every month, but only four (27%) of

the respondents mentioned that their association met this regularly while the other associations met between two and eight times per year. The farmers' hectic schedule of agricultural activities was cited as the primary reason for not meeting on a monthly basis. The BOD members were relatively better educated and financially well-off compared the 'typical' farmers and thus, they could influence decision-making within the IA. Sector Meeting were only held if the members encountered problems within the local community. Three-fifths of the respondents attended half of the meetings of the association.

All of the respondents reported that their association had conducted training sessions and seminars for their farmer members as and when needed. Topics covered included irrigation management, financial management, group dynamics and leadership development. In addition to meetings and training seminars, group discussions and dialogue with *barangay* officials or NIA-IDO staff provided other avenues through which members could express their concerns about the management of their irrigation system.

4.1.6 Conflict Management and Resolution

In the sample IAs, 87% of the respondents agreed that water distribution and water stealing were major problems. A number of the respondents also mentioned that conflict occurred between the IA officers and the farmers. As mentioned earlier, the Head or an officer of the Association or officers was responsible for supervising water distribution, but this did not prevent favouritism and conflict in water scheduling. Other causes of conflicts were: collection of irrigation fees, attendance of meetings and diversion of unscheduled water distribution.

All IAs had a Complaints Committee which was responsible for taking action on a complaint or grievance by one member against another. The committee established procedures whereby complaints could be promptly investigated and acted upon. Half of the respondents mentioned that "IA O & M policies were observed" as one of the methods used to resolve conflict amongst members. The remaining respondents

contended that the appeal process, intervention by IA officers and farmer education were the main methods used to help resolve conflict amongst association members.

4.1.7 Problems of the Irrigator Associations

The most persistent problem experienced by the IAs were water shortages during the dry season. This led to the stealing of the water by some farmers. Other problems identified by the respondents were difficulty in collecting fees, typhoon damage to facilities and conflict amongst members especially during the dry season. One respondents mentioned that "most members lacked education in water use". Farmers themselves took a lead role in resolving these problems but were not always successful.

4.1.8 Future Membership and Benefits From IAs

The majority of the respondents (87%) believed that the IA would still be intact in 10 years time. When asked whether association membership was likely to increase in the next five years, 73% answered positively and 27% were not sure or answered "Don't know." The most likely explanation for this response is that farmers had experienced working with the association and were well aware of the benefits that a member could obtain.

Most of the respondents (93%) agreed that association membership motivated farmers to assume greater responsibility for irrigation management and likewise, the same percentage of respondents believed that being a member encouraged farmers to participate in key decisions for irrigation. Twenty-seven percent (27%) of the respondents strongly agreed that association membership also promoted collective ownership of the irrigation facilities and of these, six (40%) strongly agreed that it would lead to the expansion of the irrigation system. When asked whether being a member provided a means for farmers to increase their income, 53% answered "strongly agree" and 47% replied "agree." Overall, the respondents in the Iloilo Province perceived clear benefits arising from IA membership.

4.2 Individual Farmers

4.2.1 Characteristics of the Farmers

A total of 144 farmer members of four irrigator associations were interviewed: 36 farmers from the Siwaragan, Lipata, Palaypay and GIPA irrigation systems, respectively.

Table 1. Socio-demographic characteristics of the farmers associated with different irrigator associations in the Iloilo Province.

CHARACTERISTICS	Irrigator Association Siwaragan[1] N= 36	Lipata N= 36	Palaypay N= 36	GIPA N=36	All Sites N=144
1. Age (years)	52 (14)[2]	43 (11)	55 (11)	47 (8)	49 (12)
2. Sex	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Male	32 (89)	35 (97)	26 (72)	30 (83)	123 (85)
Female	4 (11)	1 (3)	10 (28)	6 (17)	21 (15)
3. Educational Attainment	6.5 (3.3)	6.4 (2.7)	9.4 (3.3)	8.1 (3.1)	7.6 (3.3)
4. No. of Children	3.5 (2.5)	(3.9) (2.8)	4.3 (2.1)	3.6 (1.6)	3.8 (2.3)
5. Percent Income from Rice Farming	64 (21)	95 (8)	93 (12)	79 (20)	83 (20)

[1] Siwaragan, Lipata, Palaypay and GIPA are the names of the irrigation systems within each municipality selected for the survey.

[2] Figures in parentheses underneath the mean values are the standard deviation.

Farmer Age

The average age of the farmers in the associations ranged from 43 to 55 years with an overall mean of 49 years (Table 1). Farmers involved with the Siwaragan and Palaypay systems were relatively older than those from the other two systems. Proportionately more respondents were in older age groups in the GIPA systems compared to the respondents from the other systems (Table 2). However, nearly one-fifth of the

respondents from Lipata were less than 30 years of age compared to less than 1.5% from the other three systems. Women accounted for one-fifth of the total farmer respondents. Proportionately more women (28%) from the Palaypay system than the other systems participated in irrigation-related activities.

Table 2. Age distribution of the farmer members of four irrigator associations in the Iloilo Province.

AGE	Irrigator Association				
	Siwaragan	Lipata	Palaypay	GIPA	All Sites
(Years)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
22-30	0 (0)	7 (19)	1 (1)	0 (0)	8 (6)
31-40	7 (19)	10 (28)	2 (6)	10 (28)	29 (20)
41-50	13 (36)	9 (25)	8 (22)	13 (36)	3 (30)
51-60	6 (17)	10 (28)	12 (33)	11 (31)	39 (27)
over 60	10 (28)	0 (0)	13 (36)	2 (6)	25 (17)
Mean (years)	52	43	55	47	49
Std. dev.	14	11	10	8	12

Education

An average respondent had nearly eight years of schooling, but the educational attainment of respondents was relatively higher for the Palaypay and GIPA members than for the other two systems (Table 1). However, significant variation across the four associations was observed with respect to the educational level of the respondents. In general, the Lipata respondents were relatively less educated and the Palaypay farmers were more educated than the members surveyed from the other systems. One in five respondents in Palaypay had attained a college level education (Table 3).

Table 3. Education (years of schooling) attained by farmer members of four irrigator associations in the Iloilo Province.

EDUCATIONAL ATTAINMENT	Siwaragan		Lipata		Palaypay		GIPA		All Sites	
(Years)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Primary (1-4)[1]	14	(39)	13	(36)	0	(0)	7	(19)	34	(24)
Intermediate (5-6)	9	(25)	11	(31)	11	(31)	9	(25)	40	(28)
High School (7-10)	10	(28)	8	(22)	10	(28)	14	(39)	49	(34)
College (11-14)	3	(8)	4	(11)	8	(22)	6	(17)	21	(15)
Mean (years)	6.5		6.4		9.4		8.1		7.6	
Std. dev.	3.3		2.7		3.3		3.1		3.3	

[1] Years of schooling i.e. Primary comprises the first four years; typically 7 to 10 years of age.

Number of Children

The respondents on average had 3.8 children per household. The Palaypay respondents had proportionately more children (4.3) per household than those from the other systems (Table 1). Table 4 indicates that none of the GIPA members were without a child while more than half of the respondents in Palaypay had five or more children. More than three fifths of the respondents had three or more children across all of the associations.

Income from Rice Farming

Rice farming alone provided more than four-fifths of the total household income in the study area (Table 1). In fact, most respondents depended on rice farming as their major source of household income. The Lipata, GIPA and Palaypay respondents were proportionately more dependent on income from rice farming than those associated with the Siwaragan system (Table 5). The Siwaragan system was different from the other three systems because of its proximity to the fishing centre in the southern part of the Iloilo Province (Map 1). Consequently, many of the respondents could generate off-farm income from fish-related activities. Poultry, hog raising, cattle fattening and vegetable production were major sources of non-rice income for the GIPA farms.

Table 4. Number of children per household for four irrigator associations in the Iloilo Province.

CHILDREN	Siwaragan		Lipata		Palaypay		GIPA		All Sites	
(Number)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
No children (0)	5	(14)	7	(19)	3	(8)	0	(0)	15	(10)
Children (1-2)	9	(25)	3	(8)	3	(8)	10	(28)	25	(17)
Children (3-4)	11	(31)	11	(31)	10	(28)	16	(44)	48	(33)
5 or more	11	(31)	15	(42)	20	(56)	10	(28)	56	(39)
Mean	3.5		3.9		4.3		3.6		3.8	
Std. dev.	32.5		2.8		2.1		1.6		2.3	

Table 5. Percentage of total household income derived from rice farming for four irrigator associations in the Iloilo Province.

RICE FARMING INCOME	Siwaragan		Lipata		Palaypay		GIPA		All Sites	
(Percentage)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
22- 50	16	(44)	0	(0)	0	(0)	5	(14)	21	(16)
51-75	10	(28)	1	(3)	4	(11)	5	(14)	20	(14)
76-99	5	(14)	12	(33)	9	(25)	18	(50)	44	(31)
100%	5	(14)	23	(64)	23	(64)	8	(22)	59	(41)
Mean	64		95		93		79		83	
Std. dev.	21		8		12		20		20	

4.2.2 Farm Characteristics

Total farm area

The mean area farmed was markedly different between the four systems and ranged from 0.25 ha in the Lipata system to 2.44 ha in Palaypay area (Table 6). In Palaypay, more than two-fifths of the farms were over 2 ha (Table 7), but fewer than 6% of the farms from the other systems were in this size category. On the other hand, four-fifths of the farms in Lipata and half of the farms in Siwaragan were 0.5 ha or smaller. Within the GIPA system nearly two-fifths of the farms were between 0.6 and 1.0 ha.

Table 6. Farm size, accessibility to irrigation systems and adequacy of water for irrigator association within the Iloilo Province.

	Irrigation System				
Characteristics	Siwaragan	Lipata	Palaypay	GIPA	All Sites
1. Total farm area (ha)	0.68 (0.78)[1]	0.25 (0.56)	2.44 (2.29)	0.91 (0.54)	1.07 (1.51)
2. Distance from the main water source (travel time in minutes)	135 (65)	33 (24)	88 (51)	23 (7)	69 (62)
3. Distance from the main canal (travel time in minutes)	86 (50)	19 (10)	30 (32)	11 (7)	37 (42)
4. Distance from the branch canal (travel time in minutes)	31 (19)	9 (6)	13 (14)	6 (6)	15 (16)
5. Distance from the homestead (travel time in minutes)	27 (16)	18 (14)	37 (26)	25 (18)	27 (20)
6. Adequate water availability for rice (% respondents reporting)					
Adequate/moderately adequate	92	100	58	97	87

[1] Figures in parentheses underneath the mean values are the standard deviation.

Table 7. The proportion of land owned (by different size categories) within four irrigator associations in the Iloilo Province.

TOTAL FARM AREA	Siwaragan		Lipata		Palaypay		GIPA		All Sites	
(Hectares)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
< 0.5	19	(53)	29	(81)	1	(3)	11	(31)	60	(42)
0.6 - 1.0	9	(25)	5	(14)	8	(22)	14	(39)	36	(25)
1.1 - 2.0	6	(17)	1	(3)	11	(31)	10	(28)	28	(19)
> 2.0	2	(6)	1	(3)	16	(44)	1	(3)	20	(14)
Mean (hectares)	0.68		0.25		2.44		0.91		1.07	
Std. dev.	0.78		0.56		2.29		0.54		1.51	

Proximity to the main water source

Farms in the Siwaragan were farthest from the main water source (135 minutes of travel time). Respondents from the Palaypay system took nearly one and a half hours to reach the main water source (Table 6), while farms in the GIPA and Lipata systems were only 23 and 33 minutes, respectively, from the main water source (Table 8). The GIPA system farmers had the least variation in travel time to the main water course.

Proximity to the main canal

The farms served by the Siwaragan system were the farthest (86 minutes) from the main canal (Table 6). The farms served by the GIPA and Lipata systems were relatively nearer to the main canal than the farms in the Palaypay and Siwaragan systems. None of the farms in the GIPA association were more than half an hour away, while more than 90% of the farms in the Siwaragan association were more than 30 minutes, from the main canal (Table 8).

Table 8. Proximity of the farms (walking time) to the main water source or main canal for four irrigator associations in the Iloilo Province.

TRAVEL TIME	Siwaragan		Lipata		Palaypay		GIPA		All Sites	
(Minutes)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
0 -20 Main water source	2	(6)	16	(44)	3	(8)	14	(39)	35	(24)
Main canal	3	(8)	24	(67)	17	(47)	32	(89)	76	(53)
21-30 Main water source	0	(0)	8	(22)	2	(3)	21	(58)	31	(22)
Main canal	0	(0)	10	(28)	9	(25)	4	(11)	23	(16)
31-60 Main water source	2	(6)	10	(28)	12	(33)	1	(3)	25	(17)
Main canal	12	(33)	2	(56)	8	(22)	0	(0)	22	(15)
61-120 Main water source	14	(39)	2	(6)	11	(8)	0	(0)	27	(19)
Main canal	14	(39)	0	(0)	1	(3)	0	(0)	15	(10)
120- up Main water source	18	(50)	0	(0)	8	(22)	0	(0)	26	(18)
Main canal	7	(19)	0	(0)	1	(3)	0	(0)	8	(6)
Mean (minutes) Main water	135		33		88		23		69	
Std. dev.	65		24		51		7		62	
Mean (minutes) Main canal	86		19		30		11		37	
Std. dev.	50		10		32		7		42	

Proximity to a branch canal

All of the farms in the GIPA association and most of the farms in the Lipata and Palaypay associations were within 20 minutes of a branch canal (Table 9). However, in the Siwaragan system, nearly three-fifths of the farmers could access a branch canal within half an hour. Variation in travel time to the branch canals between the farms in the four associations was small.

Proximity to the homestead

The respondents expressed no problems in reaching their farm from the homestead. The average time from the homestead to the farm was 37 minutes (Table 9). However, the Palaypay association farms were relatively farther from the homestead than those in the

other three associations. Eight farmers lived two hours or longer from their cultivated land.

Table 9. Proximity of farms (walking time) to the branch canal or homestead for four irrigator associations in the Iloilo Province.

TRAVEL TIME		Siwaragan	Lipata	Palaypay	GIPA	All Sites
(Minutes)		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
0 - 20	Branch canal	12 (33)	35 (97)	31 (86)	36 (100)	114 (79)
	Homestead	16 (44)	26 (72)	16 (44)	19 (53)	77 (53)
21 - 30	Branch canal	9 (25)	1 (3)	4 (11)	0 (0)	14 (10)
	Homestead	11 (31)	6 (17)	3 (8)	9 (25)	29 (20)
31 - up	Branch canal	15 (42)	0 (0)	1 (3)	0 (0)	16 (11)
	Homestead	9 (25)	4 (11)	17 (47)	8 (22)	38 (26)
Mean (minutes) Branch canal		31	9	13	6	15
Std. dev.		19	6	14	6	16
Mean (minutes) Homestead		27	18	37	25	27
Std. dev.		16	14	26	18	20

Water availability

Farms farthest from the main water source (i.e. those in the Siwaragan system) in terms of either the main or branch canal, were not necessarily short of water. It is important to note, however, that although farms in the Lipata association were not markedly nearer to a water source than those in the GIPA, all respondents reported that irrigation water was adequate (Table 10). On the contrary, although distance (in travel time) from the main canal in Palaypay was roughly three times closer than in Siwaragan, 58% of the respondents experienced an inadequate supply of irrigation water. These findings, suggests that there are management and water distribution problems in the Palaypay system which require further investigation.

Table 10. Adequacy of irrigation water supplied from four irrigator associations within the Iloilo Province.

Water availability	Siwaragan	Lipata	Palaypay	GIPA	All Sites
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Inadequate (0)	3 (8)	0 (0)	21 (58)	1 (3)	25 (17)
Adequate/More (1) than adequate	33 (92)	36 (100)	15 (42)	35 (97)	119 (83)
Mean	0.92[1]	1.00	0.42	0.97	0.83
Std. dev.	0.28	0	0.50	0.17	0.24

[1] Mean score were inadequate = 0 and adequate (or better) = 1.

4.2.3 Farmer Participation in Irrigation Systems

Farmer participation in irrigation-related activities included: planning stage, construction (contribution to labour, financies and material), repairs and maintenance (cleaning, repairs to structures and materials), attendance of meetings, participation in resolving conflicts arising from the operation and use of the irrigation system and that related to involvement in water supervision (Table 11).

Planning

Farmers in all the four IAs reported being involved during the planning stage of the system. This started from the time of the initial decision on whether or not an irrigation systems should be built in their area. It should be noted, however, that farmers in all IAs participated even though, the now defunct Farm System Development Corporation (FSDC), as part of its overall program to bring irrigation to rainfed farms through the establishment of communal irrigation systems, played a very important role together with NIA in the establishment of the four systems studied. The participation in planning by the respondent was "high" or "very high" in the Siwaragan and Palaypay (89%), while it was very low in the other two systems (Table 12). The main reason why GIPA and Lipata respondents had a very low level of participation appeared to be because of

the smaller farm size and the greater distance from the main water source, and the main and branch canals and their homestead (Tables 8 & 9) in these irrigation systems compared to the Siwaragan and Palaypay associations.

Table 11. Farmer participation in irrigation system activities for four irrigator associations within the Iloilo Province.

ITEM	Siwaragan	Lipata	Palaypay	GIPA	All Sites
1. Participation in: (% respondents reporting)					
a. Planning	89 (32)[1]	6 (23)	89 (32)	11 (32)	49 (50)
b. Construction					
Labour	83 (38)	3 (17)	39 (49)	36 (49)	40 (49)
Financial	67 (48)	0 (0)	0 (0)	3 (17)	17 (38)
Materials	11 (32)	0 (0)	0 (0)	3 (17)	3 (18)
c. Repairs and maintenance					
Cleaning	81 (40)	8 (28)	50 (51)	42 (50)	45 (50)
Repairs to structures	75 (44)	3 (17)	28 (45)	14 (35)	30 (46)
Providing materials	14 (35)	0 (0)	0 (0)	3 (17)	4 (20)
d. Resolving conflict					
With fellow members	92 (28)	0 (0)	33 (48)	11 (32)	34 (48)
With officers of IA	86 (35)	0 (0)	92 (28)	8 (28)	47 (50)
With NIA/DA personnel	13 (35)	0 (0)	8 (28)	6 (23)	7 (26)
2. Attendance of meetings (No. of meetings attended in a year)	2.00 (0.41)	1.00 (0)	7.33 (2.10)	1.56 (2.16)	2.97 (2.96)
3. Water supervision (% of respondents reporting)					
Individual farmer	97	100	0	0	49
Head and officer	3	0	100	100	51

[1] Figures in parentheses are standard deviations.

Table 12. Farmer participation in the irrigation system at the planning stage for four irrigator associations in the Iloilo Province.

LEVEL OF PARTICIPATION	Siwaragan	Lipata	Palaypay	GIPA	All sites
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
No Participation/ Low/Moderate (0)	4 (11)	34 (94)	4 (11)	32 (89)	74 (51)
High/Very high (1)	32 (89)	2 (6)	32 (89)	4 (11)	70 (49)
Mean	0.89[1]	0.06	0.89	0.11	0.48
Std. dev.	0.32	0.23	0.32	0.32	0.50

[1] Mean score were inadequate = 0 and adequate (or better) = 1.

Construction of irrigation system

Farmers as a group worked together for the common benefit of the association. By pooling their resources they had accomplished much more than would have been possible by the individual efforts of farmers. Table 11 indicates that farmers in all four associations contributed labour, cash and/or materials. It is worth noting that respondents in Siwaragan were quite active in terms of their labour and financial contribution and less active with respect to providing materials for the construction of the irrigation system. However, none of the respondents in Lipata and Palaypay had a "high" or "very high" contribution in terms of cash or in kind to their local irrigation system. Only 3% and 39% of the respondents from these irrigation systems, respectively, contributed their labour (Table 13). The participation by the respondents involved in the GIPA association was similar (35%) in terms of their financial and material contribution. Furthermore, farmers in the Lipata, Palaypay and GIPA associations had to some extent participated in all three of the construction-related activities.

Table 13. Farmer participation in the irrigation system at the construction stage for four irrigator associations in the Iloilo Province.

CONTRIBUTION	Siwaragan	Lipata	Palaypay	GIPA	All sites
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
A. Labour					
VeryLow/Low/Moderate (0)	6 (17)	35 (97)	22 (61)	23 (64)	86 (60)
High/Very high (1)	30 (83)	1 (3)	14 (39)	13 (36)	58 (40)
Mean	0.83	0.03	0.39	0.36	0.40
Std. dev.	0.38	0.17	0.49	0.49	0.49
B. Financial					
VeryLow/Low/Moderate (0)	12 (33)	36 (100)	36 (100)	35 (97)	119 (83)
High/Very high (1)	24 (67)	0	0	1 (3)	25 (17)
Mean	0.67	0	0	0.28	0.17
Std.dev.	0.48	0	0	0.17	0.38
C. Materials					
VeryLow/Low/Moderate (0)	32 (89)	36 (100)	36 (100)	35 (24)	139 (97)
High/Very high (1)	4 (11)	0	0	1 (3)	5 (3)
Mean	0.11	0	0	0.28	0.03
Std. dev.	0.32	0	0	0.17	0.18

Repairs and maintenance

The involvement of the Siwaragan respondents was either "high" or "very high" with respect to the cleaning of canals and undertaking structural repairs. However, their contribution in the form of materials for repairs was low. Only one in seven respondents was highly involved in contributing materials (Table 14). The involvement of the respondents in the Lipata association in terms of repairs and maintenance activities was "low" to "moderate." On the other hand, half of the respondents in Palaypay were actively involved in cleaning activities and nearly one-fifth participated in repairs to the structures. None of the respondents reported his/her participation to be "high" or "very high" in providing materials. In the GIPA association, less than half of the respondents rated their participation as being "high" or "very high" in terms of cleaning the irrigation system.

Table 14. Involvement of the respondents in the repairs and maintenance of irrigator associations for four irrigation systems in the Iloilo Province.

TYPE OF ACTIVITY	Siwaragan	Lipata	Palaypay	GIPA	All sites
A. Cleaning	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
No participation/Verylow/ Low/Moderate (0)	7 (19)	33 (92)	18 (50)	21 (58)	79 (55)
High/Very high (1)	29 (81)	3 (8)	18 (50)	15 (42)	65 (45)
Mean	0.81	0.08	0.50	0.42	0.45
Std. dev.	0.40	0.28	0.51	0.50	0.50
B. Repairs to structure					
No participation/Verylow/ Low/Moderate (0)	9 (25)	35 (97)	26 (72)	31 (86)	101 (70)
High/Very high (1)	27 (75)	1 (3)	10 (28)	5 (14)	43 (30)
Mean	0.75	0.03	0.28	0.14	0.30
Std. dev.	0.44	0.17	0.45	0.35	0.46
C. Providing Materials					
No participation/Verylow/ Low/Moderate (0)	31 (86)	36 (100)	36 (100)	35 (97)	138 (96)
High/Very high (1)	5 (14)	0	0	1 (3)	6 (4)
Mean	0.14	0	0	0.03	0.04
Std. dev.	0.35	0	0	0.17	0.20

Resolving conflict

Respondents in all four of the IAs experienced conflicts amongst farmers, between farmers and officers, and farmers and NIA/DA personnel. More respondents from the Siwaragan system had been involved in resolving conflicts amongst members (92%) and officers of the IA (86%), while 14% of the respondents rated their participation as being "high" or "very high" in resolving conflicts with NIA/DA personnel. None of the respondents in Lipata had "high" or "very high" participation in conflict resolution (Table 15). The Palaypay and GIPA respondents played a "low" to "moderate" role in

resolving conflicts amongst farmers and with the NIA/DA personnel. However, the Palaypay system respondents' participation in resolving conflicts involving IA officers was either "high" or "very high" compared to those from the GIPA system. Amongst the four irrigation systems, the Siwaragan system members were most active in resolving conflicts amongst farmers and officers of the IA. This may have been due to the proximity of their farms to the water supply (main water source, main canal and branch canal; see Tables 8 & 9). Water allocation was the most common conflict encountered by the respondents (Table 10).

Table 15. Farmer participation in resolving conflict for four irrigator associations in the Iloilo Province.

CONFLICT WITH:	Siwaragan	Lipata	Palaypay	GIPA	All sites
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
A. Members					
No participation/Verylow/ Low/Moderate (0)	3 (8)	36 (100)	24 (67)	32 (89)	95 (66)
High/Very high (1)	33 (92)	0	12 (33)	4 (11)	49 (34)
Mean	0.92	0	0.33	0.11	0.34
Std. dev.	0.28	0	0.48	0.32	0.48
B. Officers of Irrigators Asso.					
No participation/Verylow/ Low/Moderate (0)	5 (14)	36 (100)	3 (8)	33 (92)	77 (53)
High/Very high (1)	31 (86)	0	33 (92)	3 (8)	67 (47)
Mean	0.86	0	0.92	0.08	0.47
Std. dev.	0.35	0	0.28	0.28	0.50
C. NIA/DA Personnel					
No participation/Verylow/ Low/Moderate (0)	31 (86)	36 (100)	33 (92)	34 (94)	134 (93)
High/Very high (1)	5 (14)	0	3 (8)	2 (6)	10 (7)
Mean	0.14	0	0.08	0.06	0.07
Std. dev.	0.35	0	0.28	0.23	0.26

Attendance in meetings

All respondents in the Lipata system reported that they had attended at least one meeting in the past year (Table 16), which implies, that the General Assembly meeting was attended by all of the respondents. Notably, no farmer was an officer of the association and none never attended any emergency meetings. In the case of the Siwaragan and GIPA systems, some members either attended Board of Directors (BOD) or Sectoral meetings, and thus, farmer attendance varied from one to five meetings per year. Farmers in the Palaypay system were most active in attending meetings and these comprised a combination of the General Assembly, BOD and Sectoral meetings. Sectoral meetings were conducted as and when required.

Table 16. Farmer attendance of association meetings in the past 12 months for four irrigator associations in the Iloilo Province.

ATTENDANCE OF:	Siwaragan	Lipata	Palaypay	GIPA	All sites
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
0 - 1 meetings (1)	1 (3)	36 (100)	0	29 (81)	66 (46)
2 - 5 meetings (2)	35 (97)	0	8 (22)	6 (17)	49 (34)
6 meetings or more (3)	0	0	28 (78)	1 (3)	29 (20)
Mean	2.00	1.00	7.33	1.56	2.97
S.D.	0.41	0	2.10	2.16	2.96

Water supervision

All respondents in the Palaypay and GIPA system claimed that it was the Head of the Association or an officer of the IA that supervised water distribution to local farmers. However, in Lipata and Siwaragan, water distribution was supervised by a "water tender" assigned to the area (Table 17). Thus, water supervision in an IA depended on whether the association had to employ a water tender or it could be carried out by an officer of the IA.

The extent of participation by the respondents was assessed by considering all of the activities mentioned earlier (i.e. planning the irrigation system, contribution to construction, involvement in repairs and maintenance, resolving conflicts and attending

meetings). In general, respondents from the Siwaragan and Palaypay associations were more active than those from the other two associations. Their participation was "high" to "very high" for irrigation activities such as planning of the irrigation system, labour and cash contribution during the construction stage, repairs and maintenance (cleaning of the canals, repairs to structures) and conflict resolution (amongst members and officers of IA). This supported the findings of Korten & Siy (1988) who claimed that the NIA encouraged the farmers' involvement from the very start of the project which include planning, constructing the structures, developing skills in resource mobilisation and conflict resolution that are needed for the effective operation and maintenance of the irrigation systems. Respondent participation in meetings, as reflected in the number of meetings they had attended per year, varied according to the needs of the association.

Table 17. Supervision of water amongst farmers associated with an irrigator association in the Iloilo Province.

WATER SUPERVISION	Siwaragan	Lipata	Palaypay	GIPA	All sites
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Water Tender (0)	35 (97)	36 (100)	0	0	71 (49)
Officer/Head of IA (1)	1 (3)	0	36 (100)	36 (100)	73 (51)

4.2.4 Farmer Attitudes About the Management of Irrigation Systems

Farmer attitudes about irrigation system management in terms of their involvement in planning, construction, payment of irrigation fees and attendance of the group meetings are summarised in Table 18. Most respondents expressed no hesitation that they should be involved during the planning stage of an irrigation system. Only one of the 36 respondents from Palaypay and six of the 36 respondents from the GIPA association were unsure about their role during the planning stage of an irrigation system. Almost all respondents (97%) "agreed" or "strongly agreed" that their involvement at the construction stage was important. This was consistent with the indication that respondent participation was "high" or "very high" in terms of their labour and cash

contribution in Siwaragan, although it was either "low" or "moderate" in Lipata (Table 13). Almost all respondents (96%) agreed that they should pay their irrigation fees promptly. Only six of 144 respondents (all from the GIPA system) were unsure or disagreed with this statement.

Table 18. Farmer attitudes about aspects of irrigator association management in the Iloilo Province.

ATTITUDE	Siwaragan	Lipata	Palaypay	GIPA	All sites
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
1. Farmers should be consulted during the planning stage.					
Agree/Strongly agree	36 (100)	36 (100)	35 (97)	30 (83)	137 (95)
Undecided/disagree	0	0	1 (3)	6 (17)	7 (5)
2. Farmers should help construct the system.					
Agree/Strongly agree	36 (100)	36 (100)	35 (97)	32 (89)	139 (97)
Undecided/disagree	0	0	1 (3)	4 (11)	5 (3)
3. Farmers should pay their irrigation fee promptly.					
Agree/Strongly agree	36 (100)	36 (100)	36 (100)	30 (83)	138 (96)
Undecided/Disagree	0	0	0	6 (17)	6 (4)
4. Farmers should attend group meetings regularly.					
Agree/Strongly agree	35 (97)	36 (100)	11 (31)	28 (78)	110 (76)
Undecided	1 (3)	0	25 (69)	8 (22)	34 (24)

All but one respondent in the Siwaragan and Lipata systems "agreed" or "strongly agreed" with the statement that they should attend meetings on a regular basis. However, there was a strong disagreement or uncertainty amongst the Palaypay respondents about this aspect of irrigation management. This may have been associated with their larger farm size (Table 6) and higher living standard compared to those farmers from the other systems. Slightly more than three fourths of the respondents in

GIPA "agreed" or "strongly agreed" that association meetings should be attended regularly.

4.3 Factors Associated with Farmer Participation In Irrigation-Related Activities

Four sets of factors were used in the study (see the conceptual framework outlined in Figure 1 in Chapter 3) and results have been presented in Tables 1, 6, 11 and 18. Pearson's correlation analysis was conducted to determine the degree of association between farmer and farm characteristics, and irrigation system management. In the following section the results of the statistically significant correlation coefficients in the bivariate analyses are discussed.

4.3.1 Association Between Management Factors and Socio-economic/ Demographic Characteristics

Table 19 indicates the association between management factors and socio-economic/demographic characteristics. Farmer participation in planning was negatively associated with the age ($r = -0.29$) and positively associated with household rice income ($r = 0.19$). The low correlation coefficients suggest a weak association between the pairs of variables examined. The respondents' gender, number of children and educational attainment did not influence their participation in irrigation planning activities. This results contradict Soltes' (1981) finding whichshowed a high correlation between knowledge and participation in irrigation activities. Younger respondents and households with a greater proportion of income from rice tended to participate more in planning activities.

Male respondents and those who belonged to a household with a higher proportion of household income from rice farming, contributed both labour and cash to their local irrigation system. More educated respondents contributed cash, while those with a lower income tended instead to contribute materials.

Table 19. Association between management factors and key socio-economic and demographic characteristics (Pearson's correlation coefficients).

Management factor	Socio-economic and demographic factors				
	Age	Sex	No. of children	Educational Attainment	House-hold Income
Participation in:					
1. **Planning**	-0.29**[1]	0.03	-0.08	-0.13	0.19**
2. **Construction** (contribution)					
Labour	-0.09	-0.22**	0.06	0.01	0.30**
Financial	-0.06	-0.19*	0.11	0.15+	0.37**
Materials	-0.06	0.08	-0.10	-0.11	-0.17*
3. **Repair & maintenance**					
Cleaning	-0.16*	-0.22**	-0.08	0.10	0.18*
Repair to structure	-0.07	-0.14+	0.02	0.06	0.35**
Providing materials	-0.14+	0.01	0.09	0.05	0.24**
4. **Resolving conflicts**					
Members	-0.24**	0.04	0.01	0.02	0.38**
Officers of IA	-0.29**	0.01	-0.02	-0.11	0.14+
NIA/DA personnel	-0.05	0.04	-0.02	0.02	0.14+
5. **Attendance at meetings**	0.29**	-0.25**	0.13	0.30**	0.19*
6. **Water supervision**	0.14	-0.21	0.07	0.36**	0.14+

[1] Levels of significance: + $P < 0.10$, * $P < 0.05$, ** $P < 0.01$.

The households with a higher proportion of income from rice farming were also actively involved in carrying out repairs and maintenance to the irrigation system. Male respondents were more actively engaged in repairs to structures. Furthermore, there is an indication that younger male respondents were involved in cleaning and the provision of materials for repairs and maintenance.

Conflicts were resolved by the respondents from the household generating a higher proportion of income from rice farming. Conflicts, more specifically with members and officers of the IA, were resolved by younger respondents. The greater participation of younger respondents in resolving conflicts maybe associated with their ability to negotiate and convince the parties involved.

Older men respondents attended most of the meetings, and as did the more educated and members of households with a higher proportion of income from rice farming. The respondents with a higher proportion of household income from rice farming and who were relatively more educated also influenced water supervision activities. This implies that respondent involvement in this irrigation activity is dependent on their education and share of household income derived from rice farming. This finding agrees with the study of Olano (1981), who noted that the level of participation in irrigation activities was related to one's education.

4.3.2 Association Between Management and Physical Factors

Respondent participation in planning was negatively associated with farm size (r=-0.36), distance from the main water source (r=-0.62), distance from the main canal (r=-0.47), and distance from the branch canal (r=-0.40) (Table 20). Among the physical factors considered, only distance from the homestead did not influence respondent participation in the planning of the irrigation system. The respondents who had smaller farms and who were located farther away from the water source, tended to participate more actively in the planning activities for the irrigation system. This finding seems to contradict the results of Alicante (1991) who indicated that the owners of larger farms tended to participate more actively in tasks related to the project than those who had smaller farms.

The respondents whose farm was far from the main water source, main canal and branch canal tended to be more active contributors of labour, cash and materials during the construction of the irrigation system and also to repairs and maintenance activities. Likewise, respondents with larger farms took part in the cleaning activities of the irrigation as well.

Table 20. Association between management factors and physical factors in the Iloilo Province (Pearson's correlation coefficient).

Management Factor	Physical Factors					
	Farm size	Water Availability	Distance from Main water source	Distance from Main canal	Distance from Branch canal	Distance from Homestea
Participation in:						
1. **Planning**	-0.36**	0.29**	-0.62**	-0.47**	-0.40**	-0.11
2. **Construction**						
Labour	0.02	0.03	-0.39**	-0.39**	-0.36**	-0.05
Financial	0.08	-0.11	-0.51**	-0.58**	-0.53**	-0.65
Materials	0.03	-0.09	-0.26**	-0.31**	-0.21*	0.05
3. **Repair & Maintenance**						
Cleaning	0.15+	-0.01	-0.30**	-0.31**	-0.30**	-0.03
Repair to structure	0.06	-0.02	-0.37**	-0.36**	-0.35**	-0.01
Providing materials	0.06	-0.10	-0.21*	-0.24**	-0.24**	-0.04
4. **Resolving conflicts**						
Members	-0.12	0.10	-0.56**	-0.60**	-0.53**	-0.22**
Officers of IA	-0.33**	0.38**	-0.60**	-0.48**	-0.39**	-0.26**
NIA/DA personnel	-0.10	0.09	-0.29**	-0.31**	-0.27**	-0.10
5. **Attendance at meetings**	0.45**	-0.58**	0.19*	-0.01	0.02	0.23**
6. **Water supervision**	0.40**	-0.34**	-0.22**	-0.38**	-0.31**	0.23**

[1] Levels of significance: + $P < 0.10$, * $P < 0.05$, ** $P < 0.01$.

Participation in terms of resolving conflict with officers of the IA, amongst members and with NIA/DA personnel were significantly related to the distance from the main water source, main canal, branch canal and homestead. Those respondents whose farm was far from the supply turnout were more active in resolving conflicts. This could be due to the fact that these farmers are more likely to be affected by problems with water availability and conflicts could arise and remain unsolved with respect to this.

Furthermore, respondents with larger farms and those close to the water turnout tended to participate actively in resolving conflicts with the officers of IA.

Respondents from larger farms and those that were far from the main water source and homestead were more active in attending meetings. Also, the greater the amount of water the respondents accessed, the more they attended meetings. The respondents were generally satisfied with the way water was distributed amongst the users. This is consistent with Alicante (1991) who suggested that the greater the benefit the respondents received, the more likely they were to participate in irrigation-related activities.

4.4 Factors Associated With Farmer Attitudes About Irrigation System Management

4.4.1 Association Between Socio-economic & Demographic and Attitudinal Factors

The strength of attitudes about factors such as, timely irrigation fee payment, regular attendance of meetings and consultation during the planning stage were significantly ($P < 0.05$ and $P < 0.10$) associated with farm income expressed as a proportion of total household income and age and education. Generally, and as could be expected, respondents with a higher share of rice farming income were positively associated with paying irrigation fees on time. Gender and the number of children per household had no bearing on the respondents' attitude about irrigation system management (Table 21).

4.4.2 Association Between Physical and Attitudinal Factors.

Farm size was positively associated with the farmers' perception of the timely payment of irrigation fees ($r=0.26$) and negatively associated with meeting attendance ($r=-0.43$) (Table 22). Water availability was positively associated with the respondent's attitude about system construction and irrigation payment, but negatively linked with meeting attendance.

Table 21. Association between key socio-economic and demographic characteristics and attitudinal factors (Pearson's correlation coefficients).

Socio-economic & demographic factors	**Attitudinal factors** [1]			
	Planning	Construction	Irrigation payment	Attending meetings
Age	-0.01	0.14	0.17*[2]	-0.20*
Sex	0.02	-0.06	-0.09	0.10
Educational attainment	0.08	0.12	0.17*	-0.13
No. of children	-0.07	-0.03	0.11	-0.12
Household income	-0.15+	-0.04	0.22**	-0.28**

[1] Attitudinal factors refers to the statements as: a) "Farmers should be consulted during the planning stage," b) "Farmers should help construct the system," c) "Farmers should pay their irrigation fee promptly," and d) "Farmers should attend group meetings regularly."

[2] Levels of significance: + $P < 0.10$, * $P < 0.05$, ** $P < 0.01$.

Table 22. Association between physical factors and attitudinal factors (Pearson's correlation coefficients).

Physical factors	**Attitudinal factors** [1]			
	Planning	Construction	Irrigation payment	Attending meetings
Farm size	0.01	0.07	0.26**	-0.43**
Water availability	-0.06	-0.26**	-0.47**	0.30**
Distance from main water source	0.09	0.07	0.15+	0-.01
Distance from main canal	0.08	-0.03	-0.06	0.12
Distance from branch canal	0.02	-0.05	-0.11	0.07
Distance from homestead	0.03	0.07	0.16+	-0.07

[1] Attitudinal factors refers to the statements as: a) "Farmers should be consulted during the planning stage," b) "Farmers should help construct the system," c) "Farmers should pay their irrigation fee promptly," and d) "Farmers should attend group meetings regularly."

[2] Levels of significance level: + $P < 0.10$, * $P < 0.05$, ** $P < 0.01$.

Respondents who accessed the largest volume of water were more likely to have a favourable attitude toward the irrigation system. Physical factors such as the distance of the farm from the main water source and the homestead were also found to have bearing on the respondent's attitude about the timing of irrigation fee payments.

4.5 Irrigated Rice Area Under Irrigation Systems of the Iloilo Province

Table 23 indicates the area in irrigated rice (hectares) owned by farmers from the four irrigation associations in the Iloilo Province. Overall, an average farm had 1.23 ha under irrigated rice. The respondents served by the Palaypay irrigation system had the largest (1.52 ha) irrigated rice area and GIPA had the smallest (0.92 ha). The irrigated rice area in Palaypay was on average 16% larger than that in Lipata, and 32% larger than that in Siwaragan. The mean irrigated rice area (ha) in GIPA was statistically greater ($P<0.05$) than in Lipata and Palaypay.

Table 23. Mean area (ha) in irrigated rice production (owned and leased land) for four different irrigation systems of Iloilo Province.

Irrigation systems	Rice area
Siwaragan	1.153 [A] (0.460)[1]
Lipata	1.311 [AB] (0.644)
Palaypay	1.517 [B] (0.979)
GIPA	0.922 [AC] (0.523)
Arithmetic Mean	1.226 (0.251)

[A, B, C] Mean values within columns with different letters are significant at $P < 0.05$.
[1] Figures in parentheses are the standard deviation.

4.6 Rice Yields for Different Irrigation Systems of Iloilo Province

The mean rice yield (kg/ha) for the different IAs is shown in Table 24. Amongst the four irrigation associations, GIPA farmers achieved the highest mean rice yield (6693 kg/ha) and Lipata had the lowest average yield (2908 kg/ha). The GIPA system respondents had significantly greater ($P<0.01$; more than twice) rice yields compared to the remaining respondents. However, rice yields in Siwaragan, Lipata and Palaypay were statistically similar.

Table 24. Mean rice yield (kg/ha) for different irrigation systems of Iloilo Province.

Irrigation systems	Rice yield (kg/ha)
Siwaragan	2946 [A] (1710)[1]
Lipata	2908 [A] (1485)
Palaypay	3230 [A] (986)
GIPA	6693 [B] (3007)
Arithemetic Mean	3944 (2502)

[A, B] Mean values within columns with different letters are significant at $P < 0.05$.
[1] Figures in parentheses are standard deviation.

4.7 Factors Associated With Irrigated Rice Area : Bivariate Results

Amongst the identified socio-economic and demographic factors, the percentage of household income from rice farming was the only factor significantly ($P<0.10$) associated with the irrigated rice area, although the degree of association was weak ($r=0.14$). There was no significant bivariate association between irrigated rice area and age, gender, educational attainment and number of children per household. Amongst the management factors, respondent participation in planning and attendance of IA meetings was significantly ($P<0.05$) associated with the area in irrigated rice.

Table 25. Association between irrigated rice area and key socio-economic/ demographic, management, attitudinal and physical attributes.

Socio-economic and demographic factors	**r**
Age	-0.03
Sex	0.06
Educational attainment	0.02
Number of children	0.00
Household income	0.14 +[1]
Management factors	
Planning	-0.25**
Construction	
Labour	0.08
Financial	0.04
Materials	0.06
Repair and maintenance	
Cleaning	-0.06
Structure	0.03
Providing materials	0.03
Resolving Conflicts	
Members	-0.10
Officers of IA	-0.13
NIA/DA personnel	-0.04
Attendance at meetings	0.19*
Water supervision	-0.02
Physical factors	
Farm size	0.67**
Water availability	-0.19*
Distance from main water source	0.20*
Distance from main canal	0.20*
Distance from branch canal	0.22**
Distance from homestead	0.20*
Attitudinal factors	
Planning	0.05
Construction	0.03
Irrigation payment	0.10
Attending meetings	-0.14

[1] Levels of significance: + $P < 0.10$, * $P < 0.05$, ** $P < 0.01$.

Of the physical factors considered in the study: farm size, travel time from the farm to the main water source, main canal, branch canal and homestead were positively associated with irrigated rice area. However, water availability was negatively associated with the area in irrigated rice (Table 25). Thus, physical factors proved to be a good determinant of the area in irrigated rice. There was no significant association

between positive attitudes and the area in irrigated rice in the study region. Farm size as could be expected, was most strongly correlated (r=0.67) with the area in irrigated rice.

4.8 Determinants of Irrigated Rice Area : Multivariate Regression Results

The conceptual framework (Figure1, Chapter 3), in combination with an assessment of the relationships indicated in the univariate and bivariate analysis, was used to formulate a multiple regression model to explain the area under irrigated rice, a proxy variable for participatory management. The variables included in the final model and associated results are presented in Table 26.

Table 26. Determinants of irrigated rice area in the Iloilo Province; coefficients for a multiple regression model.

	Parameter Estimate (t- statistics)
Intercept	0.5320
	(0.64)
Percent rice income in total household income	0.0047+[1]
	(1.97)
Total farm area	0.3610**
	(10.57)
Travelling time from farm to the main water source	0.0026+
	(1.78)
Travelling time from farm to the main canal	-0.0036
	(-1.43)
Travelling time of farm from the branch canal	0.0064
	(1.380)
Respondents participation in planning	0.1796
	(1.33)
Number of meetings the respondents attended in a year	-0.0194
	(-0.92)
Respondents participation in resolving conflict with officers of IA	-0.3320*
	(-2.39)
Respondents attitude in attending group meetings regularly	0.2563*
	(2.25)
Respondents experienced as water user	-0.0103
	(-1.25)
Respondents age as of the last birthday	-0.0410 †
	(-1.51)
Square age	0.0004 †
	(1.46)
Respondents gender	0.1582
	(1.26)
R-square	0.57
Adj R-square	0.53

[1] Levels of significance: † P < 0.15, + P < 0.10, * P < 0.05, ** P < 0.10.

The variables included in the model collectively explained 53% of the variation in the irrigated rice area. The results suggest that a 10 percent increase in household income from rice farming would increase the irrigated rice area by 0.05 ha and a one percent increase in the average farm size would result in a 0.4 ha increase in irrigated rice area. Proximity to the main water source was important in explaining the area in irrigated rice. The model provided contradictory evidence to the field results (Table 6) and suggest that farms further from main water source are likely to have a larger area under irrigated rice. No plausible reason for this was established.

Conflict resolution between the farmers and the IA officers by the respondents was most effective where farmers had a smaller area under irrigated rice possibly because they had fewer problems (Table 15 and 23). A positive view about regular attendance of IA meetings increased the likelihood of a larger area being under irrigated rice (i.e. these farmers have a "larger" stake in irrigation). A negative relationship between respondent age and irrigated rice area is suggested, and younger respondents tend to have a larger irrigated area than the older respondents.

The data do not support the statistical importance of proximity to the main and branch canals, participation in planning for the irrigation system, number of meetings the respondents attended in a year, the experience of respondents as water users and respondent's gender to the area in irrigated rice. This is inconsistent with the conceptual model outlined in Chapter 3 and suggests variables other than those measured through the questionnaire contribute to the level of farmer participation in the management activities of the IA.

4.9 Summary

In this Chapter the organisation and management of irrigation systems in Iloilo province has been outlined and the factors associated with farmer participation in irrigation-related activities have been described. Irrigated rice area was used as a proxy for participatory management. The percentage of household income from rice farming was

found to be associated with the area of irrigated rice and the physical factors showed to be a good determinant of area in irrigated rice.

In the next Chapter the study is a summarised and the conclusions drawn and recommendations for further research are presented.

Chapter 5 Summary, Conclusions and Recommendations

5.1 Summary

Like like many other developing countries, the Philippines has been actively involved in rural development activities. One of the major thrusts of the government in its rural development efforts has been the initiation of new irrigation projects and rehabilitation of existing systems. Today, participatory management has become a widely adopted policy for managing both small and large irrigation systems in south and southeast Asia. Farmer organisations in the form of irrigator associations seek to increase the capacity of farmers to participate in the decision-making processes and to encourage their involvement in the lay-out and design of the new canals and structures. This allows their knowledge of the local area and their desires to be incorporated into construction plans. The current government emphasis on small irrigation projects, means performance parameters are needed to describe the overall management efficiency, group dynamics and extent of farmer participation in irrigation projects. This study was conducted to assess the impact of farmer-managed irrigation systems on the socio-economic conditions of rural people in the Iloilo province of the Philippines. The primary focus was on small-scale irrigation systems.

The Iloilo Province, one of the leading rice-producing provinces in the country, was selected as the study area. Two levels of respondents were interviewed: representatives of the IAs and a sample of their farmer members. Four IAs were randomly selected from amongst the 31 operational communal irrigation systems in the Iloilo Province and 36 farmers from each IA were also chosen by random selection. The irrigation systems selected for the study represented the different municipalities and 15 irrigator associations. All of the irrigation systems were organised by the NIA-IPIO in collaboration with the FSDC and IDO assigned to the province.

Data were gathered through personal interviews utilising an interview schedule. All of the 15 IAs and 144 farmer-members of the four associations (named: Siwaragan, Lipata, Palaypay and GIPA) were interviewed. Data collected from the IAs in relation to the organisation and management of irrigation systems in the Iloilo province, the association's involvement in the repairs and maintenance, water allocation and distribution, payment of irrigation fees, attendance of meetings and training seminars, conflict management and resolution, problems faced by the association, and future membership and benefits from IAs. The farmer survey focussed on them as individuals and their farm characteristics, their participation in irrigation activities and the inter-relationships amongst various factors associated with the management of irrigation in the Iloilo province. These data were tabulated, coded and entered into the spreadsheet for analysis using the SAS computing package. Data analysis was subjected to descriptive statistics, cross tabulation and regression analysis. Pearson's correlation coefficient was employed to determine the association between the variables included in the study.

Irrigator Associations

The IAs were organised by the National Irrigation Administration-Iloilo Provincial Irrigation Office (NIA-IPIO), in collaboration with the defunct Farm System Development Corporation (FSDC), and Irrigators' Development Officers (IDO). The majority of the operational CIS had been rehabilitated and had been active since their establishment. Almost (93%) of the respondents had been involved during the planning stage of the irrigation system and performed a variety of tasks. All of the members contributed labour and materials to maintain their systems. In the sample IAs, 86% of the respondents claimed that the Head or an Officer of the association was responsible for ensuring that the irrigation facilities were maintained. A *dagyao* was called for the maintenance of the canals. Thus, participation in these irrigation activities by the association members was very high. This level of activity has been sustained over the life of the association.

Water distribution was under the supervision of the Head or an Officers of the IA. Almost (93%) of the IA officers mentioned that they had encountered problems with

water distribution. This was normally during dry a season because of an inadequate water supply. The majority (66%) of the farmers paid their irrigation fee on the basis of both the number of crops grown and the area irrigated. The association meetings were well attended. However, the BOD members were better educated and financially well-off compared to the 'typical' farmer and thus, they had a proportionately greater influence on decision-making within the IA. Training sessions and seminars were only conducted as and when needed. This seems very inadequate considering the large number of farmers from each association that potentially could participate. Most conflicts occurred between the IA officers and the farmers regarding water distribution. Water stealing was the major problem. All IAs had a Complaints Committee which was responsible for taking action on a complaint or grievance by one member against another. These worked satisfactorily. The most persistent problem experienced by the IAs were water shortages during the dry season, difficulty in collecting fees, typhoon damage to facilities and conflict amongst members. The majority of the respondents (87%) believed that the IA would still be intact in 10 years time and most (93%) respondents agreed that association membership motivated farmers to assume greater responsibility for irrigation management.

Farmer survey

The average age of the farmers in all four irrigation systems was 49 years. Generally, they had nearly eight years of schooling (second year high school). The average household had about four children. Most of the respondents (83%) depended on rice farming as their major source of income except in the Siwaragan Association where off-farm income was commonly derived from fish-related activities. Irrigation to assure high crop yields and multiple crops per year is critical to the livelihhod of the farmers. The effective management of irrigation structures and water distribution is therefore a fundamental element of maintaining the farming community.

Generally, farms were small (1.07 ha). Farms in Palaypay, however, were relatively large (2.44 ha) compared to those from the other three systems. Farms in GIPA were nearer, in terms of walking time, to the main water source (23 minutes), main canal (11 minutes) and branch canal (6 minutes). Water insufficiency was not a problem for

farmers except for some of the Palaypay members. This maybe due to the larger size of the Palaypay farms which meant that not all of each farm could be allocated with water.

Farmers in the Siwaragan and Palaypay Associations were most active in irrigation-related activities. Their participation during the planning stage, repairs and maintenance and in resolving conflicts was greater than that by their counterparts in the Lipata and GIPA systems. Farmers in all the four systems experienced conflict with other members, officers of the IA and NIA/DA personnel. Attendance at meetings differed between the irrigator associations. Virtually all farmers attended the General Assembly and some attended BOD meetings. All respondents in the Lipata system reported to have attended at least one meeting in the past year, but farmers in the Palaypay system were more active in attending the General Assembly, and the BOD and Sectoral meetings. Water supervision was done by both the Head of the Association or an Officer of the IA and a "water tender" assigned to the area.

Most of the respondents "agreed" or "strongly agreed" that their involvement during the planning and construction stages and prompt payment of irrigation fees was important. On the other hand, in terms of the statement whether farmers should attend meetings on a regular basis, only the Palaypay respondents were uncertain about this.

The association between management factors and socio-economic/demographic characteristics indicated that only age and household income were negatively and positively associated respectively, with farmer participation in planning for the IA. As could be expected, household income was positively associated with the farmers' contribution to the system's in terms of construction and repairs and maintenance. Moreover, respondents with a higher proportion of income from rice farming, and who were relatively better educated, were more regular attenders of IA meetings and had a greater influence over water supervision activities than those with lower rice incomes and less education.

Among the physical factors considered, only distance from the homestead did not influence the respondents' participation in the planning of the irrigation system. Farms that were far from the main water source, main canal or branch canal contributed labour,

cash and materials during the construction stage and also to repairs and maintenance activities of the irrigation system but tended to be less involved during the planning phase. Despite the disadvantage of distance, respondents whose farms were far from the supply turnout were more active in resolving conflicts amongst members and officers of the IA. Water availability was also significantly associated with the level of farmer attendance of meetings.

Among the attitudinal factors studied only the timeliness of irrigation payment, attendance of meetings and participation in planning were significantly associated with the socio-economic/demographic characteristics of the farmers (household income, age and educational attainment). Among the physical factors, farm size, water availability, distance from the main water source and homestead were found to have a bearing on respondents' attitudes toward system construction, irrigation payments and attendance of meetings.

The area of irrigated rice owned and leased by farmers under the different irrigation systems in the Iloilo Province averaged 1.23 ha but this varied considerably between the IAs (0.92 to 1.52 ha). In terms of rice yield (kg/ha), amongst the four IAs , GIPA farmers achieved the highest mean rice yield (6693 kg/ha) probably because they had to make their living off smallest sized farms.

Amongst the identified socio-economic/demographic factors, only the percentage of household income from rice farming was found to be associated with the irrigated rice area. On the other hand, respondent participation in planning and attendance of IA was significantly and positively associated with the area in irrigated rice. The physical factors proved to be a good determinant of the area in irrigated rice. Farm size was strongly correlated (r=0.67) with the area in irrigated rice and household income. No significant association found between attitudinal factors and the area in irrigated rice.

A multiple regression model was constructed which explained 53% of the variation in the irrigated rice area (a proxy variable for participatory management). The percent rice income in total household income, total farm area, proximity to the main water source, respondents' participation in resolving conflict with officers of the IA, regular

attendance of group meetings and respondents age were important in explaining the area in irrigated rice.

5.2 Conclusions

The following conclusions were drawn from the study:

1. Irrigation management was significantly associated with socio-economic/ demographic (household income from rice, age, gender, educational attainment) and physical factors (proximity from the main water source, main canal, branch canal and the homestead, farm size and water availability). In particular, respondents with a higher proportion of income from rice farming and who were furtherest from the water turnout, are likely to be the most actively involved in irrigation-related activities.

2. Generally, attitudinal factors such as the timeliness payment of irrigation fees, regular attendance of meetings and involvement in consultation during the planning stage were significantly and positively associated with farming income as a proportion of total household income, age and education. Respondents who accessed the largest volume of water were more likely to have a favourable attitude about the aspects of the irrigation system.

3. Farmers with a smaller area in irrigated rice achieved higher average yields than those with a larger area of irrigated rice.

4. Physical factors, particularly farm area, were a good determinant of the area in irrigated rice.

5. The conceptual framework developed for the study to explain the area under irrigated rice (a proxy variable for participatory management) correctly identified variables which are good determinants of the irrigated rice area and level of farmer participation in IA-related activities.

5.3 Recommendations

1. The institutional organisation of farmer associations should be strengthened. Farmers should be encouraged to participate in irrigation-related activities because this gives them responsibilities and a sense of ownership and accountability for projects. Farmers who have outstanding participation in activities should be recognised by the IA through an awards/recognition programme.

2. The government may need to consider providing direct financial assistance through special credit programmes to cover the high cost of production inputs and extend technical advice to the farmers with small properties in particular. Production levels are already high on these small farms and there are limited opportunities to expand the area of irrigated rice. If the small farms become economic the owners will be forced to seek off-farm work in the already overcrowded urban areas.

5.4 Suggestion for Further Study

The scope of the present study was limited by time and resource constraints and the researcher would like to recommend that similar studies at the regional or possibly national level be undertaken. This study included only those irrigation systems which employ participatory management; systems which practise "without" participatory activities should also be studied. Gender sensitivity analysis and the role of women should also be included as one of the factors associated with participation in irrigation activities. In hindsight, this factor could been more actively explored in this study.

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APPENDIX I

DEPARTMENT OF AGRICULTURAL
AND HORTICULTURAL SYSTEMS MANAGEMENT
MASSEY UNIVERSITY

PARTICIPATORY MANAGEMENT OF IRRIGATION SYSTEMS IN THE PHILIPPINES: AN IMPACT ASSESSMENT

SURVEY QUESTIONNAIRE FOR FARMERS

Control No. _____ *Irrigation System* _____

Interviewer _____ *Date of Interview* _____

A. Household Characteristics

1. Name: *(Optional)*_____
2. Age: *(as of the last Birthday)* _____
3. Gender: Male /___/ Female /___/
4. Marital Status:

   Single /___/ Married /___/

   Widow /___/ Others *(specify)*_____
5. Educational Attainment *(years of schooling)*_____
6. Household Size *(No. of People)*_____
7. Number of Children_____

B. Farm Characteristics

1. Farming Experience *(No. of years)*
   a) In rice farming_____
   b) As water user_____

2. Area of land used for different crops *(ha.)*

Crops	*Irrigated*	*Unirrigated*
Rice	_____	_____
Corn	_____	_____
Mungbean	_____	_____
Vegetables	_____	_____
Others	_____	_____
Total	_____	_____

3. What percentage of your household income comes from farming?

_____ *(IF 100% GO TO SECTION C)*

4. What other sources of income do your household have and what are their estimated annual contribution to total income?

	Income Source	*Estimated Contribution to Total Income (%)*
a)	_____	_____
b)	_____	_____
c)	_____	_____

C. Land Area and Use

1. Please provide a breakdown of the farm area *(ha.)* by ownership structure and land use.

	Owned	*Leased*	*Total*
Total	_____	_____	_____
Cropped & Fully Irrigated	_____	_____	_____
Cropped & Partially Irrigated	_____	_____	_____
Cropped & Unirrigated	_____	_____	_____
Not Cropped	_____	_____	_____

2. How many croppings did you plant this year? _____

D. Irrigation

1. Which sector are you a member of? _____

2. What is your position in the association?
   a) Executive /___/
   b) Member /___/
3. How far is your farm from the main water source?
   (SPECIFY WALKING TIME) _____minutes/hour
4. How far is your farm from the main canal?
   (SPECIFY WALKING TIME) _____minutes/hour
5. How far if your farm from the branch canal?
   (SPECIFY WALKING TIME) _____minutes/hour
6. How farm is your farm from the homestead?
   (SPECIFY WALKING TIME) _____minutes/hour
7. How would you rate the availability of water to your farm?
   a) More than adequate /___/ b) adequate /___/
   c) Inadequate /___/ d) None/negligible /___/
8. How is water distributed?
   a) Simultaneously /___/ b) Rotational /___/
   c) Other *(specify)* /___/
9. Who supervises water distribution amongst farmers?
   a) Head of the association /___/
   b) Officers of the association /___/
   c) Individual farmer /___/
   d) Other (specify) _____

E. Farm Production

1. What total production was achieved for the following crops last year?

Crops	*Irrigated*	*Unirrigated*
a) Rice (Cav)	_____	_____
b) Corn (kgs)	_____	_____
c) Mungbeans (kgs)	_____	_____
d) Vegetables (kgs)	_____	_____
e) Other (specify)		
_____	_____	_____

2. Relative to an average year, how would you rate last year's production for:

	Above Average	*Average*	*Below Average*
a) Rice (Cav)	/____/	/___/	/___/
b) Corn (kgs)	/____/	/___/	/___/
c) Mungbeans (kgs)	/____/	/___/	/___/
d) Vegetables (kgs)	/____/	/___/	/___/
e) Other (specify)			
_____	/____/	/___/	/___/

3. For the main cropping area what quantities of purchased inputs did you use last season for different production crops?

	1st Cropping	*2nd Cropping*	*3rd Cropping*
Type:	Crop_____	Crop_____	Crop_____
a) Seeds *(kgs. per ha.)*			
Varieties:			
(i) Modern	_____	_____	_____
(ii) Local	_____	_____	_____
b) Fertilizers *(bags per ha.)*			
(i) Urea	_____	_____	_____
(ii) Triple 14	_____	_____	_____
(iii) Ammonium Phosphate	_____	_____	_____
(iv) Other *(specify)*			
_____	_____	_____	_____
c) Farm Chemicals *(li or kgs per ha.)*			
(i) Fungicides	_____	_____	_____
(ii) Herbicides	_____	_____	_____
(iii) Insecticides	_____	_____	_____
(iv) Other *(specify)*			
_____	_____	_____	_____

d) Hired labour

(i) No. of labourers employed _____ _____ _____

(ii) Duration of labour employment *(days)*_____ _____ _____

(iii) Total amount paid (pesos/day) _____ _____ _____

F. Farmer Participation

1. Did the planners of the irrigation association discuss the irrigation scheme with the farmers before making major decisions? Yes /___/ No /___/
2. Were you involved in making decisions to establish this irrigation system?
   Yes /___/ No /___/
3. Did you participate in designing the lay-out of the irrigation system?
   Yes /___/ No /___/ *(GO TO Q5 IF 'YES' TO Q's 2 AND/OR 3)*
4. Were you opposed to the establishment of an irrigation system in your area?
   Yes /___/ No /___/
5. Overall, how would you rate your participation in the irrigation scheme during the planning stage?
   a) Very High (intensive-attended all meetings) /___/
   b) High (regular-attended most meetings) /___/
   c) Moderate (periodic-attended half meetings) /___/
   d) Low (casual-attended few meetings) /___/
   e) Very low (occasional-attended one meeting) /___/
   f) No participation /___/

6. Did you participate in the construction of the irrigation system?
   Yes /___/ No /___/ *(GO TO Q8)*
   Why_____

7. How would you rate your contribution to the scheme's construction in the following areas?

	Very High	*High*	*Moderate*	*Low*	*Very Low*	*No Part.*
a) Labour	5	4	3	2	1	0
b) Financial	5	4	3	2	1	0
c) Materials	5	4	3	2	1	0
d) Others *(Specify)*						
_____	5	4	3	2	1	0

8. Who is responsible for repairing and maintaining the irrigation system?

a) NIA/DA /___/ b) Association /___/

c) Farmers /___/ d) Others (Specify) _____

9. Are "bayanihan" activities practiced to repair and maintain the irrigation canal?

Yes /___/ No /___/ *(GO TO Q11)*

10. How may times was "bayanihan" called for last year and how many times did you participate?

a) Called _____ b) Attended _____*(IF 0 GO TO Q12)*

11. How would you rate your involvement in repairs and maintenance in the following areas? *(IF NO /___/, GO TO Q12)*

	Very High	*High*	*Moderate*	*Low*	*Very Low*	*No Part.*
a) Cleaning	5	4	3	2	1	0
b) Repairs to Structures	5	4	3	2	1	0
c) Providing Materials	5	4	3	2	1	0
d) Others *(Specify)*						
_____	5	4	3	2	1	0

12. How much did irrigation fees cost last year?_____

13. Do you have any outstanding account with the irrigation association?

Yes /___/ No /___/

If yes, how much?

a) Amount (in Peso) _____

b) Production (cavan) _____

Reasons for non-payment: _____

_____

14. How frequently does your irrigators association meet?

a) Every _____ weeks/month (CROSS OUT ONE)

b) Never_____ *(GO TO Q17)*

15. How many times did you attend association meetings in the past 12 months?

_____*(IF ONCE OR MORE, GO TO Q17)*

16. If you did not attend association meetings, why?

_____

17. a. Does the association conduct training events or seminars for its members?

Yes /___/ No /___/ *(GO TO Q20)*

b. If yes, how often? Every _____month(s)

18.a. How many training seminars did you attend in the past two years? _____

b. If none, why did you not attend training seminars? _____

_____*(GOTO Q20)*

19. What topics were covered at the training seminars?

a)_____ b)_____

c)_____ d)_____

20. In relation to the irrigation scheme, have you ever experienced conflict with:

a) members Yes /___/ No/___/

b) Officers of IA Yes /___/ No/___/

c) NIA and DA personnel Yes /___/ No/___/

d) Others (specify) _____

(GO TO SECTION G IF ALL ANSWERS ARE NO)

Why did the conflict(s) occur? _____

_____

21. Was the conflict resolved by meeting with:

a) members Yes /___/ No/___/

b) Officers of IA Yes /___/ No/___/

c) NIA and DA personnel Yes /___/ No/___/

d) Others (specify) _____

e) Wasn't resolved Yes /___/

If it was not resolved, why?_____

_____

22. How long did it take to arrange a meeting with the irrigator association to discuss you problem? _____

23. How would you rate your participation with the following groups in terms of resolving you conflict(s)?

	Very High	*High*	*Moderate*	*Low*	*Very Low*	*No Part.*
a) Members	5	4	3	2	1	0
b) Officers of IA	5	4	3	2	1	0
c) NIA & DA Personnel	5	4	3	2	1	0
d) Others *(Specify)* _____	5	4	3	2	1	0

G. Farmer Attitudes

	SA	A	Un-decided	DA	SD	No Opinion
1. Farmers should be consulted during the planning stage for any irrigation schemes.	5	4	3	2	1	0
2. Farmers should help construct the system.	5	4	3	2	1	0
3. Farmers should pay their irrigation fee promptly.	5	4	3	2	1	0
4. Farmers should attend group meetings regularly.	5	4	3	2	1	0
5. Farmers benefit from irrigation.	5	4	3	2	1	0
6. Irrigation increases rice production.	5	4	3	2	1	0
7. Farmer participation is vital for the efficient operation of an irrigation scheme.	5	4	3	2	1	0
8. Benefits from irrigation are less than the operation and maintenance costs.	5	4	3	2	1	0
9. Irrigation increases the farmer's income	5	4	3	2	1	0
10. Cooperation amongst members is required to accomplish group activities.	5	4	3	2	1	0
11. The interests of individuals are better served if group goals are achieved.	5	4	3	2	1	0
12. The government should spend more on irrigation schemes	5	4	3	2	1	0
13. Farmer participation in the management of irrigation schemes is essential.	5	4	3	2	1	0

THANK YOU FOR YOUR ASSISTANCE.

APPENDIX II

DEPARTMENT OF AGRICULTURAL
AND HORTICULTURAL SYSTEMS MANAGEMENT
MASSEY UNIVERSITY

PARTICIPATORY MANAGEMENT OF IRRIGATION SYSTEMS IN THE PHILIPPINES: AN IMPACT ASSESSMENT

SURVEY QUESTIONNAIRE FOR IRRIGATOR'S ASSOCIATION

A. Organization and Formation of Irrigator Association

1. To what farmers'association do you belong? _____
2. What sector are you a member of? _____
3. Who organized the association? _____
4. When was the association established? _____
5. How many active members does the association have at present? _____
6. How many inactive members does the association have at present? _____

B. Functions and Involvement in Irrigation Planning

1. Were members of your association involved in planning the irrigation scheme?

   Yes /___/ No /___/

   If yes, what were your main tasks ?

   _____ _____

   _____ _____

   If no, why not? _____

   _____

2. Did your association participate in designing the irrigation scheme's layout ?

   Yes /___/ No /___/

   If no, why? _____

   _____

3. Was your association involved in constructing the scheme?

   Yes /___/ No /___/

4. In what ways did the association contribute to the scheme's construction?

a) Labour Yes /___/ No /___/

b) Materials Yes /___/ No /___/

c) Financial Yes /___/ No /___/

d) Others (specify)_____

C. System Management Activities

5. In what year was construction of the irrigation system completed ? _____

6. Who is responsible for ensuring local irrigation facilities are maintained ?

a) Head of the association /___/ b) Officers of the association /___/

c) Sector leader /___/ d) Individual farmer /___/

e) Other (specify) _____ f) No involvement /___/

7. How do association members participate in the repair and maintenance of the irrigation system?

a) Physically (labour) /___/ b) Materially /___/

c) Financially /___/ d) Other (specify) _____

8. How is water distributed amongst farmers?

a) Simultaneously /___/ b) Rotational /___/

c) Other (specify) _____

9. Who supervises the distribution of water amongst the farmers?

a) Head of the association /___/ b) Officers of the association /___/

b) Sector leader /___/ d) Individual farmer /___/

e) Other (specify) _____

10. Do farmers encounter problems because of the way water is distributed?

Yes /___/ No /___/

If yes, Why? _____

11. How often do farmers pay their irrigation fee?

a) Per cropping /___/ b) Per year /___/

c) Other (specify) _____

12. Is the irrigation fees based on:

a) Per farm /___/ b) Per hectare /___/

c) Metered water use /___/ d) Other (specify) _____

13. What fee do farmers pay for the right to irrigate?

	Wet season	Dry season
a) Per farm	_____	_____
b) Per ha.	_____	_____
c) Metered water use	_____	_____
d) Other (specify)	_____	_____

14. Who is responsible for collecting irrigation fees from the farmer?

a) Head of the association /___/ b) Officer of the association /___/

c) Sector leader /___/ d) Other (specify) _____

15. Has the association borrowed funds from banks or from non-governmental sources?

Yes /___/ No /___/

a) For what purposes? _____

16. How do you rate the association's ability to meet loan repayments?

a) Very satisfactory /___/ b) Satisfactory /___/

c) Moderately /___/ d) Unsatisfactory /___/

e) Very unsatisfactory /___/

17. What are the major problems you have experienced in managing the irrigator group?

_____

_____

D. Association Dynamics

1. How often does the irrigator association meet each year?

a) Board Meeting _____

b) Gen. assembly _____

c) Sector Meeting _____

2. On average, how many members attend association meetings? (Number) _____

3. How do you rate farmer attendance of association meetings?

a) Very high (attended all meetings) /___/

b) High (attended most meetings) /___/

c) Moderate (attended half meetings) /___/

d) Low (attended few meetings) /___/

e) Very low (attended one meeting) /___/

4. How often does the association conduct training seminars for its farmer members?

a) Every_____ weeks/months *(CROSS OUT ONE)*

b) As the needs arise /___/

c) Never /___/

5. What are some examples of topics covered in training seminars?

a) _____ b) _____

c) _____ d) _____

6. Other than meetings and training seminars, are there other ways for association members to express concerns about the management of the irrigation scheme?

_____

_____

7. As an association, have you experienced any conflict among:

a) Members Yes /___/ No /___/

b) Officers of Irrigators Group Yes /___/ No /___/

c) NIA & DA Personnel Yes /___/ No /___/

d) Other (specify) _____

8. If yes, can you provide examples of the cause of conflict?

_____

_____

_____

9. What methods have been used to resolve conflict amongst association members?

_____

_____

_____

E. Future Membership

1. Do you believe the irrigator association will still be intact in 10 years time?

a) Yes /___/ b) No /___/ c) Don't know /___/

2. Are association members likely to decline or increase in the next five years?

a) Decline /___/ b) Increase /___/ *(GO TO SECTION F)*

c) Don't know /___/ *(GO TO SECTION F)*

3. If numbers decline, will it be difficult to get replacement members?

a) Yes /___/ b) No /___/ c) Don't know /___/

4. If association membership declines who will bear the increased burden of repairs and maintenance for the system?

_____

_____

F. Benefits

1. What benefits do farmers receive from being a member of the irrigator association?

_____

_____

_____

2. How would you rate the benefits of association membership using the following scale (SA = Strongly agree, A = Agree, Indifference = Neither agree nor disagree, DA = Disagree, SD = Strongly disagree).

	SA	*A*	*Indiff.*	*DA*	*SD*
a) Motivates farmers to assume greater responsibility for irrigation management.	5	4	3	2	1
b) Encourages farmers to participate in key decisions for irrigation.	5	4	3	2	1
c) Promotes collective ownership of the irrigation facilities.	5	4	3	2	1
d) Leads to expansion of the irrigation system.	5	4	3	2	1
e) Provides a means for farmers to increase income.	5	4	3	2	1

G. General

Do you have any other comments about irrigator association or irrigation in general?

_____

_____

_____

_____

_____

_____

THANK YOU FOR YOUR HELP.