REVISITING IRRIGATION MANAGEMENT TRANSFER: A CASE STUDY OF A PHILIPPINE MUNICIPALITY'S EXPERIENCE IN TRANSFERRING IRRIGATION MANAGEMENT TO FARMER ASSOCATIONS

by

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Abstract

There is a lack of data and analysis relating to implementation processes and impacts for Irrigation Management Transfer (IMT), particularly at the community level. This is despite the fact that IMT has become one of the most popular trends in irrigation management worldwide.

This research fills key gaps in knowledge about IMT in practice, specifically with respect to: (1) the different approaches being used, the constraints to implementation, the impacts on all stakeholders; and (2) the suitability of IMT in different social, political and economic settings, through a case study analysis of the municipality of Plaridel, Bulacan, Philippines.

Based on a review of literature focused on the works of the leading experts in IMT, seven 'best practices', with respect to the implementation of IMT, are formulated. Through semi-structured interviews and data collection, the implementation of IMT in Plaridel is then evaluated against these seven 'best practices'.

It is found that all seven of the 'best practices' are not currently operational in the municipality and that as a result, there is an extremely high likelihood that Plaridel's farms and Irrigation Associations (IAs) will not be viable in the near future. The main reasons for this being the absence of clearly recognized and sustainable water rights and service and insufficient financial resources provided by the implementing irrigation agency, the National Irrigation Administration (NIA). This study argues that this scenario is likely because NIA is implementing IMT solely to reduce its own financial costs in operating and maintaining Plaridel's irrigation systems and not to improve productivity or the livelihoods of Plaridel's farmers.

Plaridel is a cautionary tale to any government that is planning to implement IMT, as it shows how IMT is no quick fix to a financially unviable Irrigation Agency or agricultural sector. Rather it is a difficult, painstaking process that requires substantial financing and commitment.

Preface

This research was approved by The University of British Columbia's *Behavioral Research Ethics Board*, the Certificate Number of the Ethics Certificate is H10-00567. I, Jennifer Lauren Bedore, conducted all of the research for this thesis as well as wrote it in its entirety.

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List of Acronyms

AFMA	Agriculture and Fisheries Modernization Act
AMRIS	Angat-Maasim River Irrigation System
BANE	Bulacan-Aurora-Nueva-Ecije
CARP	Comprehensive Agrarian Reform Program
CIS	Communal Irrigation System
DA	Department of Agriculture
DENR	Department of Environment and Natural Resources
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
IA	Irrigation Association
IDD	Institutional Development Department
IDO	Irrigator Development Officers
IMT	Irrigation Management Transfer
INPIM	International Network on Participatory Irrigation Management
IOSP	Irrigation Operation Support Program
ISF	Irrigation Service Fee
IWMI	International Water Management Institute
IWRM	Integrated Water Resources Management
MAO	Municipal Agricultural Office
MWSS	Metropolitan Waterworks and Sewerage System
NGO	Non-Governmental Organization
NIA	National Irrigation Administration
NIS	National Irrigation System
NPC	National Power Corporation
NWRB	National Water Resources Board
O&M	Operations and Maintenance
PENRO	Provincial Environment and Natural Resources Officer
PHP	Philippine Peso
PIM	Participatory Irrigation Management
PPDO	Provincial Planning and Development Office (of Bulacan)
PSALM	Power Sector Assets and Liabilities Management Corp.
SAPRIN	Structural Adjustment Participatory Review International Network
SWMT	Supervising Water Master Technician

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To each, I extend my deepest appreciation.

Dedication

For the farmers, NIA and Municipal staff of Plaridel who welcomed me into their homes, hearts and minds and made me feel at home in a foreign land and way of life.

Chapter One: Introduction

Many irrigation experts have found that Irrigation Management Transfer (IMT) has been moving away from its original objectives of reaching rice self-sufficiency and improving the livelihoods of farmers, to simply reducing the state's financial burdens (Zialcita, 1984, p. 277). One critic of the implementation of IMT in the Philippines, Joost Oorthuizen (2003), summed up the reality behind the implementation of IMT in the Philippines "It is almost as if there are two different realities. The reality of international irrigation policy discourse, which tells positive stories about farmer empowerment and system efficiency due to turnover and the fine results of the NIA's financially autonomous status… then there is the real world of harsh realities" (p. 5).

This research explores the extent to which the implementation of IMT in Plaridel exists in the 'reality' of the 'international irrigation policy discourse' or in 'the real world of harsh realities'. This research aims to utilize the existing research on Irrigation Management Transfer, which focuses primarily on macro scale dynamics, to determine what experts of Irrigation Management Transfer (IMT) specify as 'best practices' for the implementation of IMT. This research will then appraise the degree to which Plaridel is currently adhering to these standards.

The primary research question this thesis addresses is:

> Are the 'best practices' with respect to the implementation of IMT currently being adhered to in Plaridel?

The subsidiary research questions are:

1. What have irrigation management experts cited as being 'best practices' for the implementation of IMT?

2. Given the present course of IMT implementation in Plaridel, what degree of success, in terms of productivity, profitability and sustainability, are Plaridel's Irrigation Associations (IAs) likely to achieve post-IMT?

3. What are the main impediments, if any, to adhering to the 'best practices' for IMT implementation in the municipality?

4. How can the study inform the implementation of IMT in other areas of the Philippines and worldwide?

To address these questions, this research conducted a literature review to determine the requirements of best practices in IMT that could be used to assess the IMT experience in Plaridel. Using various research methods – content analysis of documents, participant observation of meetings, semi-structured interviews and focus groups - data was collected on the on-going process of IMT in Plaridel and then assessed against these requirements. A more in-depth discussion of the research methods and procedures used is provided in the Research Methodology Section on page 19.

Definition of Key Concepts and Terms: Comparing Irrigation Management Transfer and Participatory Irrigation Management

This section will first describe and contrast the concepts of Irrigation Management Transfer and Participatory Irrigation Management. It will then discuss why IMT has increasingly been implemented worldwide. Lastly, the worldwide results of IMT will be discussed and how the dearth of data and academic research on the topic may be problematic for countries that are adopting IMT.

In its broadest sense, Irrigation Management Transfer (IMT) is "the partial or complete transfer of irrigation management rights and responsibilities for an irrigation (sub) system from government to [either] farmer organizations, water user associations, other non-governmental agencies (including the private sector), or local government agencies" (Giordano, Samud & Namara, 2006, p. 1). However, it is important to note that IMT does not necessarily entail the complete withdrawal of the government from these systems, nor the complete transfer of ownership of these irrigation systems' assets to the new entities (Johnson, Vermillion & Sagardoy, 1995, p. 19).

IMT is often formalized by a Transfer Agreement, which specifies "the basic long-term roles, decision-making authority and obligations that water users associations and government agencies have relative to irrigation systems" (FAO & INPIM, 2001). Key elements typically included in IMT Agreements are: role and jurisdiction of the Irrigation Association (IA); rights, authority and obligations of the IA; and the rights, authority and obligations of the government toward the IA (FAO & INPIM, 2001). Apart from these basic parameters, the nature of the implemented IMT programs can vary greatly from country to country and region to region (Johnson, Vermillion & Sagardoy, 1995, p. 20).

One way in which IMT programs often differ is with respect to implementation strategies. For example, as is common in the Philippines, programs proceed in a "gradual, incremental way" where "the government negotiates on a case-by-case basis and systems are only transferred if water users agree" (FAO & INPIM, 2001). Conversely, in some

countries IMT is “implemented rapidly, for many thousands or even millions of hectares”, as in Mexico and Turkey, where the “government mandates transfer of all targeted systems” at once (FAO & INPIM, 2001).

The implementation of IMT is also commonly adapted to include “strategic planning for the irrigation sector and restructuring of the irrigation agency” (FAO & INPIM, 2001). Aspects of this may include: “downsizing, adoption of new mandates, redeployment of personnel, and a change from a centrally-financed line agency to a financially autonomous authority or corporation”. The Philippines is a prime example of a location that has benefitted by assuming these distinctive adaptive traits.

Lastly, the implementation of IMT may differ in that some IMT programs mandate full transfer of responsibilities from the irrigation agency to smaller community based entities while others mandate only partial transfer, or joint management. In the Philippines, for example, full responsibility is transferred to the Communal Irrigation Systems (CISs), meaning that in the post-transfer phase, the IAs assume responsibility of the Operations and Management (O&M), Irrigation Service Fees (ISF) collection, and management of the entire irrigation system. Whereas, the National Irrigation Systems (NISs) are only partially transferred, meaning that post-transfer the NISs are only responsible for the O&M and ISF collection for a sub-section of the irrigation system (such as tertiary or secondary canals).

IMT and Participatory Irrigation Management (PIM) are often used interchangeably and are therefore commonly interpreted as being one and the same. However, it is of critical importance to understand the differences between these programs and their respective policy implications.

The Economic Development Institute of the World Bank defines PIM as "the involvement of irrigation users in all aspects of irrigation management at all levels" (World Bank, 1990, p. 12). All aspects include the initial planning and design of new irrigation projects and improvements, as well as the construction, supervision, financing,

decision rules, O&M, monitoring and evaluation of the system (Gupta & Srivastava, 1999, p. 11), as well as "the roles they would like to perform and the roles that they want the government to perform" (Raby, n.d., p. 2). The main purpose of PIM is therefore that "farmers… make important decisions about irrigation system development themselves, or strongly influence the outcomes of decisions made through a process of discussion and negotiation with government agencies" (Bruns, 1993, p. 1838).

The main distinction between the two terms is therefore that where "the IMT concept intends to replace [to a certain degree] the role of the government, PIM seeks to strengthen the relationship between water users and government by adding farmer participation to government management" (International Water Management Institute, 2007, p. 11). In addition, PIM can be used in conjunction with IMT, at the last stage of the IMT process "where, before a final transfer takes place, the government agency and the recipient organization agree to share responsibilities" (International Water Management Institute, 2007, p. 19). Lastly, PIM can also be implemented in irrigation systems without IMT, in irrigation systems "that have not been formally transferred" but whose irrigation agencies still wish to "enjoy real participation in management decisions" (Groenfeldt, 2004).

Why IMT is Being Implemented Worldwide

Experts indicate that over the past three decades “governments in developing countries worldwide have been transferring in varying degrees rights and responsibilities [of natural resources] to communities” including water resources, and “ in particular irrigation” (Araral, 2009, p. 687). This is due in large part to the “rise of the structural adjustment policies of the mid 1980s” (Johnson, Vermillion & Sagardoy, 1995, p. 11) and the failed "earlier approaches to irrigation development [which] were based on the assumption that a combination of 'correct technology', 'efficient markets', and 'capable agency' would yield optimal performance” (Gupta & Srivastava, 1999, p. 37).

Consequently, these countries are looking to a more decentralized approach to irrigation management that will produce “the desired improvement in efficiency and equity in operation” (Gupta & Srivastava, 1999, p. 37) that they are looking for. Accordingly, international interest in the IMT process has been steadily growing worldwide (Johnson, Vermillion & Sagardoy, 1995, p. 10). The following are the three principal reasons why IMT is believed to be the best available option for achieving the objectives these countries gave set out for themselves.

1. Advantages of Devolution: IMT is being championed principally because of the observed advantages that occur when managerial responsibility for irrigation systems is passed from the state to small community based organizations, such as farmers associations. Irrigation experts have consistently appraised these associations as being better suited to manage irrigation systems than centrally financed government agencies (Johnson, Vermillion & Sagardoy, 1995, p. 10). The main arguments supporting this claim are first, that farmers have a greater motivation than salaried bureaucrats to manage irrigation systems efficiently and productively, given the direct relationship between the system’s operation and their personal livelihood (Araral, 2009, p. 687). The second argument is that they have a comparative advantage over the bureaucracy to solve collective action problems as they have better access to the necessary information (i.e. local knowledge) (Wijayaratna, 2004, p. 53) and more available manpower than remote

government officials (Araral, 2009, p. 687). Lastly, through their increased participation in system management, they force both themselves and the state to become more accountable and transparent, resulting in an increase in overall efficiency and productivity (Thompson, 1995, p. 1521).

In addition, during the IMT process, farmers are individually empowered (Bandyopadhyay, Shyamsundar & Xie, 2007, p. 9) and the social capital of the farmers associations is built up (FAO & INPIM, 2001), resulting in the enhancement of their capacity for "self-management and resource mobilization...[as well as] mechanism[s] to articulate local needs and interests to the government sector and other external institutions" (FAO & INPIM, 2001). Accordingly, their ability to be heard and affect their own lives outside of just the irrigation management sphere is increased, thus furthering the democratization of the country (Wijayaratna, 2004, p. 35).

2. Cost Reduction: The second main reason governments worldwide are turning to IMT is to reduce the extremely high costs associated with irrigation systems (operation, management, maintenance and rehabilitation) (Attia, n.d.), enabling them to either reallocate government revenues to other sectors (NIA "Irrigation Management Transfer", n.d.) or to stop expending scarce financial resources (Araral, 2006, p. 20). In addition, critics have argued that, "highly subsidized financing of irrigation development encourages and perpetuates top-down, wasteful, unaccountable patterns of government activity in irrigation" (Bruns, 1993, p. 1837). Accordingly, it is understood that transferring management to farmer associations will lead to an increased willingness, on the part of farmers, to pay ISFs. Worldwide, ISF collection rates pre-IMT have been so consistently low they often fail to cover even basic system costs (NIA "Irrigation Management Transfer", n.d.). Experts believe that collection rates can be improved when farmers make decisions on fee spending as they are more likely to understand and support the necessity of paying ISFs (Wijayaratna & Vermillion, 1996, p. 3).

In addition, governments are able to cut costs by reducing the staff needed to maintain and manage irrigation systems by passing most of their responsibilities over to the farmer associations. This is often referred to as "streamlining". Streamlining not only reduces

salary costs but reduces the potential for rent-seeking behavior among poorly paid developing-world bureaucracies (Araral, 2009, p. 687).

3. Infrastructure Improvement: The last main reason governments worldwide are turning to IMT is to improve the declining state of irrigation infrastructure, which is "often characterized by chronic underinvestment in maintenance [and] rapid deterioration"(FAO & INPIM, 2001). This has resulted in "persistently inefficient, unreliable, and inequitable water service" and a "reduction in service areas… [which impacts] agricultural productivity [and] economic and financial rates of return" (Araral, 2006, p.67). Experts believe that because IMT can potentially "significantly increase the amount of funds available (FAO & INPIM, 2001) [to the IA]"s and because IAs are more accountable to the needs of the irrigations system, they will be more responsive in undertaking necessary maintenance and repairs than would governmental bureaucracies (Wijayaratna, 2004, p. 3). This results in increased "reliability and predictability of adequate and timely water flows" (Uphoff, Ramamurthy & Steiner, 1991, p. 18) and thus a corresponding increase in "area irrigated, cropping intensities and/or crop diversity, yields and economic returns" (International Water Management Institute, 2007, p. 36). These linkages are becoming increasingly important given that "the central challenge facing irrigated agriculture today and in the foreseeable future is how to produce more food and farmer income with less water" (FAO & INPIM, 2001).

As IMT programs are producing the results these countries are striving for while demanding fewer financial resources over the long-term, (which is of prime concern to struggling agricultural departments of developing countries), it is understandable that more than sixty countries have used IMT as a tool for irrigation sector reform (International Water Management Institute, 2007, p. 5), with more than 25 other Asian, African and Latin American countries currently working towards IMT (Asian Development Bank, 2008, p. 8). Despite this enthusiasm, many of the countries implementing IMT are lax in addressing the paucity of reliable data and research on the IMT process, at the cost of an improved understanding of, and adherence to, 'best practices' for IMT (Bandyopadhyay, Shyamsundar & Xie, 2007; Vermillion, n.d.; Giordano, Samud & Namara, 2006; Mansuri & Rao, 2004; Oorthuizen, 2003; Shivakoti,

Vermillion, Lam, Ostrom & Pradhan, 2005; Vermillion, 1997).

Worldwide Results of Irrigation Management Transfer

Ideally, IMT could produce results that many countries are seeking while demanding fewer financial resources than other irrigation management strategies. However, many of the countries implementing IMT fail to address the severe lack of reliable data and information collected on the impacts of IMT worldwide (Bandyopadhyay, Shyamsundar & Xie, 2007; Mansuri & Rao, 2004; Giordano, Samud & Namara, 2006; Oorthuizen, 2003; Shivakoti, Vermillion, Lam, Ostrom & Pradhan, 2005; Vermillion, n.d.; Vermillion, 1997).

The studies that have been conducted on IMT to date have mainly focused on the impacts of IMT with respect to the following outcomes:

- Crop yields
- Agricultural productivity
- Cropping intensities
- ISF Collection rates
- Total amount of government subsidies channeled to IAs
- Efficiency, reliability and equitability of water use and distribution
- Level of maintenance conducted on irrigation infrastructure
- Amount of O&M activities undertaken by IAs
- Change in the income level of farmers

What may be surprising to countries implementing IMT is that the results coming from the IMT field, with respect to these outcomes, are mixed at best. While conducting the literature review for this research, it was at times challenging to find results that were not contradicted in other research (one example being: Bandyopadhyay, Sushenjit, Priya Shyamsundar & Mei Xie, 2007, and Panella, 2004). As well, many studies (NIA "Impacts of Irrigation Management Transfer", 2010; International Water Management Institute, 2007; Vermillion, 1997) specified that the purported benefits of IMT could potentially be the byproduct of other unrelated factors, such as previous physical

rehabilitation of the irrigation infrastructure or the introduction of higher-yielding cropping varieties into the study area. Furthermore, many of the outcomes cited, with respect to the above factors, were determined to lack sufficient data to support the given claims (Johnson, Vermillion & Sagardoy, 1995, p. 258).

The Philippines is experiencing the same types of problems. Although studies have been conducted on IMT in the Philippines, appraisals of its effects vary greatly, with causal relationships between practices and outcomes being difficult to assess (Raby, n.d., p. 1). Therefore, it can be said that there is insufficient data and information with respect to the effects of IMT on the above outcomes to justify implementing it on large scales prior to a more careful analysis of the effects of IMT in pilot projects.

Of particular concern is that IMT has, and continues to be, implemented throughout the Philippines with only minimal and seemingly inconclusive data on its effects and absolutely no studies on its long-term impacts with respect to the affected IAs, the agricultural sector, or the nation's goal of rice self-sufficiency. Accordingly, this research was conducted, to better understand the effects of IMT in the Philippines, at the IA level, so that informed decisions on the implementation of IMT in the Philippines, and perhaps worldwide, can be made.

Relevance and Rationale

As of today, more than sixty countries have used IMT as a tool for irrigation sector reform (International Water Management Institute, 2007, p. 5) and there are currently more than 25 Asian, African and Latin American countries working towards IMT (Asian Development Bank, 2008, p. 8). However, despite the fact that IMT has become one of the most popular trends in irrigation management worldwide, there has been a persistent lack of data and information collected on the process of its implementation and its impacts, particularly at the community level (Bandyopadhyay, Shyamsundar & Xie, 2007; Giordano, Samud and Namara, 2006; Oorthuizen, 2003; Mansuri & Rao, 2004; Shivakoti, Vermillion, Lam, Ostrom & Pradhan, 2005; Vermillion, n.d.; Vermillion, 1997).

IMT experts worldwide have therefore been calling for more research to be conducted at the community level, which focuses on the different approaches being used, the constraints to implementation, the impacts on all stakeholders and the suitability of IMT in different social, political and economic settings. This research needs to provide a more detailed and contextualized understanding of an IMT process (Bandyopadhyay, Shyamsundar & Xie, 2007; Giordano, Samud and Namara, 2006; Oorthuizen, 2003; Mansuri & Rao, 2004; Shivakoti, Vermillion, Lam, Ostrom & Pradhan, 2005; Vermillion, n.d.; Vermillion, 1997).

Indeed, Irrigation Agencies, policy makers and development agencies from all over the world are looking for viable irrigation management options but are either unable to choose IMT as they are constrained by a lack of information on the above issues, or are implementing IMT in spite of the lack of available information.

In the Philippines, IMT has been implemented for decades, however, only a handful of studies (Araral, 2006; Bandyopadhyay, Shyamsundar & Xie, 2007; Oorthuizen, 2003; Panella, 2004; Svendsen, 1992) have been conducted on its implementation and effects at the local level. Therefore, although most of the country's IAs have completed, or are in

the process of completing, the implementation of IMT, very little is known about the various practices employed or the outcomes of them. This inexpert application of IMT is belied by the fact that in the 1980s “people from other nations were flocking to the Philippines to observe the NIA's participatory methods” (Bruns, 1993, p. 5), resulting in unproven beliefs in their successful implementation and positive outcomes and inspiring similar efforts in countries throughout Asia and worldwide (Bruns, 1993, p. 5).

Accordingly, this case study on the municipality of Plaridel is being conducted to help fill the knowledge gaps surrounding IMT with respect to: the different approaches being used, the constraints to implementation, the impacts on all stakeholders, and the suitability of IMT in different social, political and economic settings, so that a more detailed and contextualized understanding of IMT can be achieved both in the Philippines and worldwide.

Research Methodology

This study is exploratory in nature, employing a qualitative research paradigm shaped as a case study. Two methods were used to collect data and information. The first method was a literature review, which was used to inform and shape the research questions and best practices[1]. The second method was semi-structured interviews of relevant stakeholders (n=64) of the IMT process in Plaridel. In addition, some interview respondents provided supplementary data and information intended to support their statements. These two methods enabled me to gain the best understanding possible of the implementation process of IMT in Plaridel. The 64 semi-structured interviews were important to this study as they ensured that all relevant stakeholders had a voice, including stakeholders who are rarely heard or included in planning and decision making processes.

This study took place in Plaridel, Philippines during the months of June and July of 2010. Plaridel was chosen, firstly, because it is currently in the process of implementing IMT in all of its IAs. Secondly, because it is located in close proximity to Metro Manila (and commonly referred to as a 'bedroom community' of Metro Manila) and therefore it is already feeling the effects of resource constraints and overpopulation, which are commonly cited impediments to the implementation of IMT and issues many agricultural areas across the world are currently facing. Lastly, Plaridel was the first municipality in the Philippines to be declared an agrarian reform town, in the early 1960s, and was one of the first municipalities to adopt the new Green Revolution technology, which included improved irrigation infrastructure and irrigation management techniques. Therefore, the history of farming and irrigation in the municipality is rich and strong.

[1] It is important to note that these best practices were generated from secondary literature largely written by agricultural development practitioners and irrigation experts, based on their independent research and evaluation, and not by participatory research with farmers, which could have privileged their indigenous knowledge.

The fieldwork was conducted throughout Plaridel, as well as at NIA's regional office, which oversees Plaridel, located in, San Rafael, Bulacan. The research was facilitated through Hermanio A. Frias, Jr., Head Municipal Agriculturalist at Plaridel's Municipal Agricultural Office, who is well connected in Plaridel's agricultural sector. This was important to the research as I, the researcher, am a Canadian national and as a first time visitor to the country would have otherwise been viewed as more of an 'outsider' by the Plaridel community due to differences in class, race and physical appearance. Therefore, having Mr. Frias introduce me to all of the interview respondents and providing me with the contact information for those he could not introduce to me directly played a large role in the respondents' willingness to tell me their stories and welcoming me into their country, community and homes.

I do not speak the native language of the region, Tagalog. However, English is the second language of most Plaridel residents and for the most part those working in professional capacities could be interviewed in English. However, all farmer interviews, as well as some others who preferred not to be interviewed in English, were conducted in Tagalog with the help of my translator, Yanna Castro, a recent university graduate in business administration. Yanna's mother and uncles own an engineering firm established by her late grandfather who had worked with NIA as an engineering contractor. She accompanied me on all of my interviews and also helped me gain insight into local cultural subtleties that I was unable to perceive or understand on my own.

Prior to the commencement of this research, an approval certificate was obtained from the University of British Columbia Ethics Review Committee with all procedures outlined therein being strictly followed. All interviews were recorded with a voice recorder and all recordings were transcribed verbatim and translated by Yanna who was present during all of the interviews.

In selecting participants for the study, care was taken to ensure that a balanced insight into the issue was gained, meaning that all stakeholders of Plaridel's IMT process were represented. All of the interview respondents can be classified as either 'community

participants' or 'expert participants'. Community participants are those who have a direct stake in the successful implementation of IMT in Plaridel. These include:

- Farmers belonging to one of Plaridel's seven IAs (n=36)
- NIA field level staff (n=3)
- Other (a private financier of Plaridel's farmers)

Expert participants are those who have a direct or indirect stake in the successful implementation of IMT in Plaridel and/or have insight into the IMT process in Plaridel or factors affecting its implementation. These include:

- NIA regional level staff (n=9)
- Municipal and provincial officials (n=12)
- Other (barangay captains and councilors and a municipal bank official) (n=5)

Table 1.1, below, lists the number of interview respondents by classification and type. In total there were 64 interview respondents. However, there were only 37 interviews conducted in total as most of the farmers interviewed were interviewed in groups, by their respective Irrigation Association.

Table 1.1: Number of interview respondents by category

Community(44)			Experts (20)		
Farmers	**NIA Field Staff**	**Other**	**NIA Reg. Staff**	**Mun & Prov Officials**	**Other**
36	3	1	9	12	5

As not all farmers in the municipality could be interviewed, due to time and resource constraints, it was decided that only one barangay for each of the seven IAs that exist in Plaridel would be chosen for interviews[2]. In order to choose the 'best' barangay for each IA it was decided that the barangays with the largest amount of agricultural and irrigated rice land compared to the total area of the barangay and the largest number of farmers

[2] It is important to note that IAs are based on lateral canals and therefore one IA can exist in more then one barangay, or even municipality or province (Municipal Government Official Interview 1). For example IA Plagui is composed of three barangays from Plaridel and three from Guiguinto, a neighboring municipality (Farmer Group Interview 8).

would be chosen. Based on these requirements the following barangays were chosen for interviews:

Table 1.2: Barangays interviewed and corresponding IAs.

Barangay	IA
Bagong-Silang	Plagui
Bulihan	BSJB
Culianin	BPB
Lagundi	Lagum
Lalangan	Plaridel-Malolos
Parulan	Parulan-Halang
Sipat	Lucidar

Source: Plaridel's Municipal Agricultural Office

Additionally, Mr. Frias, Plaridel's head Municipal Agriculturalist, confirmed that these seven barangays would be the most representative of Plaridel's barangays for this purpose.

The following table, 1.3, shows the barangays chosen for interviews (highlighted) compared to the other barangays of Plaridel with respect to the amount of agricultural and irrigated palay land they possess relative to their total land area and their total number of farmers. With respect to both requirements the chosen barangays are comprised predominantly of those that have larger amounts of agricultural and irrigated palay land as well as a larger number of farmers when compared to the other barangays.

Table 1.3: Agricultural area, irrigated palay area and no. of rice farmers by barangay

Barangay	Total Land Area	Agricultural Area	Irrigated Palay Area	No. of Farmers
Agnaya	66	14	8	5
Bagong Silang	**226**	**200**	**165**	**121**
Banga I	124	55	0	0
Banga II	160	39	0	0
Bintog	201	158	110	78
Bulihan	**493**	**450**	**287**	**191**
Culianin	**306**	**237**	**129**	**127**
Dampol	76	29	3	1
Lagundi	**212**	**197**	**213**	**113**
Lalangan	**197**	**66**	**60**	**52**
Lumang bayan	166	57	36	15
Parulan	**418**	**168**	140	**92**
Poblacion	49	0	0	0
Rueda	77	63	65	40
San Jose	376	244	165	133
Sana Ines	69	0	0	1
Santo Nino	334	194	126	82
Sipat	**398**	**254**	**122**	**82**
Tabang	302	146	36	27
TOTAL	**4,250**	**2570**	**1665**	**1160**

Source: Municipality of Plaridel, 2007

Although I am confident that this research data would be similarly reiterated in other barangays with similar land allocations, it would have been useful to gain greater insight into any potential contrast in opinion among farmers in those barangays with a high proportion of agricultural land and those closer to the municipal center who are experiencing higher rates of agricultural land conversion and social fragmentation.

While conducting and analyzing the interviews, I sought at all times to be self-critical and reflective, constantly assessing the ways in which my personal views might interfere with the collection of information and its analysis. I also attempted to remain aware of the fact that those being interviewed could potentially, perhaps intentionally, neglect to tell me part(s) of their story, as they may want to present themselves, or their government, in a certain light to their 'guest'. Therefore, efforts were made to gain second or third

opinions on statements that didn't fit the larger picture. It is also important to note that one limitation of this research is that the farmer members interviewed did not engage in a consultation process with their fellow IA members to strongly justify their answers. Nor were their responses validated or triangulated with other research methods, such as surveys or interviews with other members from within their IAs. This is especially important to take into consideration with respect to the data presented in Tables 4.1, 4.2 and 5.1 as the answers recorded by each IA may not be representative of all of the IA's farmer members.

It is also important to note that I conducted this research under unusual national circumstances. Benigno S. Aquino, the current Filipino president, was just being brought to power while I was undertaking this research. Among others, he promised to all Filipinos to cut down on government corruption and to improve infrastructure and health care. Aquino also made explicit promises to farmers, promising to improve their security through greater access to irrigation, extension services, markets and the elimination of middlemen (philSTAR, n.d). I was cognizant of the fact that this event might influence the opinions of those employed in the agricultural sector with respect to their future livelihoods, and therefore IMT, as many were caught up in the potential power of Aquino to change the future of the agricultural sector in the Philippines.

Organization of the Study

This study is organized into seven chapters. The first chapter introduces the reader to the focus, intent, scope and methodology of the research. The second chapter discusses the history and politics of rice self-sufficiency in the Philippines and the institutional consequences these efforts have had at the national, regional and local levels of the agricultural sector, namely the implementation of both PIM and IMT nationwide. The third chapter introduces the Municipality of Plaridel, the chosen location for this case study research, by discussing the history and current role of agriculture in the municipality, the main reasons behind NIA's decision to implement IMT in Plaridel and, lastly, how it will be implemented. The fourth, fifth and sixth chapters analyze whether the management, financial viability and O&M related 'best practices' for the implementation of IMT are currently being adhered to in Plaridel. The last chapter attempts to answer the primary and subsidiary research questions of this thesis.

CHAPTER 2. Rice Self-Sufficiency in the Philippines: The Historical, Institutional and Political Contexts

The Philippines, an archipelago in South-East Asia, located between the Philippine and the South China Sea (Central Intelligence Agency, 2010) consists of three main regions, which from north to south are: Luzon, where this research was conducted, the Visayas, and Mindanao (see Figure 2.1 below).

Figure 2.1: The Philippines by region

Source: Philippines Maps, n.d.

Of the total land area of the country, 300,000 square kilometers (Araral, 2006, p. 33), approximately 38 percent is devoted to agriculture (The World Bank, 2010) and approximately half of that is comprised of permanent cropland, the majority of which is irrigated palay land (Manaytay, 2008). Palay is by far the largest agricultural commodity produced in the Philippines (Manaytay, 2008). This should be of no surprise as rice is the staple food of 85 percent of the Filipino population, with each Filipino family spending an average of 11 percent of its annual budget on rice (Provincial Agriculture Office, n.d.).

The agricultural sector is a crucial component of the Philippine economy, representing the largest contribution to both income and employment in the country (Teruel & Kuroda, 2004, p. 327). In 2009, the agricultural sector employed 34 percent of the total population

aged 15 to 65 (Central Intelligence Agency, 2010) and was the primary source of livelihood for most of the rural population (Manaytay, 2008).

However, despite the importance of the agricultural sector, and thus palay production, to the Philippines' social and economic well-being, it has been a struggle for the Philippines to maintain rice self-sufficiency for the better part of the past century. This chapter will therefore discuss the history and politics of rice self-sufficiency in the Philippines and the institutional consequences these efforts have had at the national, regional and local levels of the agricultural sector, namely the implementation of both PIM and IMT nationwide.

History of Rice Self-Sufficiency in the Philippines

This section will outline the history of rice self-sufficiency in the country, which has been a primary goal of the Philippine national government since the 1940s, and the current state of efforts in reaching this goal.

After the Second World War the Philippines had “some of the lowest rice yields in the world” (NIA, 1990, p. 10). This necessitated a first ever, critical effort to import large quantities of rice, and marked the “starting point of the country's rice importation" (Bagadion, 1989, p. 5). In the 1960s, the Philippine national government finally decided to take a more aggressive stance towards its irrigation development program in order to solve the rice self-sufficiency problem. This resulted in the creation of the National Irrigation Administration (NIA) in 1964 (Bagadion, 1989, p. 3) whose purpose was to solve national rice shortage problems. In the first few years of its life, NIA deployed a number of initiatives that resulted in the Philippines achieving rice self-sufficiency in 1968, thus ending over twenty years of rice importation (NIA, 1990, p. 13).

Then, almost as soon as it had begun, rice self-sufficiency was gone as rice production was not able to keep pace with a rapidly growing population (SAPRIN, 2002). This resulted in the Philippines becoming increasingly dependent on rice imports, whose prices were subject to volatile world markets, creating an increasingly unstable national economy. This lasted until 1974, when the Green Revolution dramatically increased the productivity level of rice production in the country (NIA, 1990, p. 14).

Thanks to the Green Revolution, the country enjoyed rice self-sufficiency and produced huge surpluses (NIA, 1990, p. 16). In 1977, the country even began exporting for the “first time since the end of World War II" (NIA, 1990, p. 16). However, throughout the 1980s and 1990s there was a significant decrease in productivity due to a variety of factors, including unsustainable intense cropping systems, climatic factors (NIA, 1990, p. 19), lack of financial resources, and political turmoil and corruption (Teruel & Kuroda, 2004, p. 325).

Since the mid-1980s the Philippine national government has attempted to reverse this situation through a number of agricultural policy reforms. These reforms included dismantling trade monopolies; the importation of major agricultural inputs, such as fertilizers, seeds and machinery, the 1988 Comprehensive Agrarian Reform Program (CARP) program (which as of 2001 had redistributed approximately 3.14 million hectares to, previously, landless farmers) (Teruel & Kuroda, 2004, p. 320) and the 1997 Agriculture and Fisheries Modernization Act (AFMA), which aimed to modernize the sector, through measures such as "production and marketing support services, human resources development, research and development, extension, and trade and fiscal incentives", as well as ensuring budget allocation for agricultural research and development projects, extension, irrigation and other infrastructure (Teruel & Kuroda, 2004, p. 320).

However, these policy reforms have only been moderately successful as they were unable to overcome the effects of other larger negative influences on growth and productivity, namely population growth (Resurreccion, 2010). Therefore, despite increasing rice yields over the past decade the Philippines is still importing rice to this day (Resurreccion, 2010).

The national government, however, still has high hopes. Its newest target is to attain rice self-sufficiency by the year 2017 (Balea, 2010). However, In order to reach this goal they will have to overcome a series of obstacles that have stood in their way for decades. The following section speaks to these and how the national government plans to overcome them with new vigor.

Main Obstacles to Rice Self-Sufficiency in the Philippines

This section will look at four of the five main reasons (as poor agricultural productivity was already discussed) why the Philippines has not been able to achieve their goal of rice self-sufficiency. These are: high population growth rates, political corruption resulting in insufficient funding of the agricultural sector, erratic weather conditions, and the political economy.

1. Population Growth: The first and arguably largest obstacle to achieving rice self-sufficiency in the Philippines is the inability of rice production to keep pace with rapid population growth, despite the fact that "the growth of rice production [in the Philippines] has been remarkable" (Kikuchi, Maruyama & Hayami, 2001, p. 109). For example, rice production in the Philippines grew by "an average of 3.68% from 2002 to 2007" (Balea, 2010), which is an exceptional rate for any nation. However, it would have needed to grow by an average of 4.7% in order to keep pace with the population increase during the same period (Balea, 2010).

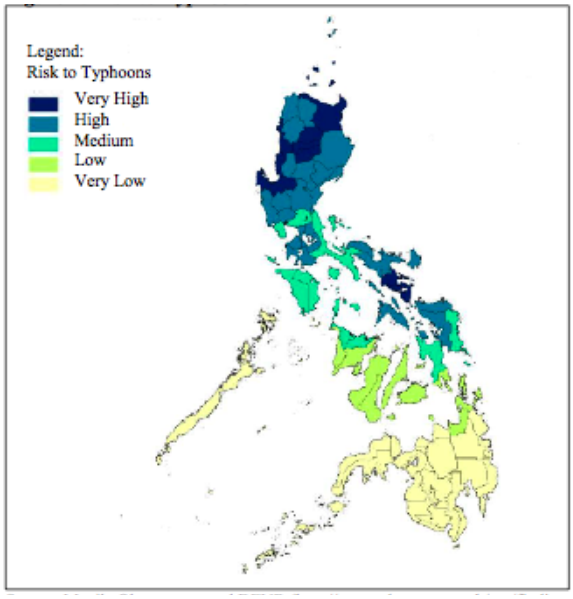
Population increases will continue to be an obstacle for the Philippines as, firstly, although growth rates have been slowly declining in the country over time the population is still growing at an unsustainable rate (Panella, 2004, p. 49), with the current population of 100 million projected to grow to 111 million by 2025 (Panella, 2004, p. 50). Secondly, there has been an increasing trend of rural to urban migration, the largest number of rural migrants settling in Manila and the surrounding areas of Central Luzon (Kelly, 1998, p. 35). This has resulted in the Philippines' "rice bowl" and other agricultural areas in close proximity to urban areas, being converted from prime agricultural, mainly palay, land to a "variety of urban and industrial uses" (Kelly, 1998, p. 35). With the country's current rate of urbanization at three percent (Panella, 2004, p. 50) it can be expected that land conversion will continue to rise. Therefore, it can be seen why rapid population growth has been a persistent obstacle for the Philippines to overcome in attempting to reach its goal of rice self-sufficiency.

2. Corruption and Underfunding: The second main obstacle the Philippines has attempted to overcome to achieve their goal of rice self-sufficiency is political corruption within the

agricultural sector. Corruption in the Philippines is thought to be prevalent and results in the frequent misappropriation of financial resources intended to fund agricultural projects (Business Mirror, 2010). One well known example of this occurring in the agricultural sector was in 2004 when three billion Pesos allocated to the Department of Agriculture (DA) was allegedly siphoned off to the presidential campaign of Gloria Arroyo, with the money "mysteriously end[ing] up in the hands of obscure private foundations and companies… congressmen, mayors and governors" (Rimban, 2005). This resulted in the failure of numerous programs and policies, such as AFMA, due to low budgetary support (Business Mirror, 2010). Until political corruption is curbed, the agricultural sector will undoubtedly remain seriously under-funded. The recently inaugurated Aquino has vowed to "fight corruption within the bureaucracy" (philSTAR, n.d) but success in the matter has yet to be seen.

3. Weather: The last main obstacle the Philippines needs to overcome to achieve rice self-sufficiency is erratic weather conditions. The Philippines is hit by 20 to 22 typhoons a year, the level of risk to typhoons by region can be seen in Figure 2.2, below, as well as both El Nino and La Nina, which result in both flooding and drought (Rincon & Virtucio, n.d., p. 19).

Figure 2.2: Level of risk to typhoons in the Philippines



Source: Rincon & Virtucio, n.d., p. 19.

These events frequently result in drastically reduced rice yields and farmers' incomes (Oryza, 2010), many of which already fall below the poverty line (Raby, 1997). Some recent examples are:

- **"**From 2000 to 2005, typhoons robbed approximately one million tonnes of our rice. Loss due to drought was about 400 thousand tonnes during the same period" (Agriculture Business Week, 2008).
- "In 2009, rice production fell by 3.31% due to back-to-back killer typhoons Ondoy and Pepeng" (Balea, 2010). Combined they "destroyed US$4.3 billion in crops, property and infrastructure" (Office of the President Adviser on Global Warming and Climate Change, 2009).
- "The 1997-1998 El Nino resulted in a 6.6 percent GDP contraction in agricultural production... [a] combined loss of 1.8 million tons in rice and maize" (Rincon & Virtucio, n.d., p. 18).

These costs are expected to increase in the future as the Philippines is "highly vulnerable to the adverse impacts of climate change" (Rincon & Virtucio, n.d., p.2). Based on predictions from the Hadley Center's global climate model PRECIS, the Philippine's Climate Change Commission stated that "significant warming will occur in the Philippines by the middle of the current century," the "average mean temperature is projected to increase by 0.9C-1.2C by 2020 and 1.7C-3.0C by 2050" (World Bank, 2005, p. 16). It is expected that this will result in more typhoons, heavy flooding (Yap, 2009), drastic changes in rainfall patterns (Climate Change Commission Office of the President, 2009, p. 12), sea-level rising, droughts, (Resurreccion, 2010) and other extreme weather events (Yap, 2009). "The Philippines also ranks among the top 10 countries whose economic activity is at risk from an intensification of storm surges" caused by climate change (Sering, 2009).

The impacts of these climate change induced events on the agricultural sector hold catastrophic potential. In 2007, the IPCC identified that the water and agricultural sectors were those "most sensitive to climate change-induced impacts in Asia" (Godilano, 2009).

The Philippines will experience events such as, increased incidence of pests (Rincon & Virtucio, n.d., p. 16), altered quantity and quality of available fresh water (Godilano, 2009), changes in timing of growing season (Rincon & Virtucio, n.d., p. 16), the drier season becoming dryer and the wet season becoming wetter (Rincon & Virtucio, n.d., p. 15), and generally "more unpredictable farming conditions" (Godilano, 2009). If current trends persist the 2050 yield of irrigated rice crops in the Philippines will decrease by approximately 10 percent (Godilano, 2009) as approximately 84 percent of rice lands in the Philippines will be affected by climate change. In numerical terms, 1 degree Celsius increase equates to a 1 million tonne increase of rice imports for the Philippines (Godilano, 2009). It can therefore be seen how the Philippines' unfortunate susceptibility to erratic weather conditions has, and will continue to be, an obstacle to reaching their goal of rice self-sufficiency.

4. Political Economy: The last main obstacle the Philippines has had to address to achieve rice self-sufficiency has been to overcome government policies of the 1960s that subverted the viability of the agricultural sector in their preference for the development of the manufacturing sector, resulting in the agricultural sector's staggering decline. Whereas the Philippines was one of the most productive in Asia in the 1960s, from the 1980s onward it has consistently been among the most poorly performing (Asian Development Bank, 1994; Balisacan, 2000).

The economic policies, surrounding the import substitution industrialization strategy (e.g. overvaluing domestic currency, increasing tariffs and quantitative restrictions on agricultural trade) resulted in the depression of relative prices of agricultural products and encouraged capital-intensive patterns of industrialization (Balisacan, 2000, p. 26). This negative effect on the agricultural sector was exacerbated by additional policies that depended on the acquisition of foreign loans that required repayments, further exacerbating the country's fiscal deficits. Financial constraints led to lack of investments in rural infrastructure such as farm-to-market roads and irrigation that constrained "the responses of rural areas to the stimulus provided by agricultural growth [during the Green Revolution], thereby further stifling economic development [in the sector]" (Balisacan,

2000, p. 2). Furthermore, this motivated those working in the agricultural sector to seek employment opportunities in the expanding and more lucrative non-farming economic areas (Balisacan, 2000, p. 10). The effects of these policies on the agricultural sector were severe and the attempts in the 1990s to reverse their impact have been insufficient to help achieve rice self-sufficiency in the country (Asian Development Bank, 1994, p. 4).

Now that it has been established how and why the Philippines has been unable to reach their goal of rice self-sufficiency it will be discussed how the national government created the National Irrigation Administration (NIA) specifically to overcome these obstacles. It will also be discussed how NIA has attempted to do so by fundamentally reshaping the irrigation sector through the nationwide implementation of PIM and IMT.

History of the National Irrigation Administration, PIM and IMT in the Philippines

In order to achieve their goals, with respect to rice self-sufficiency, the Philippine national government, under President Ferdinand E. Marcos, established the National Irrigation Administration (NIA) through the Republic Act No. 3601 (Philippine National Government, 1963) in I964. This act not only created NIA but also allocated funds from the national treasury to implement the following objectives through them (Raby, 1997): to study, improve, construct, and administer all irrigation systems in the Philippines; to investigate all available and possible water resources in the country for the purpose of utilizing the same for irrigation; to collect ISF from the users of the irrigation systems constructed by it; to undertake all other activities directly or indirectly necessary for the attainment of its above objectives (such as R&D and land reform)

During its first decade of operation NIA believed that by emphasizing the design and construction of irrigation systems, with special focus on "the technical aspects of water distribution, system maintenance and physical rehabilitation" they would best be able to reach their goals (Bagadion, 1989, p. 10). They also believed that "institutional matters, especially the development of farmer's organizations" were relatively inconsequential to the proper management of irrigation systems and that such "minor activities [were] better left to lower level staff and other government agencies" (Bagadion, 1989, p. 12). However, NIA soon started to encounter problems with the IAs, such as: inequitable distribution of water; low irrigation fee collection rates; rapid deterioration of infrastructure due to poor maintenance; and far lower than expected production levels. These problems resulted in NIA becoming an enormous financial burden on the state and created a clear understanding that policies needed to be changed (Bagadion, 1989, p. 4).

To fix these problems, and to redouble efforts at achieving their preliminary goals, NIA's charter was amended in 1974 under Presidential Decree 552, thus transforming NIA from a government bureau to a semi-autonomous public corporation (Bagadion, 1989, p. 5). This amendment increased their decision-making and financial capacities (National Irrigation Administration, 2009), however, it also required NIA to "recover all [of] its expenses in construction, rehabilitation, operations and maintenance from beneficiaries"

(Sangupta, 1991, p. 255), thus ending NIA's tradition of paternalistic support. The subsidies NIA received from the national government declined from 10 billion pesos in 1964 (NIA, 1990, p. 27), when NIA was established, to 25 million in 1976 and would continue to decrease to zero by 1982 (Vermillion, 1997, p. 5). Although this presented hardships for the agency, it created a strong incentive for NIA to become financially solvent (Groenfeldt, 2004).

To ensure financial viability as well as to increase rice yields NIA decided to adopt the new Participatory Irrigation Management (PIM) model, which promoted the gradual transference of responsibilities of irrigation management of Communal Irrigation Systems (CISs) in the Philippines to individual farmer's organizations (Bagadion, 1989, p. 2), also known as Irrigation Associations (IAs). The basic premise of PIM is that when farmer beneficiaries participate in project planning and execution, the degree of dependency on the government after program completion, both administratively and financially, is significantly reduced. This is because the IAs become empowered to manage their own systems, resulting in an increased sense of personal and community level responsibility for the financial and productive success of their irrigation systems (Korten & Siy, 1989). This increases production levels given farmers' greater knowledge of the system and because they tend to be more responsive than government workers as they have more invested in the system's success (Bagadion, 1989, p. 9). Therefore, NIA's hope in implementing PIM was that it would provide both reductions in the financial costs incurred in these systems as well as an increase in agricultural yields, thus helping NIA to reach their main goal of rice self-sufficiency (Attia, n.d.).

In 1976, NIA "initiated its first two [PIM] pilot projects, funded by the Ford foundation in conjunction with the Philippine national government, in Laur, Nueva Ecija" (Bagadion, 1989, p. 4). To ensure the success of its new PIM program, throughout the implementation phase, NIA sought to include the farmers in every aspect of their respective projects. Thus, they assumed more of an "enabler role, in order to develop the farmer's own capacity to carry out important development functions" (Bagadion, 1989, p. 6). NIA included the farmers in such activities as: decision making within the irrigators'

associations, planning the improvements and expansion of the irrigation system, securing the water rights, obtaining rights-of-way for canals and other facilities, constructing the irrigator's facilities, and controlling construction costs. NIA also conducted a variety of trainings on such aspects as financial and operational management (Korten & Siy, 1989, p. 146) so that when the initial phases of the project were completed, the agency could hand over full responsibility and authority of the system to the farmers' organizations as they would be empowered and educated enough to rise to the challenge (Korten & Siy, 1989). The only way NIA planned to be involved after the handover would be to provide minimal technical assistance and to collect the interest-free loans they had provided to the irrigators associations (Bagadion, 1989, p. 15).

The pilot projects were facilitated by adding a 'working group', named the Communal Irrigation Committee, whose members included the Institute of Philippine Culture at Manila University, the Asian Institute of Management, the International Rice Research Institute, NIA, and the Ford Foundation (Bagadion, 1989, p. 4). They implemented a 'learning-by-doing' approach, which meant that they constantly reviewed field level experiences, systematically extracted lessons learned, developed new methodologies when needed, amended agency procedures and policies when required and contextualized each pilot project in the cultural, historical, economic context of the subject communities. In addition, "Community Organizers" (COs) were hired by NIA to live in the farming communities and to act as brokers between the farmers, "helping them vocalize their needs, problems, and ideas regarding the irrigation system expansion, maintenance, and operation, while informing them of the kind of assistance they could obtain from NIA" (Raby, 1997). These additions to the pilot projects, which were said to have made a world of difference in the outcomes of these projects (World Bank, 2005, p. 42), were made possible by a large grant from the Ford Foundation and a flexible subsidy from the national government who "recogniz[ed] that NIA's revenues from fee collections would not immediately be enough to cover the costs of O&M" (Bagadion, 1989, p. 4).

All of these measures combined resulted in an overall improvement in the "functioning and financial feasibility of the systems", as well as "the empowerment of farmers through

their newly acquired administrative and technical skills" (Bagadion, 1989, p. 7). More specifically, improvements were realized in: areas irrigated; productivity; absolute rice yields; equity of water access; farmers' ability to keep financial records, collect ISFs and repay loans; and farmers' ability to coordinate with NIA staff (de los Reyes, Romana & Jopillo, 1989, p. 92). In other words, they were an unprecedented success with respect to both of NIA's goals for the project, increased levels of palay production and a reduced long-term financial burden to NIA. In addition, PIM systems cost only 3 percent per hectare more than implementing non-participatory systems, therefore, "from NIA's standpoint, the financial benefits of making the investment in the institutional activities were substantial" (de los Reyes, Romana & Jopillo, 1989, p. 95).

In 1979, due to the pilot projects' success NIA started to expand its Philippines adapted participatory method to other areas of the country (Tapay, Greg & Hammond, 1987, p. 129). This expansion went so well that in 1981 the "World Bank team recommended the adoption of the participatory approach in all of NIA's communal irrigation projects (Bagadion, 1989, p. 3) and by 1983 the PIM approach was "standard procedure in all communal irrigation projects of the agency" (Sangupta, 1991, p. 252). As a consequence of their exceptional results with PIM "Amnon Golan of the World Bank classified the NIA as 'the finest irrigation agency in the whole of Asia and in any developing country in the World'" (Oorthuizen, 2003, p. 28). It should therefore be of no surprise that "participatory management and development has become a cornerstone, a foundation of irrigation programs in the Philippines" (Ofrecio, 2006, p. 1) or that the Filipino experience has "provided ideas and models for participatory irrigation development in other Asian countries like…Sri Lanka, Indonesia, Thailand, Nepal, India, and Bangladesh" (Bagadion, 1989, p. 19).

Until 1980, PIM was carried out exclusively on communal irrigation systems. However, it was the NISs that represented the majority of NIA's long-term financial problems as "NIA continued to incur a deficit in its operations and maintenance expenditures [for NISs], which it had previously promised [to the national government] to eliminate" (Araral, 2006, p. 61). A specific example of the severity of NIAs deficits from NISs is

that, "from 1991 to 2000, on average, NIA's operating income was 73 percent below its operating expenses", as NIS ISF collection rates "hovered just under 50% of billings" (Shivakoti, Vermillion, Lam, Ostrom & Pradhan, 2005, p. 292) throughout the 1990s. In 2000 alone, NIA "registered a net operating loss of nearly 1 billion pesos" (Shivakoti, Vermillion, Lam, Ostrom & Pradhan, 2005, p. 292).

Therefore, to resolve their financial issues NIA launched its Irrigation Operations Support Program (IOSP) for NISs in 1980, which was modeled after the PIM approach implemented in the communal systems (Thompson, 1995, p. 1522). However, PIM in NISs proved to be far too expensive for the cash strapped NIA to administer. Consequently, NIA was relegated to turning to the Irrigation Management Transfer (IMT) model in 1984, which, for NIA, did not include most of the participatory characteristics that had made their PIM model so successful (FAO, 2003, p. 36)

In 1980, the IMT Pilot Project was launched in Buhi-Lalo in Camarines Sur. Its relative success prompted NIA to expand IMT to several other NISs across the country. By 1986, approximately 35,000 hectares, or thirty-seven NISs, were either fully turned over to the irrigation associations or jointly managed with NIA at the secondary canal level (Korten & Siy, 1989, p. 156). However, the results of these first rounds of IMT transfers left much to be desired. The majority of IAs, apart from those that were exceptionally strong before IMT, experienced enormous difficulties managing their irrigation systems. Most were financially unsustainable, neglected their O&M, and had significant difficulty with management efforts due to insufficient institutional development prior to turnover (Raby, 1997). As a result, in 1991 NIA implemented Irrigation Operations Support Program II (IOSP II), funded by the Ford Foundation. IOSP II aimed to: strengthen the institutional, technical, and O&M capabilities of IAs; improve performance through minor rehabilitation and works; and provide financial support to NIA which would hopefully result in a larger number of financially viable and managerially competent IAs post IMT (Panella, 2004, p. 122).

However, in the same year that IOSP II was launched, in line with the decentralization push of 1991, the Philippine National Government, in accordance with the Agriculture and Fisheries Modernization Act (AFMA) (Republic Act No. 8435) of 1997, called for "further devolution in the irrigation sector" (Bandyopadhyay, Shyamsundar & Xie, 2007, p. 22) in order to achieve "greater farmer participation in irrigation management" (Panella, 2004, p. 125). However, it has been argued that the real reason behind this move was to achieve the greater financial viability of NIA (NIA Interview 10). To achieve this objective the national government required NIA to turn over all IAs to the secondary canal level, despite the difficulties they were then having with the IMT program. After this was completed, NIA's principal roles and responsibilities would be to operate and maintain only major irrigation structures (i.e., headworks and main canals of NISs only) and to provide technical assistance to local government units (for CISs) and IAs (for NISs) to complement the devolution of the planning, design, and management (Panella, 2004, p. 137).

In the Philippines, very few studies have been conducted to assess the impact of NIA's rushed turnover of irrigation systems management, on the country's long-term ability to become rice self-sufficient. Those few that have been conducted, especially by independent observers, have shown that it has had devastating consequences on the ability of the agricultural sector to reach rice self-sufficiency as well as on the livelihoods of the affected farmers. With one study specifying that "in more recent years, the NIA and its national systems were – and still are – in serious trouble" (Oorthuizen, 2003, p. 29). It is therefore of critical importance to gain further insight into why IMT in the Philippines has been unable to provide the results that NIA, and the rest of the Philippines, desperately wants and needs. Due to the financial situation of NIA, IMT remains the main hope for achieving rice self-sufficiency in the country. Some insight into this question can be gained from looking at the implementation of IMT in the case study of Plaridel, who is one of the last NISs to implement IMT in the Philippines.

However, before the case study of Plaridel is introduced it is first important to note that, although it is beyond the scope of this research to study in depth, multi-lateral agencies'

development strategies and policy recommendations have to a large degree dictated irrigation and agricultural policy in the Philippines, particularly since the 1970s (Balisacan, 2000).

Throughout the 1960s and 1970s agricultural sector management was highly centralized; in fact, these decades were characterized by unprecedented government intervention (Balisacan, 2000, p.16). However, once the substantial growth of the sector began to wane (due to the effects of the Green Revolution, the slowdown of new lands being brought into production, and the drop in the world commodity prices affecting the country's traditional export crops (Balisacan, 2000, p.16)) the Philippine agricultural sector opened its doors to multi-lateral organizations who promised answers to the productivity problems of the sector and the funds to solve its financial woes (Balisacan, 2000, p. 2). The main multi-lateral organizations who have been involved are the Asian Development Bank (ADB), The Overseas Economic Cooperation Fund (OECF), USAID, The World Bank (Asian Development Bank, 1994, p. 6), The Ford Foundation (Bagadion, 1989, p. 4), and the International Rice Research Institute (IRRI) (Bagadion, 1989, p. 4), among others.

However, by opening their doors to these organizations, at a time when they were highly dependent on foreign debt for funding, the Philippines became subject to highly onerous conditions associated with structural adjustment policies' conditionalities attached to the provided loans and/or grants. This ultimately resulted in the massive decentralization, deregulation, streamlining, and privatization of the agricultural and irrigation sector (Balisacan, 2000; Asian Development Bank, 1994). The commencement of these results was marked by NIA's charter being amended, transforming it from a government bureau to a semi-autonomous public corporation, responsible for its own financial viability (Bagadion, 1989, p. 5). The other main policies resulting from the influence these organizations had on the agricultural sector are enumerated in Table 2.1.

Regrettably, the effects of these policies were largely negative, resulting in a sharp decline in much needed public and private investments (Balisacan, 2000, p. 8), the

decline of public participation and support (Balisacan, 2000, p. 8) the demise of private markets for agricultural land, lower agricultural production rates (Balisacan, 2000, p. 18), massive debts in the agricultural sector to these multi-lateral organizations as well as their increased dependence upon them (Nemenzo, 2008, p. 9) and ultimately the Philippines to this day being unable to achieve rice self-sufficiency (Resurreccion, 2010).

Table 2.1. National irrigation policy history in the Philippines

- **Late 1940s:** Starting point of the Philippine's rice importations (Bagadion, 1989, p. 5).
- **1964:** NIA created and charged with solving national rice shortages (Bagadion, 1989, p. 3)
- **1960s-70s:** Green Revolution dramatically increases productivity level of rice production in the country (NIA, 1990, p. 14).
- **1970s-80s:** Rise of the structural adjustment policies promoting the transfer of rights and responsibilities of irrigation to local communities (Araral, 2009, p. 687).
- **1974:** NIA's charter amended, transforming it from a government bureau to a semi-autonomous public corporation (Bagadion, 1989, p. 5).
- **1976:** PIM model implemented, transferring responsibilities of irrigation management of Communal Irrigation Systems to individual farmer's organizations (Bagadion, 1989, p. 2).
- **1980:** IMT model implemented, transferring responsibilities of irrigation management of National Irrigation Systems to individual farmer's organizations (Korten & Siy, 1989, p. 156).
- **1986:** Start of the deregulation of the agricultural sector, which included: abolition of monopsonistic agencies and arrangements; lifting of export bans; liberalization of distribution and importation; opening of import trade; removal of price controls, among others (Balisacan, 2000, p. 16).
- **1988:** Comprehensive Agrarian Reform Program (CARP), redistributed approximately 3.14 million hectares to, previously, landless farmers (Teruel & Kuroda, 2004, p. 320).
- **1991:** Local Government Code, aimed to achieve greater decentralization of government operations across all sectors (Asian Development Bank, 1994, p. 5).
- **1991:** NIA implements Irrigation Operations Support Program II (IOSP II), aimed at building capacities of farmer organizations to better implement IMT (Panella, 2004, p. 122).
- **1997:** Agriculture and Fisheries Modernization Act (AFMA), aimed to modernize and devolve the sector (Bandyopadhyay, Shyamsundar & Xie, 2007, p. 22) and enhance the competitiveness of domestic agriculture in the global marketplace (Balisacan, 2000, p. 19).

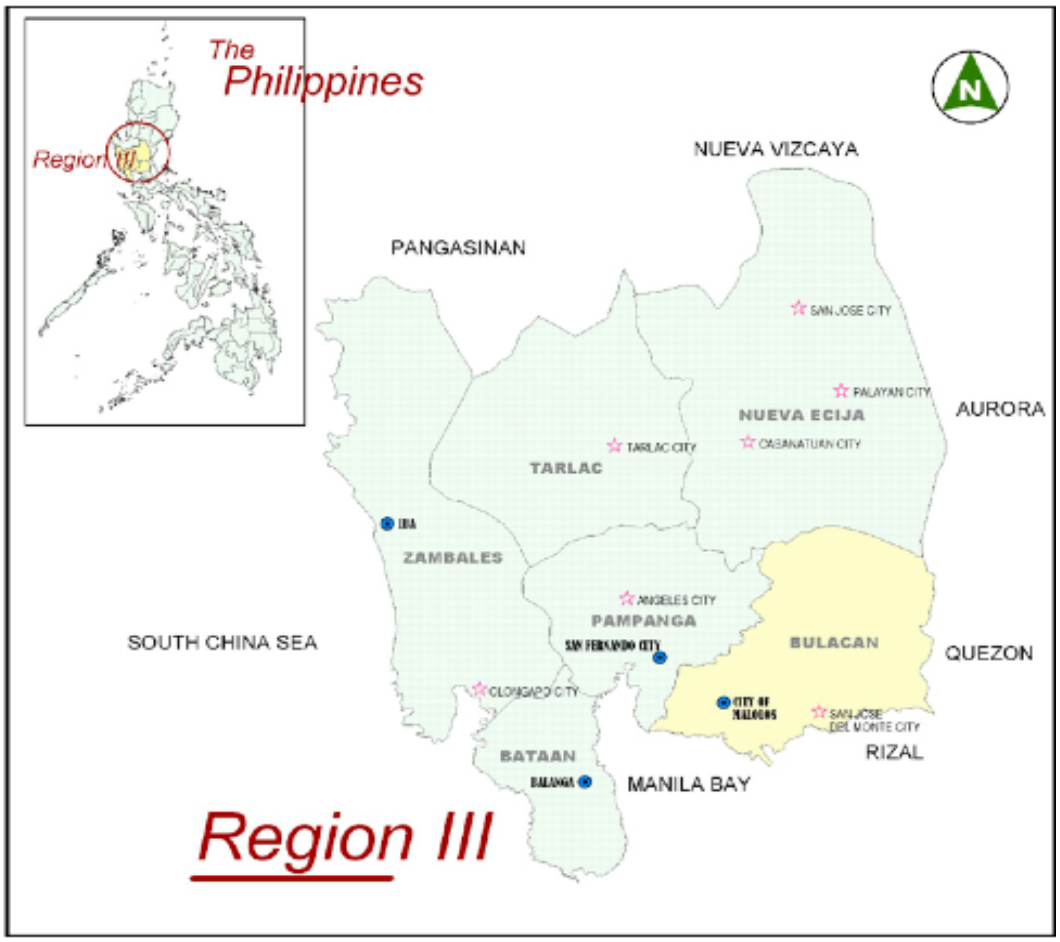
Chapter Three: Case Study of Plaridel, Bulacan: Irrigation Opportunities and Challenges

This chapter will introduce the Municipality of Plaridel, the chosen location for this case study research. It will first discuss the history and current role of agriculture in the municipality and where it fits into NIA's larger national irrigation structure. It will then discuss the two main reasons behind NIA's decision to implement IMT in Plaridel: to help achieve rice self-sufficiency and for NIA to become financially viable. Lastly, this chapter will discuss when and how IMT will be implemented in Plaridel.

The Role of Agriculture and Rice in Plaridel

Plaridel is a municipality in the province of Bulacan, located on the island of Luzon and is one of the seven provinces that make up the Central Luzon Region, or Region III, of the Philippines (Province of Bulacan, 2009, p. 10). Its geographic location can be seen below in Figure 3.1.

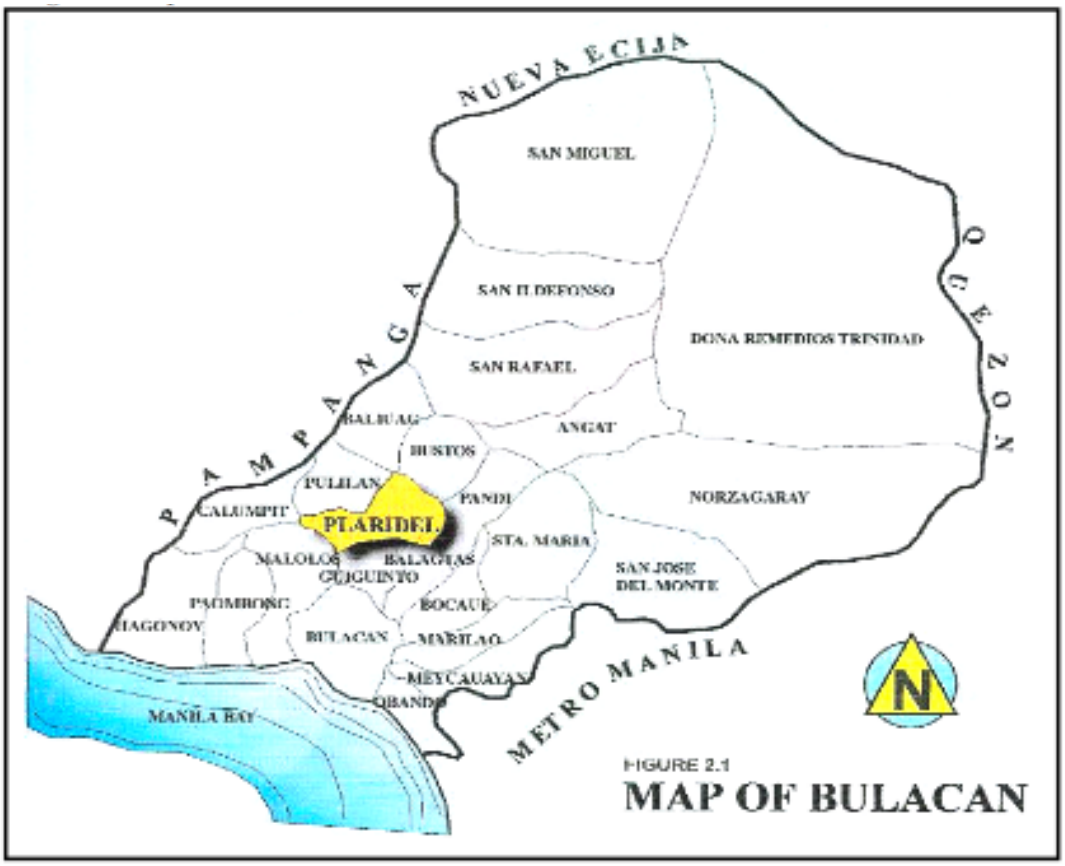
Figure 3.1: Region III, Philippines



Source Bulacan Province, 1997, p. 22

Plaridel is located in the mid-west of Bulacan, which can be seen in Figure 3.2.

Figure 3.2: Map of Plaridel in Bulacan



Source: Benzidane, Blond & Mazur, 2008, p. 26

Plaridel has a long and robust history of agriculture. It was one of the first towns in the country to experiment with 'Agrarian Reform' in the 1960s, and was one of the first municipalities to adopt Green Revolution technology, which included improved irrigation infrastructure and irrigation management techniques (Municipality of Plaridel, 2002, p. 16). This strong history of agriculture can be attributed in large part to the fact that Plaridel sits on prime agricultural lands in the 'rice bowl' of the Philippines (Provincial Planning and Development Office, 2010, p. 38).

According to the most recent data available from the Department of Agriculture (DA), in March 2000 there were 1,159 palay farmers in Plaridel, each tilling approximately 1.38 hectares. The DA "estimates that 5 percent are owner-cultivators, 5 percent are shared-tenants, and 90 percent are land reform beneficiaries with CARP certificates. This means that most farmers in Plaridel at present are landowners by themselves" (Municipality of

Plaridel, 2002 15).

Of Plaridel's total land area of 4,250 has., approximately 62 percent or 2,630 has. are used for agricultural purposes. Of the municipality's total agricultural land approximately two-thirds or 1,665 has., consist of fully irrigated palay land (Frias, 2010), with water provided by NIA from the Angat Dam through a "run-of-the river gravity system" (Municipality of Plaridel, 2002, p. 14). This provides Plaridel's farmers a great advantage as they have historically been assured two cropping seasons per year (Municipality of Plaridel, 2002, p. 16).

Plaridel falls under the Angat-Maasim River Irrigation System (AMRIS) of NIA (Raby, 1997). AMRIS has been operational since 1972 (NIA, 2008) and is the second largest district, or region, in the country with respect to both service area and number of farmer beneficiaries (see Table 3.1 below).

Table 3.1: NISs by region

Region (District)	Service Area (Has)	No. of Beneficiaries
CAR	22,622	15,946
1	55,967	56,293
2	52,589	42,327
AMRIS	**88,370**	**64,513**
3	72,665	53,869
UPRIIS	120,221	88,127
4	53,146	37,036
5	22,376	28,401
6	52,216	43,480
7	10,040	11,996
8	19,144	21,794
9	15,162	8,671
10	26,411	14,120
10AR	2,500	3,056
11	33,971	23,331
12	59,460	44,124
ARMM	13,488	8,640
13	28,019	19,791

Source: (NIA "Irrigation Delivery", n.d.)

Although much of the land in Plaridel is devoted to agriculture, the chief driver of Plaridel's economy is the service sector. Although agriculture still plays a large role in supporting Plaridel's economy, this role has been declining over time (Provincial Planning and Development Office, 2010, p. 43). For example, the number of persons employed in the agricultural sector has been declining dramatically (Municipal Government Official Interview 3)[3], to the point where this once predominantly farming based community now employs five times more citizens in the service sector than in the agricultural sector (Municipality of Plaridel, 2002, p. 38). This has mainly been a result of migration and consequent land conversion in the municipality, all of which will be discussed in the following section.

[3] First interview reference. Interviews are cited by occupation and are numerically ordered within their occupation category, which is determined by the date interviewed. A complete list of interviews can be found in the Appendix.

Reasons for the Implementation of IMT in Plaridel

This section will discuss the two main reasons behind NIAs decision to implement IMT in Plaridel: to help achieve rice self-sufficiency and secure NIA's financially viability.

Rice Self-Sufficiency in Plaridel and Bulacan

The first main reasons NIA gives for implementing IMT in Plaridel is that it will result in higher rice yields, thus helping to achieve rice self-sufficiency, which the Philippines has been striving to achieve ever since the Second World War (NIA, 1990, p. 10).

Bulacan, although historically producing large surpluses of palay, has seen declining rice self-sufficiency rates, especially over the last ten years. Between 2002 and 2008, Bulacan managed to satisfy only 96 percent of its palay requirements, which made it the only province in Central Luzon that was not rice self-sufficient for this period (Provincial Planning and Development Office, 2010, p. 27). In contrast, the other provinces of Central Luzon achieved between 128 and 567 percent rice self-sufficiency during the same time period. Bulacan's inability to be rice self-sufficient has been despite an "upward trend in palay production" in the province (PPDO Research, Monitoring, and Evaluation Division). This seemingly paradoxical trend has been a result of the overwhelming rate of population growth in the province (which is a result of the combined effect of the natural birth rate and heavy in-migration from other provinces) (Provincial Planning and Development Office, 2010, p. 28).

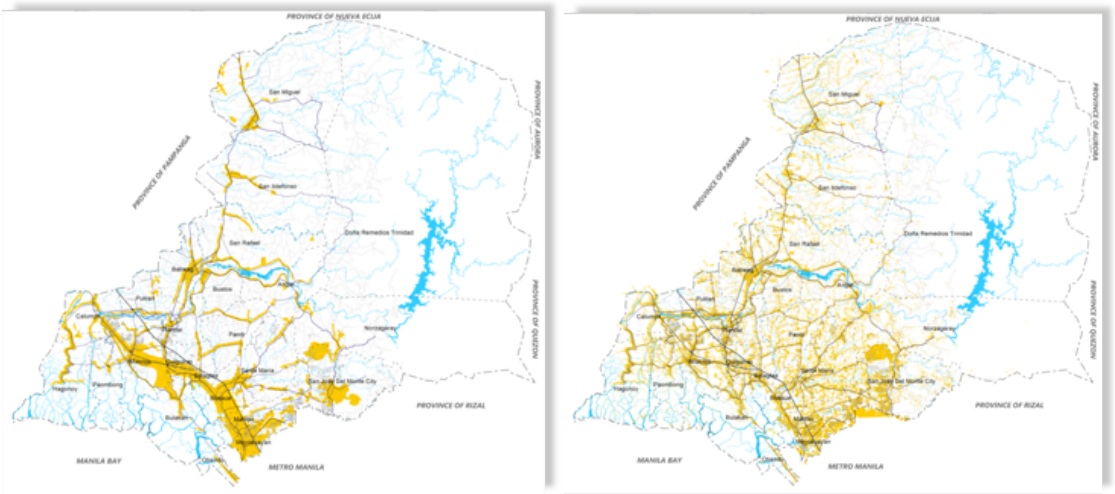
Although no data is available on Plaridel's rice self-sufficiency rates, their rapidly growing population portends a path of rice self-sufficiency problems similar to those experienced in the rest of Bulacan. As of the most recent census, in 2007, Plaridel had a population growth rate of 3.26% between 1995 and 2007, which was comparable to that of the rest of the province. This will remain a problem for Plaridel far into the future as its current population of 97,225 (Provincial Planning and Development Office, 2010, p. 10) is set to double by 2028 (Municipal Planning and Development Coordinator, 2008).

There are two main obstacles standing in the way of Plaridel, and Bulacan, meeting the palay production needs of their rapidly growing population. The first is the slow adoption of new rice technologies, leading to low rice productivity. Palay production in Bulacan averages only around 70 to 80 cavans per hectare (one cavan equaling approximately 75

Litres (Bureau of Insular Affairs, 1903)), whereas, in some areas of the Philippines, "palay production can reach up to 150 to 180 cavans per hectare" (Bulacan Province, 1997). Although no long-term data is available for Plaridel's average palay production levels, in 2008 they were just under 90 cavans per hectare (Municipal Government Official Interview 3), which although higher than Bulacan's average often fluctuates dramatically due to erratic weather events (Provincial Planning and Development Office, 2010, p. 33).

The second main obstacle standing in the way of Plaridel, and Bulacan, meeting the palay production needs of their rapidly growing population is the "irrational and indiscriminate conversion of agricultural land to other uses" (Provincial Planning and Development Office, 2010, p. 25). One of the main reasons for Bulacan's and Plaridel's high rates of agricultural land conversion is its proximity to Manila, located just 41 kilometers away (Benzidane, Blond & Mazur, 2008, p. 26). This has resulted in large inflows of migrants from Manila, who are either turning Plaridel's agricultural lands into 'bedroom communities' for wealthy professionals or informal settlements for poor migrants (Provincial Planning and Development Office, 2010, p. 25). The dramatic increase of 'built up' areas across Bulacan, resulting from these two types of migrants along with the 'natural' population growth of the province, is depicted in Figures 3.3 and 3.4 below.

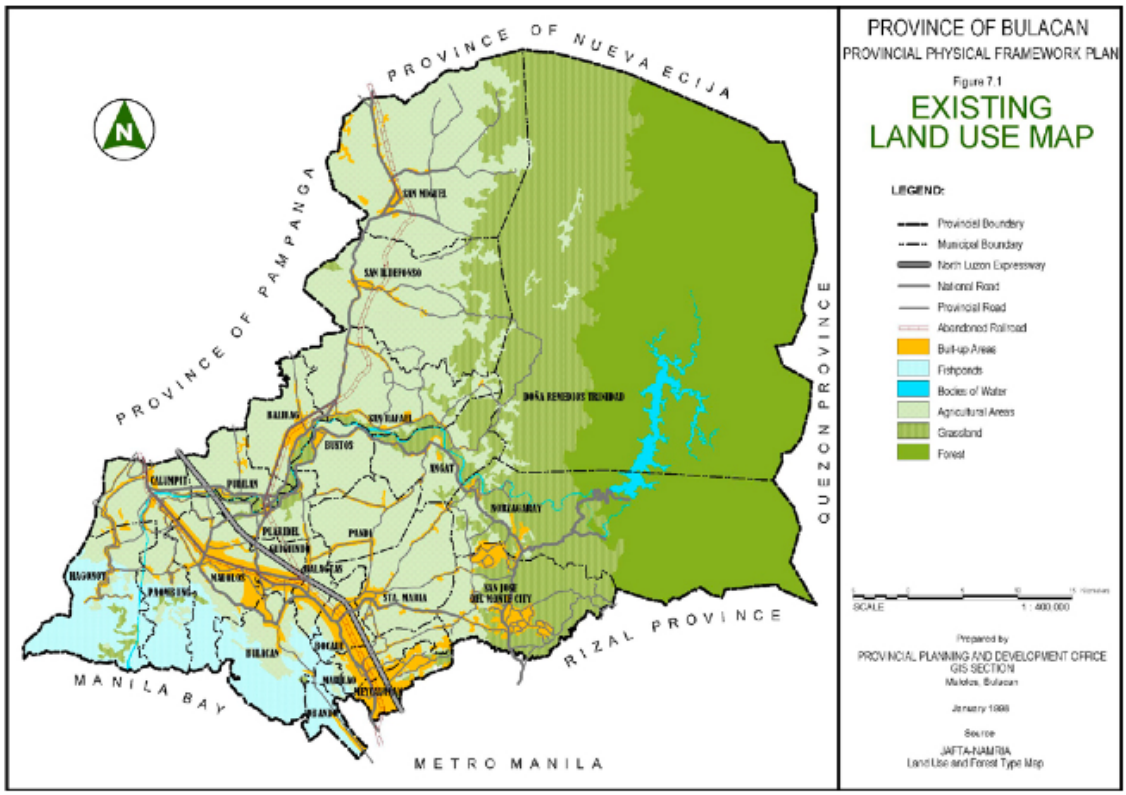
Figures 3.3 and 3.4: 'Built-up Areas' in Bulacan province, 1997 & 2007



Source: Provincial Government Official Interview 1

When these main built up areas (yellow) are transposed onto the existing land use map of Bulacan, Figure 3.5, it can be seen how they are sitting on Bulacan's prime agricultural land (lightest green: 'Agricultural Areas') which surrounds Plaridel.

Figure 3.5: Existing land use map of Bulacan



Source: Bulacan Province, 1997

When looking at population growth rates of Plaridel's barangays chosen for this study, (see Table 3.2), it can be seen that Bagong-Silang, Bulihan, Culianin, Lalangan and Parulan are all considered to be ‘fast-growing’ barangays (Municipal Planning and Development Coordinator, 2008) with Bagong-Silang, and Lalangan experiencing “a phenomenal increase in population density” over the past decade (Municipality of Plaridel, 1998, p. 38). As well, even the ‘slow-growing’ municipalities, Lagundi and Sipat, are experiencing rapid growth relative to past trends. Sipat for example is expected to double its 2007 population by 2017 (Municipal Planning and Development Coordinator, 2008). All of this puts at risk the prime agricultural lands on which they are located.

Table 3.2: Population density, change, estimated doubling time and growth category by barangay

BARANGAY	2007 Density	Change 2000*	Double Time	Category
Agnaya	44.37	11.81	2025	fast-growing/high density
Bagong-Silang	**12.97**	**5.64**	**2019**	**fast-growing/low density**
Banga I	59.36	15.97	2025	fast-growing/high density
Banga II	61.73	13.63	2030	slow-growing/high density
Bintog	17.48	1.8	2079	slow-growing/low density
Bulihan	**11. 51**	**2.79**	**2026**	**fast-growing/low density**
Culianin	**16.24**	**4.73**	**2021**	**fast-growing/low density**
Dampol	43.17	10.69	2024	fast-growing/high density
Lagundi	**14.94**	**2.97**	**2050**	**slow-growing/low density**
Lalangan	**9.2**	**2.17**	**2028**	**fast-growing/low density**
Lumang bayan	25.72	0.67	2089	slow-growing/high density
Parulan	**17.98**	**3.65**	**2024**	**fast-growing/low density**
Poblacion	86.52	12.48	2043	slow-growing/high density
Rueda	26.37	6.54	2026	fast-growing/high density
San Jose	11.39	3.3	2022	fast-growing/low density
Sana Ines	6.35	1.9	2022	fast-growing/low density
Santo Nino	130.81	17.08	2038	slow-growing/high density
Sipat	**14.51**	**2.24**	**2017**	**slow-growing/low density**
Tabang	54.71	7.81	2025	fast-growing/high density
TOTAL	**23.71**	**4.78**	**2028**	

Source: Municipal Planning and Development Coordinator, 2008
*Percent population change by barangay from 2000 to 2007

These trends are expected to continue in the future as population growth is expected to continue in Manila (Provincial Planning and Development Office, 2010, p. 26). Furthermore, national policies recently implemented to protect prime agricultural land across the country, have proven unenforceable with land conversion continuing to occur unabated (Municipality of Plaridel, 2007, p. 52). Many farmers in Plaridel anticipate that land conversion will continue, as a result of the upcoming Plaridel Bypass Road construction project, which aims to facilitate traffic flow to and from Metro Manila (Provincial Planning and Development Office, 2010, p. 26), which will encourage people to move to Plaridel and thus make it more profitable for farmers to sell their land (Farmer Interview 1).

Therefore, as rice self-sufficiency in Plaridel and Bulacan is expected to become increasingly difficult to achieve, proper management of the remaining irrigated palay land will be of critical importance. Each remaining hectare will also have to become more productive than before. It is for this first main reason that IMT is being implemented in Plaridel.

Financial Viability of NIA

The second main reason NIA provides for supporting IMT in Plaridel is that it will aid NIA in becoming financially viable at the regional and national levels.

Plaridel's ISF collection rates have historically been relatively low, ranging between 60-70 percent (Farmer Group Interview 2, 5-8; NIA Interview 1, 4, 6 and 10). In addition, NIA staff indicated that ISF collection rates in the municipality have been on the decline in the past several years (NIA Interview 4). These low collection rates make it almost impossible for NIA's regional office to undertake the O&M responsibilities assigned to them. Therefore, as the IMT process will delegate the roles and responsibilities for irrigation system O&M to Plaridel's IAs, the related financial burden imposed by the IAs low collection rates will be eliminated and make NIA significantly more financially viable (NIA Interview 4).

In addition, as collection rates typically increase post-IMT (International Water Management Institute, 2007, p. 23), NIA believes that the IAs will then have sufficient funds to undertake the delegated O&M roles and responsibilities (NIA "Review of Irrigation Management Transfer Program", n.d.).

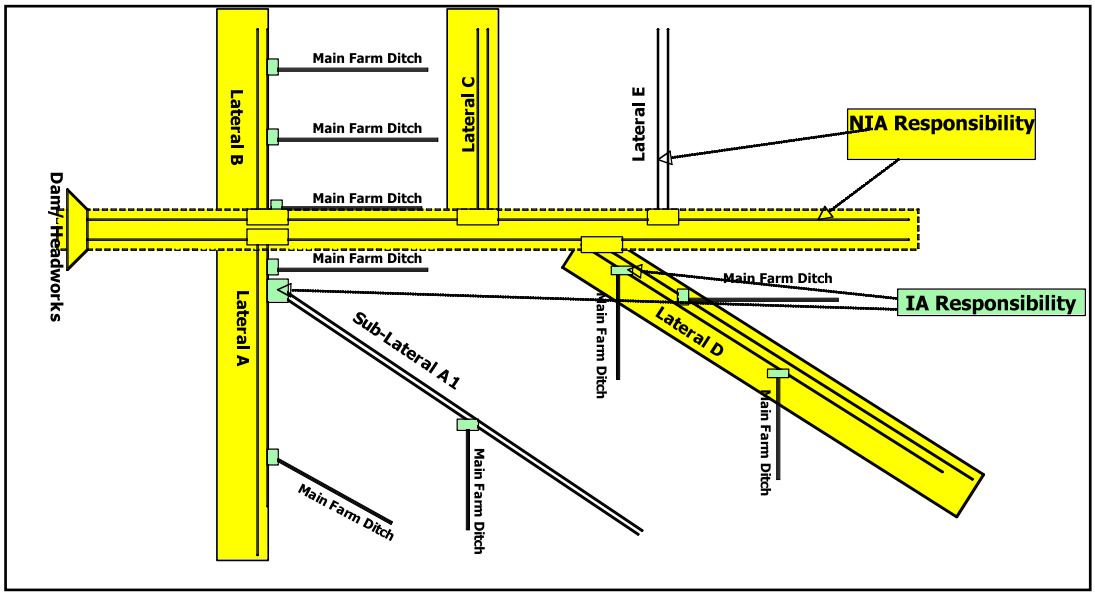
In summary, NIA is implementing IMT in Plaridel to help achieve rice self-sufficiency and for NIA to become financially viable, at the regional and national levels. The next section will discuss when and how IMT will be implemented in Plaridel.

The Implementation of IMT in Plaridel

This section outlines how and when IMT will be implemented in Plaridel. However, before this is done it is important to provide an understanding of how IMT is being implemented in the Philippines.

In the Philippines there are four stages of IMT for NISs. In order for an NIS to complete IMT each stage must be completed. Each stage requires that the IAs take on progressively larger roles and responsibilities and the terms are agreed to in legally binding contracts prior to the commencement of each new stage (NIA "Review of Irrigation Management Transfer Program", n.d.). The first of these four stages of IMT delegates only a portion of the roles and responsibilities of O&M to the IA, which among others include: canal maintenance, discharge monitoring and the preparing a list of areas to be irrigated and planted. These areas are represented in Figure 3.6.

Figure 3.6: Roles and responsibilities of both the IA and NIA pictorially represented for Stage I of the IMT contract

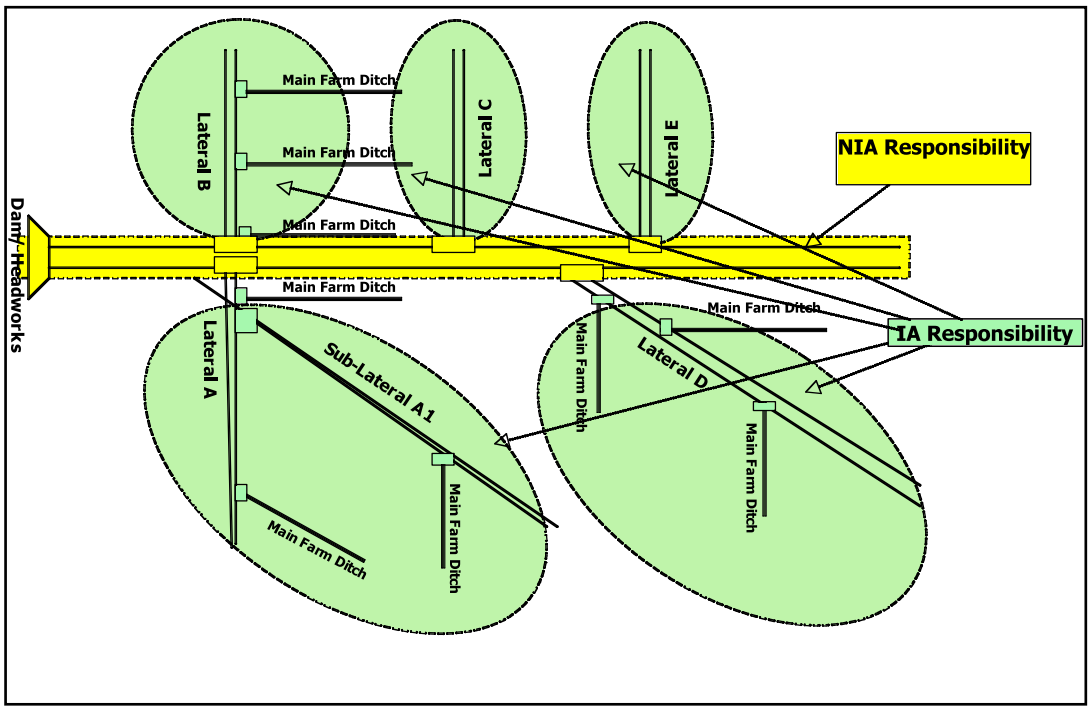


Source: NIA "Review of Irrigation Management Transfer Program", n.d.

The second of the four stages of IMT devolves the responsibility for management of the irrigation system's lateral and sub-lateral canals (see Figure 3.7) from NIA to the IAs as well as the collection of all ISFs from its members. The IA is then compensated for

taking on these new roles and responsibilities by gaining a portion of the ISFs they collect (both current and back accounts), the proportion they gain is based on how much they collect, which can be negotiated with NIA before the contract is signed (NIA "Review of Irrigation Management Transfer Program", n.d.).

Figure 3.7: Roles and responsibilities of both the IA and NIA pictorially represented for Stage II of the IMT contract

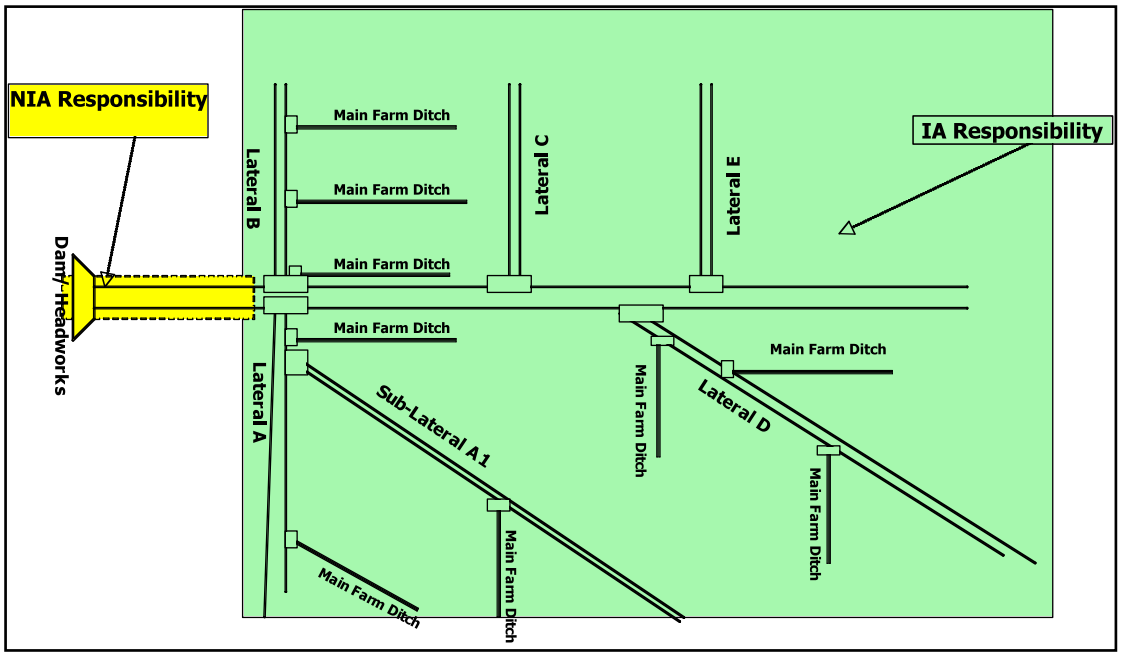


Source: NIA "Review of Irrigation Management Transfer Program", n.d.

The third and fourth stages of IMT delegate the management of the entire irrigation system to the IA. The only difference between these stages is that in the third stage NIA does not yet transfer the dam and a portion of the main canal to the IA (see Figure 3.8) (NIA "Review of Irrigation Management Transfer Program", n.d.). The decision to terminate IMT at stage three versus stage four depends wholly on the size and the capacity of the IA (NIA "Review of Irrigation Management Transfer Program", n.d.). For both, however, the IA becomes wholly responsible for the financial management of the irrigation system. NIA also allows them to control all of the ISF fees they collect and amortize any investment and rehabilitation costs to the facilities turned over to them through NIA (for a period not exceeding 50 years) (NIA "Institutional Development",

n.d.).

Figure 3.8: Roles and responsibilities of both the IA and NIA pictorially represented for Stage III of the IMT contract



Source: NIA "Review of Irrigation Management Transfer Program", n.d.

Now that an outline of IMT implementation in the Philippines has been provided, how and when IMT will be implemented in Plaridel will be addressed.

AMRIS, which is the irrigation system that encompasses Plaridel, signed the Memorandum of Agreement for Operation and Maintenance, in December 2003 (NIA, 2008). This specified that all NISs in the AMRIS system were to enter into Stage I of the IMT program beginning in 2004. As of 2010, Plaridel had yet to enter into the first stage of the IMT process due to NIA's financial shortfalls, which caused them to fall behind their IMT implementation schedule for the AMRIS system (NIA Interview 6). Consequently, to expedite the IMT process in Plaridel, IAs are preparing to sign a contract with NIA that combines the roles and responsibilities for both stage I and stage II of IMT (hereafter referred to as the 'Combined Stage I & II' contract), (Farmer Interview 1). This contract is set to finish near the end of 2012, when the final stage of the IMT contract will be implemented (NIA Interview 4 and 6). Thus, NIA has planned

for Plaridel's IAs to take over full responsibility of their irrigation system by 2012.

As stated in the second chapter, there are very few studies that appraise the impacts of NIA's rapid turnover of responsibility of irrigation systems to IAs, on the long-term ability of the Philippines to become rice self-sufficient and/or financially viable. Those few that have been conducted, especially by independent observers, have shown that it has had devastating consequences on the agricultural sector's ability to achieve rice self-sufficiency and financial viability, as well as on the livelihoods of the affected farmers. It is therefore of the utmost importance to gain further insight into why IMT in the Philippines has not been able to provide the analytical results that NIA, and the rest of the Philippines, so desperately wants and needs. This is especially important, as due to the financial situation of NIA, IMT remains the most promising means for rice self-sufficiency in the country. Some insight can be gained from looking at the implementation of IMT in the case study of Plaridel, which is one of the last NISs to implement IMT in the Philippines.

Therefore the next three chapters will evaluate if the 'best practices' for the implementation of IMT are currently being adhered to in the case of Plaridel's experience.

Chapter Four: Measuring Plaridel's Success: Management

This chapter will analyze whether the management-related 'best practices' for the implementation of IMT are currently being followed in Plaridel. These being, firstly, that the roles, responsibilities and authority needed to successfully implement IMT, with respect to both the IA(s) and the Irrigation Agency, must be clearly defined in a legally binding contract. Secondly, that IA(s) must be 'strong' enough to mobilize farmer members to undertake the roles and responsibilities that will be delegated to them under IMT. Lastly, that the Irrigation Agency staff is 'streamlined' in a manner that ensures a sufficient number of the irrigation agency staff remains in order to properly implement IMT and does not create incentives within the remaining irrigation agency staff to 'block' the IMT process from successfully completing.

Best Practice #1: The Roles, Responsibilities, Power and Authority, of Both the Irrigation Associations and the Irrigation Agency, Needed to Successfully Implement IMT Must Be Clearly Defined in a Legally Binding Contract

If the roles, responsibilities and authority necessary to successfully implement IMT, with respect to both the IA(s) and the Irrigation Agency, have not been clearly defined in a legally binding contract, successful IMT implementation is not possible. This view has been validated and reiterated by leading experts in the field through analyses of IMT outcomes in the Philippines and around the world (e.g., Attia, n.d.; Douglas; International Water Management Institute, 2007; Vermillion, 1997; Vermillion & Sagardoy, 1999; Wijayaratna, 2004).

Vermillion and Sagardoy state that for IAs to be effective post-IMT they must *at least* have the following, globally established, powers delegated to them under IMT (1999, p. 47)

- to extract water from the specified source;
- to use and maintain (and perhaps own) the irrigation and drainage infrastructure;
- rights of way for existing and future infrastructure;
- to raise funds or call out labour from its members to pay for the irrigation service;
- to apply sanctions against its members for non-compliance with rules;
- to delegate powers (such as to a water service provider);
- to hire and release staff;
- to enter into contracts;
- to purchase, own and sell property.

However, these powers are only the minimum required. In the case of Plaridel, in order for NIA to successfully complete IMT, the IAs must take on all of the roles and responsibilities that NIA will no longer undertake post-IMT, in addition to these minimum requirements. This is because it will enable both the irrigation system and the IA to continue to function as successfully as they did before IMT. Therefore, to ensure that the IA will take on all of these necessary roles and responsibilities, it must first be

ensured that NIA can force the IA to assume those roles if necessary. Thus, the only way that this can be ensured is by clearly defining the new roles and responsibilities of both parties in a binding contract that is legally enforceable.

Secondly, if the new roles and responsibilities are delegated to the IAs without sufficient authority to successfully undertake them, the IA will be incapable of completing them (Uphoff, Ramamurthy & Steiner, 1991, p. 42). Therefore, for the IA to ensure that they will be delegated the necessary authority to fulfill their new roles and responsibilities, their authority must be clearly defined in a legally binding contract. This will ensure that they can oblige NIA to abide by the specified terms of the delegated authority.

Although the delegation of this requisite authoritative capacity is repeatedly cited as being essential to the successful implementation of IMT, there are innumerable cases where this standard is not being met, within the Philippines and worldwide (Food and Agriculture Organization, 2003; Panella, 2004; Raby, 1997; Uphoff, Ramamurthy & Steiner, 1991; Vermillion, n.d.). Outcomes commonly resulting from this oversight include the constriction of IAs decision making options, the limitation of their enforcement powers, and an overall undermining of their publically held status and legitimacy (Uphoff, Ramamurthy & Steiner, 1991, p. 47).

To establish whether the current program for IMT implementation in Plaridel successfully meets this requirement, one must first determine whether or not the roles and responsibilities that NIA will relegate post-IMT are explicitly delegated to the IA in a legally binding contract.

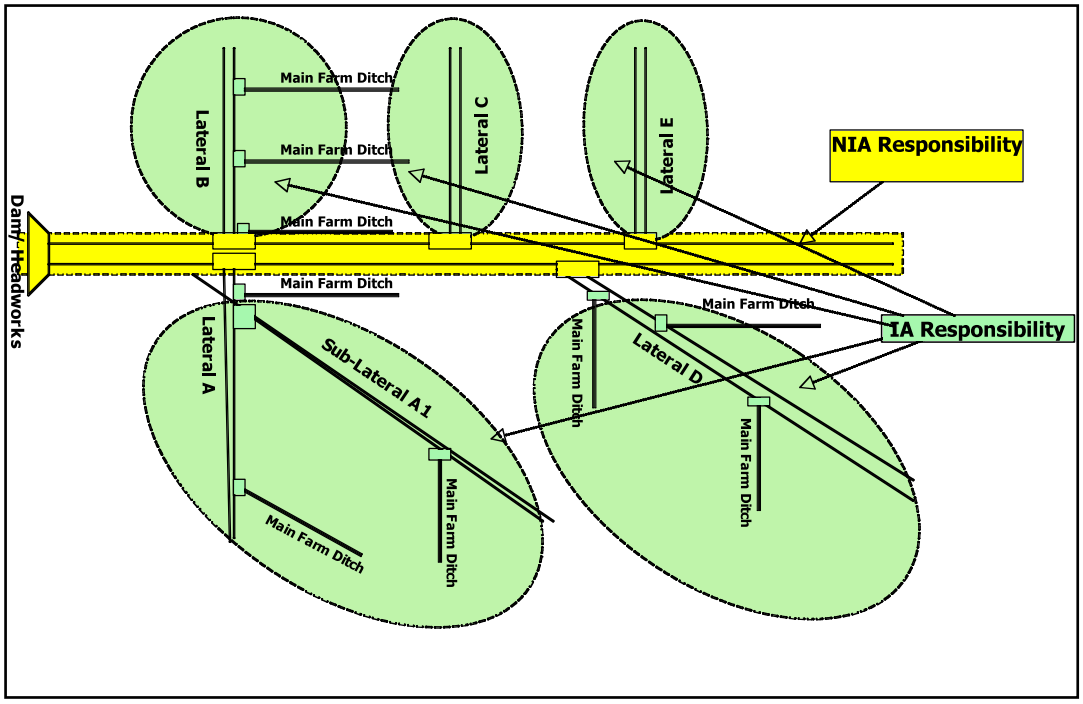
AMRIS, which is the irrigation system that encompasses Plaridel, signed the Memorandum of Agreement for Operation and Maintenance, in December, 2003 (NIA, 2008). This specified that all NISs in the AMRIS system were to enter into stage I of the IMT program beginning in 2004. As of 2010, Plaridel had yet to enter into the first stage of the IMT process due to NIA's current financial shortfalls (discussed further in section 2.3), which resulted in NIA falling behind their IMT implementation schedule for the

AMRIS system (NIA Interview 6). Consequently, to expedite the IMT process in Plaridel, IAs are preparing to sign a contract with NIA that combines the roles and responsibilities for both stage I and stage II of IMT (Farmer Interview 1), which from this point on will be called the 'Combined Stage I & II' contract.

In their 'Combined Stage I & II' contract the IAs in Plaridel will be responsible for both the lateral and sub-lateral canals (illustrated in Figure 4.1) of their respective irrigation systems (NIA "IMT Contract", n.d.). NIA will only be responsible for (NIA "IMT Contract", n.d.):

1. The main canal and headworks of the irrigation system.
2. Ensuring that there is an appropriate flow of water to the lateral canals.
3. Ensuring that the IAs are adequately trained to implement their new roles and responsibilities.
4. Assist and supervise the IAs in undertaking their new roles and responsibilities.
5. Monitor and evaluate the IAs progress and success rates.

Figure 4.1: Pictorial description of Plaridel's, to be, areas of responsibility under their 'Combined Stage I & II' contract with NIA.



Source: NIA "Review of Irrigation Management Transfer Program", n.d.

Therefore, all other roles and responsibilities necessary to maintain the same level of

functionality, of both the irrigation system and the IA, must be delegated to the IAs.

These are:

1. The management of the IA.
2. All O&M that affects the lateral and sub-lateral canals of the system.
3. The financial management of the IA.

With respect to the management of the IA, this combined stage I and II contract will delegate to the IA the following main responsibility: Plan, implement and supervise all activities related to the management of the IA's newly defined area (NIA "IMT Contract", n.d.). Specifically, this includes:

- Creating policies and procedures for implementing the responsibilities stated in the contract through rightful and equal distribution of tasks amongst IA members.
- Creating and submitting reports to NIA regarding the condition of the land including reports concerning farming activities, irrigation and the total benefited area records.
- Creating and implementing rules and regulations for irrigation management including enforcing penalties and fines for all violators.
- Managing the resolution of disputes among members.

With respect to all O&M concerns that affect the IA's newly defined area, the combined stage I and II contract delegates to the IAs the following main responsibility: Plan, implement and supervise all activities related to the operations and maintenance for the IA's newly defined area (NIA "IMT Contract", n.d.). Specifically this includes:

- Preparing yearly operations and maintenance plans for all infrastructure covered by the IA and implementing the tasks outlined within.
- Prepare irrigation management plans and cropping calendars for the area covered by the IA (with the assistance of NIA).
- Arrange the master list of all those who use irrigation water in the IA.
- Creating and implementing rules and regulations for the O&M of the irrigation

system including enforcing penalties and fines for all violators.

- Undertaking all minor construction and repairs of the infrastructure administered by the IA.
- Communicating and cooperating with NIA in all major repairs of the infrastructure administered by the IA. (ex. NIA provides the heavy equipment and materials, the IA provides the fuel and labor).
- Measuring, monitoring and recording water flows in the lateral and sub-lateral canals.
- Monitoring and distributing water equally to all the sub-lateral canals at turnouts and upholding at all times the farmer's right to water access.

With respect to financial management of the IA, the combined stage I and II contract will delegate to the IAs the following main responsibility: Plan, implement and supervise all activities related to the financing of the operations and maintenance for the IA's newly defined area (NIA "IMT Contract", n.d.). Specifically this includes:

- Creating, implementing and monitoring a regular financial plan and budget based on the operations and management plan which prioritizes the IA's responsibility in operations and maintenance.
- Accepting the calculated ISF bills from NIA, preparing a computation of each farmer's individual ISF bill, distributing ISF bills to each farmer member and collecting the ISFs from them.
- Submitting all collected ISFs and collection reports regularly to NIA.
- Monitoring the amount of ISFs collected from each member.
- Informing all farmer members of their collection status and campaigning to farmers to pay their current and back ISF fees.
- Creating and implementing all necessary rules regarding good financial management of the irrigation system and enforcing penalties to all those who violate the rules.
- Allocating a Repair and Maintenance fund from the yearly income of the organization to fund all minor repair works and to help NIA in paying for major

repairs.

NIA has herein created a contract delegating all of the roles and responsibilities that they will relinquish to the IAs post-IMT implementation. If Plaridel signs the contract, this portion of the requirement will have been met. However, to determine whether the current program for IMT implementation in Plaridel successfully meets the entire requirement, it must also be determined that the authority necessary to implement these new roles and responsibilities has been delegated to the IAs from NIA in the legally binding contract.

NIA has successfully delegated to the IAs of Plaridel the authority to: create their own plans; implement their own plans; monitor their own plans and enforce their own plans, with respect to all three of the necessary roles and responsibilities that NIA has delegated to them; the management of the IA, all O&M concerns that effect the IAs newly defined area, and the financial management of the IA. However, there are three areas where the necessary authority to implement the IAs new roles and responsibilities have not been delegated to the IAs in a legally binding contract. Although all three lie outside of the roles and responsibilities delegated to the IAs they still, however, inhibit the IAs capacity to undertake the roles and responsibilities delegated to them.

The first instance where the necessary authority to implement the IAs new roles and responsibilities has not been contractually delegated is with respect to the responsibility of the IAs to: enforce penalties on those who violate the rules created and implemented by the IA. This is problematic due to the absence of an effective penalty enforcement mechanism. Although the IA can attempt to enforce financial and social penalties on rule violating farmers, the only penalty that a farmer in violation of the rules of the IA can be obliged to respond to, is the suspension of their water rights (NIA Interview 2). However, as Plaridel is a part of a gravity irrigation system, it is effectively impossible for the IA to cut service to any one farmer as all water is controlled at the headworks, which is the responsibility of NIA to control. As a single turn-out gate is all that separates a farmer from water access, all he or she has to do to obtain it is to open the gate when no one is

there, usually at night. One NIA fieldworker stationed in Plaridel spoke of his frustration in trying to get the IA's to pay their ISFs. He said that it's almost impossible for him to enforce the rules, as the farmers know that "they will still be able to receive the water anyway" (NIA Interview 2).

Similarly, one of the rights and responsibilities delegated to the IAs under the O&M section of the contract is to uphold the farmer's right to have access to water (NIA "IMT Contract", n.d.). Again, the IAs of Plaridel cannot control the flow of water for the reasons stated above. Therefore, in truth the IAs have not been delegated the necessary authority to enforce this role delegated to them in the legally binding contract.

The third and last instance where the necessary authority to implement the IAs new roles and responsibilities have not been delegated in a legally binding contract is with respect to the fact that NIA "retains ownership of the irrigation facilities" it 'turns over' under IMT (Ofrecio, 2006, p. 3). This restricts the authority of the IA's in their ability to plan, with respect to both O&M management and financial management. In addition, IAs have been deemed to be the most effective in implementing IMT when they have the legal powers to purchase, own and sell property (FAO & INPIM, 2001; Sander, 1979; Vermillion & Sagardoy, 1999). For example, if the IA had ownership of the irrigation facility they would be able to leverage those as collateral to obtain loans from financial institutions.

Therefore, it has been determined that although a significant majority of the necessary authority needed for the IAs to implement the roles and responsibilities delegated to them by NIA have been included in their legally binding contract not all have. Therefore, only the necessary roles and responsibilities, and not the authority, necessary to successfully implement IMT with respect to both the IA(s) and the Irrigation Agency, have been clearly defined in a legally binding contract. Therefore the first accepted 'best practice' to be evaluated in Plaridel, with respect to IMT implementation, has not been met.

It has also been cited in the literature that, although not essential to the successful

implementation of IMT, the chances of IMT implementation being successful are improved by the inclusion of a negotiation between the water users and the government, where the new division of responsibilities and authority for irrigation system management is decided in a participatory manner (FAO & INPIM, 2001; Raby, 1997; Turral, 1995). This additional 'step' has been shown to result in "considerable opportunity for improving farmer participation and accountability" (Turral, 1995) in the IMT implementation process, which has resulted in: a reduction in the number of unilateral changes in the IMT contract imposed upon the IAs by the government agency later in the implementation stages and improved compliance by IAs to the IMT contract (Raby, 1997).

Can it be said that Plaridel meets this additional requirement? This research suggests that Plaridel does not meet this precondition because, even as the IAs of Plaridel are participating in a negotiation with NIA for IMT, they do not adequately address the division of responsibilities and authority for irrigation system management in the contract. Rather, the focus centers on what NIA must complete before the IA will agree to sign the contract.

Currently, all of the IAs in Plaridel are refusing to sign the 'Combined Stage I & II' contract until NIA: rehabilitates all broken infrastructure (including: gates, farm roads, and concrete lining) in all lateral and sub-lateral canals of their respective systems (NIA Interview 2); relocates all squatters from the lateral and sub-lateral canals (NIA Interview 2), primarily to prevent the squatters' from contaminating the canals with household waste; and reassesses how the percentage of ISFs collected will be allocated between the IAs and NIA in the 'incentive scheme' (NIA Interview 2), as financial projections forwarded by the IAs indicate that this current scheme does not apportion sufficient funds to run the allocated area of the irrigation system (Farmer Interview 1).

Therefore, as none of what is being negotiated addresses the actual division of responsibilities and authorities for irrigation system management under IMT, the contractual terms cannot be viewed as meeting this requirement. Furthermore, it should

be understood that the only reason NIA is negotiating with the IAs in these matters is because it is the only way the IAs will agree to sign the IMT contract, and not because NIA wants to take part in a participatory process (Farmer Interview 1; NIA Interview 2).

This research further suggests that farmers' lack of policy awareness is another reason IMT in Plaridel does not meet this requirement. At least one, and sometimes up to half, of the farmers interviewed from each of Plaridel's IAs were unaware that IMT was going to be implemented in their IA and of those farmers that were aware, many could not speak to what IMT would entail as they "had not been well informed of the [IMT] process" (Farmer Group Interview 2-8). Therefore, if not all farmers understand that IMT will be taking place in their IA, or if they do not know what it will entail, they will be unable to competently engage in negotiations with NIA over the new division of responsibilities and authority for irrigation system management. Therefore, again, it is seen that the NIA has failed to meet the requirement.

Best Practice #2: IAs Must be 'Strong' Enough to Mobilize Farmer Members to Undertake the Roles and Responsibilities That Will be Delegated to Them Under IMT

It has been shown by numerous leading experts in irrigation management that in order for an IA to be successful in implementing IMT, it must be 'strong' enough to mobilize its farmers members to undertake the roles and responsibilities that have been delegated to them, under IMT (Araral, 2006; FAO & INPIM, 2001; International Water Management Institute, 2007; Korten & Siy, 1989; Panella, 2004; Raby, n.d.; Sampath & Young, 1990; Sangupta, 1991; Shivakoti, Vermillion, Lam, Ostrom & Pradhan, 2005; Thompson, 1995; Uphoff, 1986; Vermillion, 1997; Vermillion & Sagardoy, 1999; Wijayaratna, 2004)

"Strength" here refers to this institutional and organization capacity of IA to undertake its roles and responsibilities. Notably, in 2002, it was found that one of the "most common issues and constraints effecting the management of irrigation systems world-wide" was the "lack of institutional capacity or initiative to organize farmers into viable groups" (Wijayaratna, 2004, p. 9). How then can a formal determination of IA 'strength' be made? Some studies have measured IA strength in terms of a lack of "social divisions" within the IA (Vermillion & Sagardoy, 1999, p. 17), some according to the "existence of a culture of cooperation amongst the farmers" (Sangupta, 1991, p. 253), and others through the "farmers' capacity to make group decisions" (Wijayaratna, 2004, p. 108). Irrespective of the specific measure used in each study they were all attempting to measure strength according to the same basic consideration: what are the levels of trust and cooperation between farmer members in an IA. Therefore, to determine the degree to which Plaridel's IAs meet this requirement it must first be determined whether: sufficient cooperation exists between the farmer members of each IA and, secondly, if farmer members trust their fellow members enough to manage the IA on their behalf.

It had long been thought that the Philippines was an ideal country for PIM and IMT as there already existed a high level of social capital (Bankoff, 2007, p. 327). Specifically, these conceptions stem from the existence of a '*bayanihan spirit*', where group members

or neighbors "give their help freely" to each other (Raby, n.d., p. 12), and '*pakikisama'* which emphasizes the importance of "maintaining smooth interpersonal relationships" that "connote consideration, fairness and camaraderie" (Raby, 1997). However, it has also been found that these three traits do not exist uniformly across the country (World Bank, 2005, p. 27). It has been shown that, generally, the CISs have fared far better than NISs in implementing PIM and IMT in the Philippines mostly because they have "greater social cohesiveness" (Sampath & Young, 1990).

Therefore, it must first be determined if sufficient cooperation exists, between the farmer members of each of Plaridel's IAs, to undertake the roles and responsibilities that have been delegated to them, under IMT. Table 4.1 shows the range of responses received from representatives and general members of each IA. Each response was categorized into four categories: all, many, some, or none. This means, for example, if an IA is categorized as 'all', then the farmer representatives and general members interviewed from this IA believed that all of the members of their IA cooperate and will continue to cooperate under IMT. In all instances where general members were interviewed their opinions were inline with those articulated by their representatives.

Table 4.1: Levels of cooperation within Plaridel's IAs, as stated by IA representatives and general members

Barangay	IA	Level of Cooperation
Bagong-Silang	Plagui	All
Bulihan	BSJB	All-Many
Lagundi	Lagum	All-Many
Culianin	BPB	Many-Some
Lalangan	Plaridel-Malolos	Many-Some
Parulan	Parulan-Halang	Many-Some
Sipat	Lucidar	Many-Some

Source: Farmer Group Interview 2-8

From Table 4.1, it can be seen that some IAs made self-assessments inline with this portion of the requirement more often than others. One IA believed that “all” IA members cooperate with each other, two believed that “all” to “many” cooperate, and four believe that only “many” to “some” cooperate. NIA staff had very similar responses with respect to each IA when asked the same question (NIA Interview 7 and 10).

Farmers from two of these IAs, Bagong-Silang and Parulan, spoke of how the level of cooperation that exists within their IAs affects their ability to mobilize farmers to undertake the IAs responsibilities. The farmers of Bagong-Silang, for example, stated that they have no problem mobilizing farmer members to clean the canals when necessary as they still have the "*bayanihan spirit*" (Farmer Group Interview 8*)*. In contrast, although 'some' to 'many' of the farmers of Parulan are willing to cooperate with one another, the farmers who are not willing to cooperate greatly affect the IA's ability to undertake its responsibilities. For example, they are currently having trouble maintaining water flow in many of their lateral and sub-lateral canals as not all members are willing to clean the canal for free and NIA does not have enough money to adequately pay them to do the work (Farmer Group Interview 5).

Therefore, it can be said that currently, there exists a sufficient level of cooperation between farmer members only in some of Plaridel's IAs to undertake the roles and responsibilities that will be delegated to them under IMT.

Secondly, it must be determined if there exists sufficient trust between farmers within each IA, such that members will agree to impart the authority to manage the IA to an elected minority and thereby fulfill the roles and responsibilities delegated to them under IMT. Table 4.2 shows the range of responses received from representatives and general members of each IA. Each response was again categorized into the same four options: all, many, some, or none. For example, choosing the 'some' category meant that the farmer representatives and general members interviewed believed that only some of their IA farmer members trust the other members sufficiently to allow them to manage the IA on their behalf. In all instances where general members were interviewed, their opinions were in line with those articulated by their representatives.

Table 4.2: Levels of trust that exists within Plaridel's IAs, as stated by IA representatives and general members

Barangay	IA	Trust
Bagong-Silang	Plagui	Many-Some
Bulihan	BSJB	Many-Some
Culianin	BPB	Many-Some
Parulan	Parulan-Halang	Many-Some
Sipat	Lucidar	Many-Some
Lalangan	Plaridel-Malolos	Some
Lagundi	Lagum	Some-None

Source: Farmer Group Interview 1-8.

Therefore, it can be seen that five of the seven IAs trust 'some' to 'most' of their fellow farmer members enough to impart the authority to manage the IA to an elected minority, one trusts only 'some', and one IA trusts 'none' to 'some'. Some of the IA representatives and general members interviewed spoke of how this general lack of trust might affect their ability to mobilize farmers to undertake the role and responsibilities delegated to them under IMT. One IA representative stated that it might result in low ISF collections, as the farmers do not trust the IA member who collects ISF to safely deliver it to NIA (Farmer Group Interview 4). Similar concerns were cited in many of the other IAs (Farmer Group Interview 5, 6, 10). Similarly, a farmer member voiced concern that this might result in the IA having difficulties mobilizing members for meetings and completing the tasks assigned to the IA under IMT, as they do not trust their fellow farmers to make decisions in the collective's best interest (Farmer Group Interview 5). IAs across the Philippines that have similar trust issues within their IAs have commonly experienced post-IMT problems such as low collection efficiencies and irrigated areas (Merrey, 1997, p. 79).

Therefore, it can be said that if the current levels of trust within Plaridel's IAs persists, they will have significant difficulty mobilizing farmer members to undertake the roles and responsibilities that have been delegated to them, under IMT.

In addition to the above best practice, it has been shown that the likelihood of an IA being 'strong' enough to mobilize their members to undertake the roles and responsibilities that

have been delegated to them under IMT, improves significantly if there exists a high sense of ownership over the irrigation system by all farmer members (Asian Development Bank, 2008; Groenfeldt, 1997; Gupta & Srivastava, 1999; NIA, "Irrigation Management Transfer", n.d.; Korten & Siy, 1989; Panella, 2004; Raby, 1997; Sampath & Young, 1990; Thompson, 1995)**.** A higher sense of ownership over the irrigation system by all farmer members usually results in a higher sense of responsibility for its proper functioning and general success, thus necessitating a higher level of cooperation and trust within the IA (Bagadion, 1989, p. 7). Indeed, the success of the communal systems in the Philippines was partially attributed to the fact that there existed a sense of ownership over the irrigation systems by the IAs (Bagadion, 1989, p. 7). As well, those IAs within Filipino NISs who have been found to lack such a sense of ownership experienced poor IMT results (Gupta & Srivastava, 1999; Panella, 2004; Raby, 1997)

Therefore, it must be determined whether Plaridel's IAs have a high sense of ownership over their respective irrigation systems. In interviewing representatives and general members of Plaridel's IAs and various NIA staff members working in Plaridel, it is evidenced that Plaridel's IAs have a very low sense of ownership over their respective irrigation systems (Farmer Group Interview 2, 4, 5*;* NIA Interview 4, 6). This is due to the fact that NIA has been in charge of irrigation management for all of Plaridel's irrigation systems since the creation of the IAs. Therefore, the farmers believe that it should remain NIAs responsibility to maintain the irrigation systems and not their own (Farmer Group Interview 2, 4, 5; NIA Interview 4, 6). In addition, the farmers either do not believe that IMT will happen, or, if they do, that NIA will remain indefinitely to help them if they fail. This is largely attributable to the fact that NIA has threatened IMT in the past, but has never actually implemented it until now (Farmer Group Interview 5, 8 and NIA Interview 4, 6, 8, 10).

Therefore, it can be argued that there exists a relatively low sense of ownership among Plaridel's IAs. This insight points to the diminished capacity of the IAs to mobilize their members to undertake the roles and responsibilities that have been delegated to them under IMT.

This dysfunctional dynamic is not uncommon across NIS systems both in the Philippines, and worldwide (Asian Development Bank, 2008; International Water Management Institute, 2007; Raby, 1997, N.; Wijayaratna, 2004). In the Philippines there are numerous cases where "dependency relationships...have arisen between some associations and NIA organizers, and, more generally, between IAs and NIA" (Raby, n.d., p. 115). This dependency has resulted in those IAs having difficulty, or being less willing, to take on the roles and responsibilities delegated to them under IMT (Asian Development Bank, 2008; International Water Management Institute, 2007; Raby, n.d.; Wijayaratna, 2004). This has been especially true of IAs that live in "upstream portions of the water system" (Lauraya, Sala & Wijayaratna, 1996, p. 18), as Plaridel does, as those systems are usually better maintained by the irrigation agency than the downstream portions (Lauraya, Sala & Wijayaratna, 1996, p. 18).

Therefore, as it has been determined that there exists a low sense of ownership and that generally there is an insufficient amount of cooperation and trust between farmer members of Plaridel's IA. It can be concluded that when strong member cohesion is absent, the IA will not be 'strong' enough to mobilize their farmer members to undertake the roles and responsibilities that have been delegated to them under IMT. Therefore, it can be said that this best practice of IMT implementation is currently not happening in Plaridel, Bulacan.

Best Practice #3: The Irrigation Agency Staff is 'Streamlined' in a Manner That:

a. Ensures a Sufficient Number of the Irrigation Agency Staff Remains in Order to Properly Implement IMT.

b. Does not Incentivize the Remaining Irrigation Agency Staff to 'Block' the IMT Process from Successfully Completing.

It has been observed that when a government or agency's resources are spread thinly, one way for them to strengthen their financial base is to remove all redundancies and overlaps from their system, thus improving the efficiency of its operations (NIA "A Primer on the Program on Rationalizing and Improving Public Service Delivery", n.d., p. 2). Accordingly, in 1974 when NIA was transformed into a semi-autonomous public corporation and suddenly found itself unable to maintain responsibility for its own financial viability (Bagadion, 1989, p. 4), NIA decided to implement PIM and IMT. This effort would enable NIA to train farmers to run their own irrigation systems, and thus eliminate the corresponding paid positions. This allowed NIA to significantly reduce the number of salaried staff, this process being called streamlining, which was the most burdensome element of their annual budget at the time (Araral, 2006, p. 47).

Various studies have shown that there are two main problems associated with streamlining under the IMT process. Firstly, that it may result in an insufficient number of irrigation agency staff remaining to properly turn over the system to the IAs, and secondly, that the irrigation agency incentivizes the remaining agency staff to 'block' the IMT process from successfully completing so that they may maintain their employment in one form or another (Araral, 2006; Gupta & Srivastava, 1999; International Water Management Institute, 2007; NIA "Irrigation Management Transfer", n.d.; Merrey, 1997; Raby, 1997; Uphoff, Ramamurthy & Steiner, 1991; Wijayaratna, 2004). Therefore, in order to determine whether implementation of IMT in Plaridel meets this 'best practice' it must first be determined if a sufficient number NIA staff, both managerial and field level, will remain in order to properly implement IMT.

This first requirement has been a common problem in implementing IMT, both

worldwide and in the Philippines. When irrigation agency staff is streamlined, there is not only a loss of human resources to train the IAs, but also a great loss to the overall level of experience and technical know-how, which is needed to adequately train the farmers (Food and Agriculture Organization, 2003; International Water Management Institute, 2007; Raby, 1997; Svendsen, Trava & Johnson, 1997). In fact, in a current International Water Management Institute (IWMI) study, selected results of which can be seen below in Table 4.3, it was found that out of the 43 countries worldwide, 25 had inadequately trained their IAs, 13 were found to have a weak capacity to train their IAs and 12 had IAs that were, consequently, weak with respect to both their technical and management capacities, which significantly lessens their viability post-IMT (IWMI). In the same study it showed that Asia is having a much harder time properly training their farmers for IMT. Out of the 21 countries studied it was shown that 18, or approximately 86 percent, had inadequately trained their IAs, approximately half had a weak capacity to train their IAs and again approximately half had IAs that were weak in respect to both their technical and management capacities (IWMI). Therefore, there is much improvement to be made across the globe, especially in Asian countries, with respect to the proper training of IAs for IMT. IWMI suggests that for this to happen there needs to be substantial and long-term improvement of existing methods of capacity development and training, which they deem "too short and insufficient or non-existent" (IWMI).

Table 4.3: Selected problems implementing IMT, worldwide and in Asia

Problem in implementing IMT	Worldwide (43)	Asia (21)
Inadequate training of IA	25	18
Weak capacity to train IA	13	11
Weak tech. & management capacity of IA	12	10

Source: International Water Management Institute, 2007.

So where does Plaridel stand? Streamlining of both the managerial and field staff working for Plaridel's IAs started in 2004 under the Rationalization Program funded by the World Bank (NIA “A Primer on the Program on Rationalizing and Improving Public Service Delivery”, n.d., p. 6). At the regional, or management, level the Bulacan office has been reduced from approximately 175 to just under 60 employees since the Rationalization Program was first implemented (Sangupta, 1991, p. 253). Some of the

effect of this program can be seen in Figure 4.2 below. These staff cuts are set to continue throughout the ongoing process of merging Plaridel with the Aurora and Nueva-Ecije offices to form the new region of BANE (Farmer Interview 1). This will result in the employees of these offices being reduced in number from over 200 to 66 by 2013 (NIA Interview 7).

Figure 4.2: Results of streamlining in NIA's Bulacan office

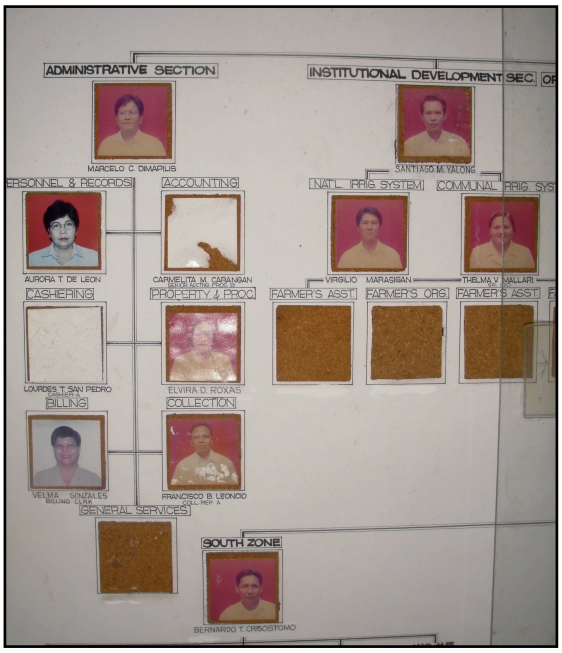


Photo credits: Jennifer Bedore

What does this means for the implementation of IMT in Plaridel? NIA's Institutional Development Department (IDD), the main department charged with implementing IMT, has been spread extremely thin as a result of streamlining (NIA Interview 4 and 6). Some of the effects of the streamlining process on this department can be seen on the right hand side of Figure 4.2 above. They are currently working with more NIA departments and covering many more tasks than before streamlining, with fewer staff, thus lessening their ability to train the farmers for IMT (NIA Interview 4). For example, currently, there are only five Irrigator Development Officers (IDOs) for the whole of AMRIS. This means that each IDO is in charge of preparing 25 to 30 IAs for IMT (NIA Interview 6). Under ideal circumstances, there would be one IDO for every IA, which was the case in the world-renowned, extremely successful, CIS PIM pilot projects implemented in the

Philippines in the 1970s (Bagadion, 1989, p. 9).

For each IA, the IDO is currently supposed to attend IA meetings on a regular basis, assist them in preparing documents, making resolutions and other preparatory paper work, communicate their needs to NIA and other necessary governmental agencies like the National Food Authority, as well as implementing all of the necessary training for IMT (which include training on leadership, water and system management, financial management, value formation, livelihood, gendering development as well as two introductory trainings on IMT) (NIA Interview 6). This is obviously an impossible list of tasks for one IDO to complete with 25-30 IAs to hand over in a time frame of just two to three years. It is of no surprise, therefore, that most of Plaridel's farmers either do not know who their IDO is, or have not seen him in years, some saying as far back as 2006 (Farmer Group Interview 2-8).

Therefore, how feasible is it to believe that all of the trainings and support necessary for the implementation of IMT will be available to a sufficient enough degree in Plaridel such that the IAs will be capable of running their own irrigation systems, up to the lateral canals, with very limited assistance from NIA by 2012? NIA's streamlined staff is not able to make this feasible, especially considering that they are already over a year behind and none of the trainings have been conducted in any of the IAs to date (Farmer Group Interview 2-8).

NIA's management staff is concerned about the situation in Plaridel, as well as throughout AMRIS. One staff member overseeing the trainings stated that they will have a problem implementing all of the trainings necessary for IMT, especially as they were caught unaware by a memorandum issued by NIA's national office stating that they must be finished implementing their 'Combined Stage I & II' contract by 2012, whether the IAs are ready or not (NIA Interview 1 and 4). They are aware that continued training and coordination with the IAs is essential to the IAs success post-IMT but they simply do not have a sufficient amount of time or money, and consequently staff, to do so (NIA Interview 1).

In the field, the situation is similar, as NIA's field staff continues to be drastically cut. The NIA working stations in Plaridel, numbers 3 and 5, have had their staff reduced by more than half in just the past five years. This has required the remaining employees to do the same number of tasks and cover the same geographical area with half of the staff (Farmer Group Interview 3-5, 7 and 8; NIA Interview 2). For example, one field-level NIA employee, a Supervising Water Master Technician (SWMT), formerly worked with two ditch-tenders and three ISF collectors. Presently, all but one of these positions has been eliminated, and the SWMT and his remaining co-worker have been obliged to assume all of the streamlined staffs' responsibilities (NIA Interview 2). The streamlining program will continue until the IMT process is completed, thereafter there will be only one NIA staff member in the field per working station. Further compounding this overburdening of NIA staff, existing plans intend to merge many of these working stations (Farmer Group Interview 6).

Although the field level staff is not directly involved with the IMT training, they are still integral to the IAs successful acquisition of the skills needed to run their irrigation systems post-IMT. The field level staff has a wealth of technical and practical knowledge of the irrigation systems that the NIA managerial staff knows nothing about. The staff members are the people the IAs depend on to learn the day-to-day skills they will need to run the irrigation system properly. The few field staff still left in Plaridel are fully occupied with completing their daily tasks in order to properly maintain the system. Consequently, they have little to no time to answer the farmers' questions, let alone to teach them how to maintain the systems on their own (Farmer Group Interview 3; NIA Interview 2). In fact, they currently have so little manpower that canal maintenance and water distribution, and consequently production levels, have been on the decline since streamlining began (Farmer Group Interview 3-5 and 8; NIA Interview 2, 7 and 10). NIA management staff stated that this could be remedied once IMT had commenced by hiring additional contract workers (NIA Interview 4). However, it seems doubtful that this will remedy the problem as they already have a number of contract workers in Plaridel. As well, it is uncertain if they will have the financial resources to retain the ones they have

hired. It much less likely that they will be able to hire more once IMT has been implemented.

Therefore it has been determined that there is a high likelihood that there will be an insufficient number NIA staff, both managerial and field level, remaining in order to properly implement IMT.

The second requirement that must be met in order for Plaridel to be judged to be properly implementing this best practice is that the irrigation agency does not 'incentivize' the remaining agency staff to 'block' the IMT process from being successfully implemented. This practice of 'blocking' has been a problem both in the Philippines and worldwide (Araral, 2006; Gupta & Srivastava, 1999; International Water Management Institute, 2007; NIA "Irrigation Management Transfer", n.d.; Raby, 1997; Svendsen, Trava & Johnson, 1997; Wijayaratna, 2004; Wijayaratna &Vermillion, 1996).

By 'incentivize' it is meant that the incentives the irrigation agency is offering to all streamlined staff to leave their current position are insufficient, or attractive enough, for them to accept being streamlined. A major impediment to successful IMT implementation across the Philippines has indeed been a lack of "attractive retirement packages" (Merrey, 1997; Sangupta, 1991; Wijayaratna, 2004). This, in combination with a lack of "easy to find alternative employment opportunities" (Sangupta, 1991, p. 255), has resulted in many of the staff scheduled for streamlining actively attempting to subvert or 'block' the IMT process (Araral, 2006; Raby, 1997; Wijayaratna, 2004; Wijayaratna & Vermillion, 1996). By 'blocking' it is meant that the irrigation agency staff, who face the possibility of being streamlined, intentionally withhold necessary skills and knowledge from those IAs that have been selected for IMT, the aim being to maintain the IAs dependency relationship with the NIA staff and thus necessitate the retention of their jobs (Raby, 1997).

It must then be assessed, if it is defensible to posit that incentives for staff slated for streamlining are too low; and thus inadequate to prevent 'blocking'? How streamlining currently works in AMRIS is that when it is determined that a full-time position is no

longer needed, the affected personnel must choose from the following two options within two months of being notified (NIA “A Primer on the Program on Rationalizing and Improving Public Service Delivery”, n.d., p. 8):

1. "Remain in government service" (however, this means that NIA reserves the right to transfer said personnel to other "functions/offices/units, with no change in salary and benefits".)
2. "Avail of retirement/separation benefits" which includes:
    a. Skills development
    b. Livelihood/entrepreneurial seminar
    c. Credit and investment management training
    d. Job facilitation and counseling programs
    e. Financial compensation based on the number of years worked for NIA

It has been much more common for staff members to choose the second option, both within AMRIS and nationwide (NIA Interview 1). This stems from the fact that the average age of NIA employees is near to the average retirement age; for example the average age of AMRIS field staff is 55 (NIA Interview 10).

Therefore, it must be determined if the streamlined staff feel that the “retirement/separation” benefits that NIA is offering are sufficient for them to live off of in their retirement, or at least to ‘retire’ and to risk finding another job outside of NIA. This can be determined by, firstly, determining if NIA staff that have been, or will soon be, streamlined are willing to retire and secondly, by determining if ‘blocking’ is taking place in Plaridel.

Although only a few current or retired staff under the purview of streamlining were willing or able to conduct interviews, from the acquired information, it can be reasoned that those NIA personnel who were willing to accept 'incentives' did so only when they had previously planned to retire along a similar timeline, or if they believed they could easily find another job (NIA Interview 1 and 4). Nonetheless, the majority of current and

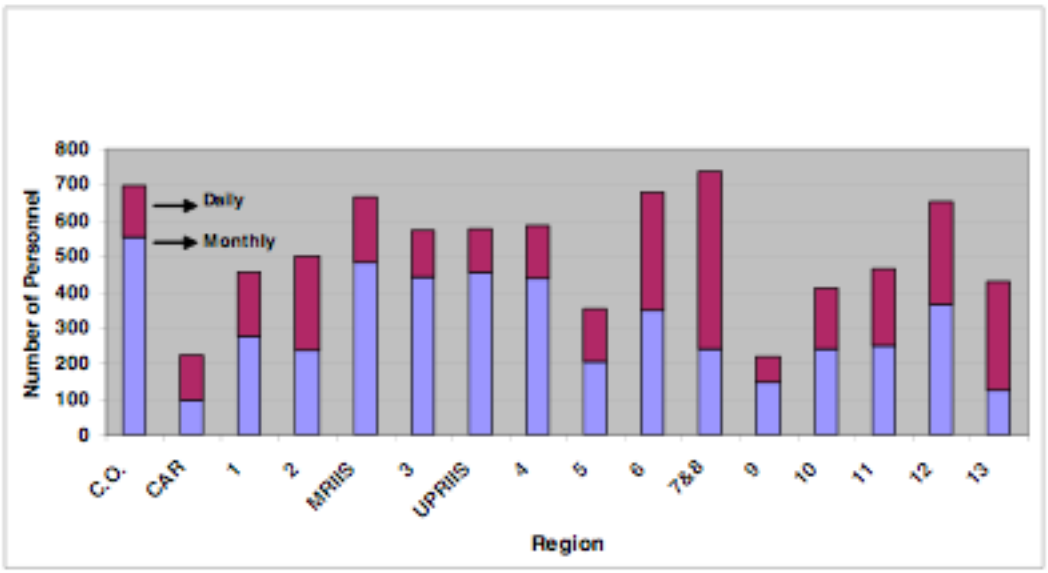
ex-employees held negative views of streamlining, expressing sentiments such as “we think it is not a good idea” (Farmer Group Interview 4), “they made me sign to leave”, (Farmer Group Interview 2), and “I need to have a job” (Farmer Group Interview 2). Indeed, the managerial staff concede that “there are many NIA employees… [who] still want to continue working in NIA after [streamlining] ” (NIA Interview 4). Therefore, it can be said that there are at least a few, if not many, NIA personnel who have been streamlined, or who are at risk of being streamlined, who would prefer to have kept, or keep, their job with NIA.

Secondly, it must be determined whether there is ‘blocking’ occurring in Plaridel. Although NIA staff members were unable to determine the exact number, it is said that “many” of the staff that NIA streamlined in Plaridel now work for NIA as ‘causal employees’ (NIA Interview 8; Farmer Group Interview 2). They have hired back these streamlined employees on a contract basis in order to keep up with the maintenance of the system, as the existing staff could not keep up with the workload, and the IAs had not yet been trained to take over the streamlined staff’s responsibilities (NIA Interview 8). In addition, if the IAs cannot keep up with the tasks turned over to them under IMT, NIA will attempt to hire on streamlined staff as ‘casual employees’ (NIA Interview 8), or the IAs might hire them on either on a permanent or part-time basis (NIA Interview 1 and 4). However, the ability of NIA or the IAs to hire streamlined NIA staff depends on their ability to pay them, which can be challenging. Firstly, NIA’s funds for the Rationalization Plan from the World Bank, which they are currently using to hire contract workers has already been exhausted (NIA Interview 4 and 8). Secondly, the ability of the IAs to collect sufficient ISFs to pay for workers is questionable, which will be addressed further in the fourth 'best practice' (NIA Interview 1, 4, 8; Farmer Group Interview 5). However, in the streamlined, or potentially streamlined, NIA’s staff minds some chance of being rehired is better than no chance at all.

Plaridel is by no means an isolated case with respect to ‘blocking’ IMT. In fact, it is known that the “dominant incentive [of NIA employees is] to protect their job security and await their retirement" (Araral, 2006, p. 158). As well, since 1997, there has been

“more non-tenured staff at NIA compared with tenured ones” and until 2005 "change only occurred in the composition of staff tenure but not staff size" (Araral, 2006, p. 158). An example of this for the year 2002 can be seen in Figure 4.3 below.

Figure 4.3: NIA's reliance on non-tenured staff by region as of 2002



Source: Araral, 2006, p. 159

Therefore, the current process of IMT in Plaridel has been shown to retain insufficient numbers of irrigation agency staff, at the field and managerial levels, to properly implement IMT. Furthermore, it has been shown that streamlined NIA staff members are motivated to purposefully ‘block’ the transfer of their skills to Plaridel’s IAs with the intent of ensuring that the IMT process is not properly implemented, thus, fulfilling the aim of necessitating their continued employment in those skilled irrigation management positions. It can therefore be said that the process of IMT in Plaridel is not adhering to this ‘best practice’.

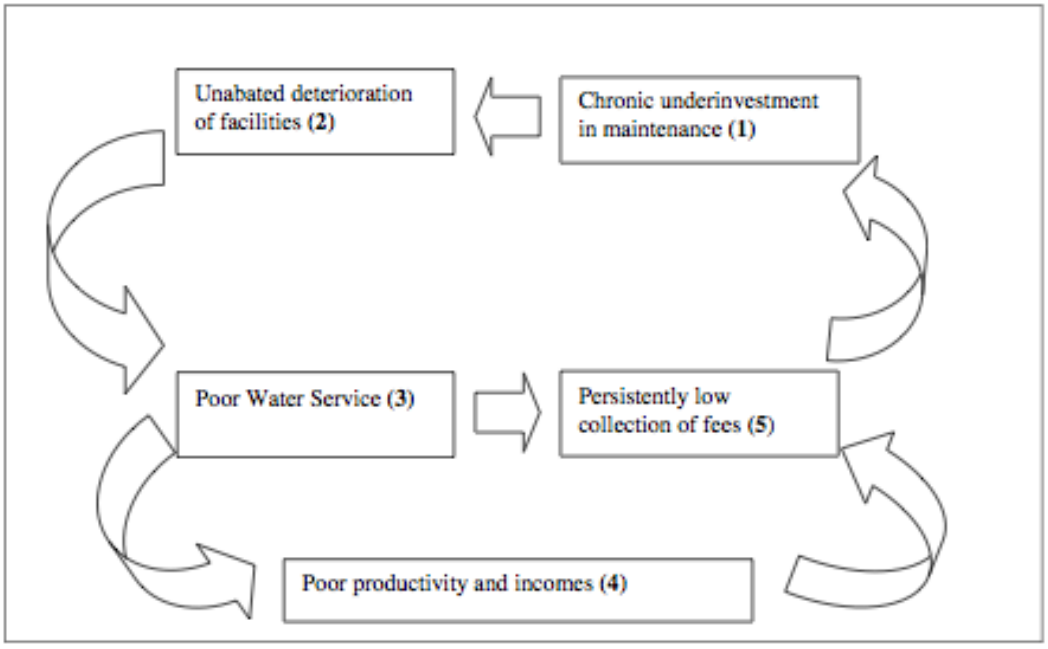
Chapter Five: Measuring Plaridel's Success: Financial Viability

This chapter will first introduce 'the vicious cycle of irrigation management', how it affects the long-term viability of IAs and how it relates to the remaining four 'best practices'. The financial viability related 'best practices' for the implementation of IMT will then be analyzed to determine whether they are currently being adhered to in Plaridel. First, IAs must have the capacity to collect Irrigation Service Fees (ISF) from their members on a sustained basis and to properly manage their financial resources. Second, financial resources must be available to farmers and IAs who are unable to profitably sustain the operation of their farm or irrigation system independent of the Irrigation Agency.

The Vicious Cycle of Irrigation Management

In their doctoral theses, "Irrigation Reform in the Philippines: Irrigation Management Transfer and the Vicious Cycle of Irrigation Management" (Panella, 2004) and "Decentralization Puzzles: A Political Economy Analysis of Irrigation Reform in the Philippines" (Araral, 2006), Panella and Araral describe the 'vicious cycle of irrigation management' (represented in Figure 5.1). This cycle may start with the chronic underinvestment in maintenance, by either the irrigation agency or association, due to inadequate resources for O&M. Ultimately this results in the unabated deterioration of the irrigation facilities. This leads to the farmers experiencing poor water service, which results in poor productivity and consequently low incomes for farmers. These circumstances produce farmers who are commonly unwilling or unable to pay their Irrigation Service Fees, in turn, the irrigation agencies or associations chronically under invest in maintenance and the cycle continues in perpetuity (Panella, 2004, p. 9).

Figure 5.1: The vicious cycle of irrigation management



Source: Araral, 2006, p. 132

The former President of the Philippines, Gloria A. Arroyo, recognized the existence of this 'vicious cycle' and how it needs to be addressed if the Philippines is to meet its goal of rice self-sufficiency (President of the Philippines, 2007). This acknowledgement was a crucial first step in addressing the cyclical problems associated with underfunding irrigation maintenance.

It is important to note, however, that the 'vicious cycle of irrigation management' doesn't have to start at 'step one'; rather, if any one of its components is present in an irrigation system, there is a high likelihood that the cycle can take hold and lead the irrigation system into its "downward spiral" (Araral, 2006, p. 132). Therefore, in the context of IMT, it is important to ensure that none of the cycle's components are present during its implementation. As well, it is important to ensure that the IA slated for IMT are adequately informed of the prevalence of the 'vicious cycle of irrigation management' to prevent it from occurring under their management. Accordingly, the last four 'best practices' pertain to the 'vicious cycle of irrigation management' and show how if one is present in the irrigation system it affects all other aspects of the system.

Best Practice #4: IAs Must Have the Capacity to Collect Irrigation Service Fees (ISFs) From Their Members on a Sustained Basis and to Properly Manage their Financial Resources

For IAs to be successful throughout the entire IMT process, they must be financially viable in order to be able to properly operate and maintain their irrigation systems. As Irrigation Service Fees (ISFs) are IAs' main source of income, the IAs must have the capacity to collect ISFs from their members on a sustained basis and to properly manage their financial resources (Araral, 2006; FAO & INPIM, 2001; International Water Management Institute, 2007; Korten & Siy, 1989; Panella, 2004; President of the Philippines, 2007; Sampath & Young, 1990; Wijayaratna, 2004)

The collection rates of ISFs post-IMT have varied significantly over time and throughout the world. However, a recent study conducted by IWMI found that of the 43 IMT cases studied worldwide, three quarters experienced an increased fee collection rate post-IMT (International Water Management Institute, 2007, p. 23). Similar findings have been found in the Philippines, however, no comprehensive study has ever been conducted on the subject (Groenfeldt & Svendsen, 2000; NIA "Irrigation Management Transfer", n.d.; Panella, 2004).

Plaridel's ISF collection rates generally range between 60-70 percent (Farmer Group Interview 2, 5-8; NIA Interview 1, 4, 6 and 10) NIA staff who oversee IMT in Plaridel have expressed the common concern that if collection rates do not increase post-IMT, it may represent "a big problem" for the financial viabilities of IAs (NIA Interview 10). In addition, they indicated that ISF collection rates have been on the decline over the past few years (NIA Interview 4). Therefore, Plaridel's IAs have to make significant progress in their collection rates post-IMT in order for them to be financially viable and thus able to properly run their respective irrigation systems.

To determine if Plaridel's IAs have the capacity to collect ISFs from their members on a sustained basis and to properly manage their financial resources, it must be determined if

the following four main requirements, identified by the irrigation management experts, have been met:

i. The IAs have had sufficient capacity building performed by the Irrigation Agency to ensure that the IAs have an adequate level of financial management skills to collect ISFs on a sustained basis and to manage their financial resources. (FAO & INPIM, 2001; FAO, 2003; Gupta & Srivastava, 1999; International Water Management Institute, 2007; Raby, 1997; Svendsen, Trava & Johnson, 1997; Wijayaratna, 2004; Yap, 2009).

ii. A sufficient level of trust exists between the members of each IA such that they will pay their ISFs to the IA. (Korten & Siy, 1989; Raby, 1997; Svendsen, Trava & Johnson, 1997; Wijayaratna, 2004).

iii. The farmer members of each IA engage in the repairs, rehabilitation, and general O&M activities, run by either the Irrigation Agency or the Irrigation Association, in order to gain a sense of ownership over their irrigation system, thus increasing their willingness to pay for the system's upkeep and improvement. (Asian Development Bank, 2008; Attia, n.d.; Groenfeldt & Svendsen, 2000; Gupta & Srivastava, 1999; International Water Management Institute, 2007; NIA "Irrigation Management Transfer", n.d.; Korten & Siy, 1989; Sampath & Young, 1990; Shivakoti, Vermillion, Lam, Ostrom & Pradhan, 2005; Wijayaratna, 2004).

iv. All IAs have the capacity to influence those farmers who have not paid their fees through both incentives and enforceable sanctions. (Attia, n.d.; Groenfeldt & Svendsen, 2000; Gupta & Srivastava, 1999; International Water Management Institute, 2007; Lauraya, Sala & Wijayaratna, 1996; Ofrecio, 2006; Small & Carruthers, 1991; Vermillion, 1997; Vermillion & Sagardoy, 1999; Wijayaratna, 2004).

To appraise Plaridel's adherence to the first requirement, that all IAs have had sufficient capacity building performed by the Irrigation Agency to ensure that they have an adequate level of financial management skills to collect ISFs on a sustained basis and to

manage their financial resources**,** it must first be determined what financial management roles and responsibilities will be delegated to Plaridel's IAs under IMT and, secondly, what training will be provided by NIA to enable the IAs to perform each of these roles and responsibilities.

Under the 'Combined Stage I & II' contract, which Plaridel's IAs will be delegated the following roles and responsibilities:

1. Creating, implementing and monitoring a regular, or yearly, financial plan and budget, based on the operations and management plan.
2. Accepting the calculated ISF bills from NIA, preparing a computation of each farmer's individual ISF bill, distribute ISF bills to each farmer member and collect the ISFs from them.
3. Submitting all collected ISFs and collection reports regularly to NIA.
4. Monitoring the amount of ISFs collected from each member.
5. Informing all farmer members of their collection status and campaigning to farmers to pay their current and back ISF fees.
6. Creating and implementing all necessary rules regarding good financial management of the irrigation system and enforcing penalties on all those who violate the rules.
7. Allocating a Repair and Maintenance fund from the yearly income of the organization to fund all minor repair works and to help NIA in paying for major repairs.

Also, under the Financial Management section of the 'Combined' Stage I & II' contract NIA is given the responsibility of providing financial management trainings to IA members who will be undertaking the IAs new financial roles and responsibilities (NIA "IMT Contract", n.d.). The following financial management skills are required by NIA's central office to be included in all financial management trainings (NIA "Review of Irrigation Management Transfer Program", n.d.):

- Budgeting, budget implementation and monitoring.
- Preparation of ISF bills for individual farmers, distribution of ISF bills, collection of ISF payments.
- Safeguarding and remitting ISF collections to NIA.
- Imposition of discipline and sanctions on settlement of members' obligations.

NIA's head of personnel in charge of training Plaridel's IAs indicated that, although not yet complete, NIA remains committed to conducting financial management training(s) for all of Plaridel's IAs, which will include all of the above mandated skills, but no others (NIA Interview 4). The following is a list of all of the roles and responsibilities that will not be addressed:

1. Creating, implementing and monitoring a regular, or yearly, financial plan based on the operations and management plan.
2. Collection reports that must be submitted regularly to NIA.
3. Monitoring the amount of ISFs collected from each member.
4. Informing all farmer members of their collection status and campaigning to farmers to pay their current and back ISF fees.
5. Allocating a Repair and Maintenance fund from the yearly income of the organization to fund all minor repair works and to help NIA in paying for major repairs.

On top of NIA's inability to deliver these necessary financial management skills training, the agency has yet to complete the four training topics it set out to do for all Plaridel IAs. Although the NIA management personnel in charge of IMT indicate that they are committed to its implementation, they have been forced to wait until the necessary financial resources are available (NIA Interview 8). These delays have been a common problem across the Philippines (Raby, 1997). If the financial management training is delayed until after the implementation of IMT has been initiated, there will be a higher chance of creating additional and unnecessary resistance from the farmers to IMT. If the farmers enter into IMT without the skills necessary to complete their delegated financial

roles and responsibilities, they will be less likely to properly undertake them, which will result in decreased ISF collection rates and a decreased capacity to properly manage their financial resources. With farmer members resultantly being less willing to forward ISFs to members, whose abilities are proven inadequate, the IA will inevitably become insolvent.

It should also be noted that these financial management responsibilities are no small task and that their delegation to the IAs should not be taken lightly. Currently, NIA field staff in Plaridel devote an average of 60 percent of their time to collecting ISFs (NIA Interview 2). Although, the IAs are legally allowed to hire employees to complete these tasks, they must first collect enough money to be able to do so (Municipal Government Official Interview 1; Farmer Interview 1; Farmer Group Interview 5 and 6). Therefore, the sheer time required to collecting these fees will be a huge challenge for already busy farmers.

Although Plaridel IAs have not yet received a sufficient level of financial capacity building from NIA, which has resulted in them having an inadequate level of financial management skills to both collect ISFs, as well as to sustainably manage their financial resources, they may at least receive some of the necessary training in the near future. However, for the IAs to be able to successfully implement *all* of the necessary financial roles and responsibilities delegated to them under IMT, a more comprehensive set of skills must be included in NIA's financial management training plans.

The absence of a sufficient level of trust between IA members that they will pay their ISFs to the IA (Korten & Siy, 1989; Raby, 1997; Svendsen, Trava & Johnson, 1997; Wijayaratna, 2004), has been a pronounced impediment to IMT. Farmers who have become accustomed to paying ISFs to Irrigation Agencies or other governmental bodies are frequently hesitant and mistrustful when asked to pay fees to a fellow IA member. This is generally because those members have not proven themselves capable and/or trustworthy. Similar mistrust has been observed when strong procedures are not in place to ensure accountability and transparency for all of the appropriate financial management procedures (Wijayaratna, 2004; Raby, 1997). However, this mistrust has also been

specified as one of the main causes of low ISF collection rates by government, including NIA (Svendsen, Trava & Johnson, 1997; Raby, 1997; NIA Interview 4).

All of the above statements of mistrust apply to the case of Plaridel. Currently, one of the reasons given for low collection rates is a lack of transparency on the part of NIA (Farmer Group Interview 5). A common complaint among Plaridel's farmers is that there is not always a direct correlation between the amount of ISFs paid by the farmer and the services provided to them. Therefore, they argue, why should they have to pay their ISFs if they are not adequately serviced (Farmer Group Interview 5)? However, mistrust of their fellow IA members in handling the collection and management of those fees is also quite prevalent, expressing fears that the ISFs may be misused, improperly managed or simply disappear (Farmer Group Interview 2-8).

Table 5.1 shows the average of all responses received from representatives and general members of each IA to the question: Will the members of your IA trust a fellow farmer member(s) to collect ISFs once IMT commences? In all instances where general members were interviewed, their opinions were in line with those articulated by their representatives. As it can be seen, only one of Plaridel's IAs had an average response of 'yes', four of the seven IAs had an average response of 'maybe' and one IA had an average response of 'no'.

Table 5.1**:** Average farmer response to the question: will the members of your IA trust a fellow farmer member(s) to collect ISFs once IMT commences, by IA

Barangay	IA	Levels of Trust
Bulihan	BSJB	Yes
Bagong-Silang	Plagui	Maybe
Parulan	Parulan-Halang	Maybe
Sipat	Lucidar	Maybe
Lalangan	Plaridel-Malolos	Maybe
Lagundi	Lagum	No
Culianin	BPB	No

Source: Farmer Group Interview 2-8

Accordingly, it would seem evident that IAs will experience significant difficulties collecting ISFs if the current low levels of trust persist. Nonetheless, NIA management

staff in Plaridel indicate that this mistrust is not an insurmountable obstacle. It is their common perception that the current lack of trust in Plaridel's IAs, with respect to ISF collection, is mainly due to a lack of information (NIA Interview 6, 8, 10). Numerous staff indicate that once the financial management training has taken place, many of their fears will disappear *(*NIA Interview 6, 10*)*. This means that trust will emerge after NIA has been able to inform all farmer members of Plaridel's IAs that the "IA officials… will be responsible for the collection of irrigation fees because [NIA] has no more personnel to collect" (NIA Interview 10), inform them of the official ISF collection procedures, including the issuance of an official receipt, and all of the safeguards that NIA has put in place to ensure the IAs are properly managing their finances, such as monitoring, evaluating, auditing etc… (NIA "IMT Contract", n.d.) When asking a few farmer members if these measures would calm their fears, and thereby increase their trust of fellow farmer members, they confirmed that it would (Farmer Group Interview 6 and 7).

Therefore, it can be said that currently there does not exist a sufficient level of trust between farmer members such that the members are willing to pay their ISFs to the IA. However, this has the potential to be remedied if financial management training can be executed before the implementation of IMT in Plaridel.

The third requirement that must be met is that farmer members participate in all repairs, rehabilitation, general O&M activities, run by either the Irrigation Agency or the Irrigation Association, in order to gain a sense of ownership and increase their willingness to pay for the system's upkeep and improvement (Asian Development Bank, 2008; Attia, n.d.; Groenfeldt & Svendsen, 2000; Gupta & Srivastava, 1999; International Water Management Institute, 2007; NIA "Irrigation Management Transfer", n.d.; Korten & Siy, 1989; Sampath & Young, 1990; Shivakoti, Vermillion, Lam, Ostrom & Pradhan, 2005; Wijayaratna, 2004). The inability of farmer IAs to meet this requirement is also a common impediment to successfully implementing IMT, in the Philippines and worldwide.

Generally, rehabilitation of irrigation systems is completed just before IMT commences and does not include any meaningful participation or investment by the IAs. This can

"reinforce a perception among farmers that the irrigation system belongs to the government" (Gupta & Srivastava, 1999, p. 17). A suggested way to improve farmer ownership over the irrigation system after turnover is to have "the farmers take the lead in setting priorities for repairs and improvements, while investing a significant amount of their own labour and material" (Gupta & Srivastava, 1999, p. 19). Indeed the more farmers are involved in repairs, rehabilitation, and general O&M activities before the system is turned over to them, the more likely they are to have a sense of ownership over the system, and thus they will be more willing to pay their ISFs (Attia, n.d.; Groenfeldt & Svendson, 2000; Gupta & Srivastava, 1999; International Water Management Institute, 2007; NIA "Irrigation Management Transfer", n.d.; Korten & Siy, 1989; Asian Development Bank, 2008; Sampath & Young, 1990; Shivakoti, Vermillion, Lam, Ostrom & Pradhan, 2005; Wijayaratna, 2004).

In the Philippines, there have been various studies that have substantiated this ownership paradigm (Korten & Siy, 1989; Shivakoti, Vermillion, Lam, Ostrom & Pradhan, 2005; Thompson, 1995). For example, a study comparing the implementation of IMT in CISs and NISs showed that because NIA did not implement a "formal mechanism for user's participation during the project implementation phase [for NISs or]...contribute to the capital cost of construction, as they do in CISs" the NISs were not as willing to pay ISFs or other construction costs post-IMT (Small & Carruthers, 1991, p. 294). Another, study showed that "farmer's investment of materials and labor in the actual construction of their system was also a crucial element which developed their commitment to its sustained maintenance" (Bagadion, 1989, p. 12). The IA's observed low sense of ownership over Plaridel's irrigation systems (see Best Practice #2) demonstrates poor adherence to this requirement.

In view of the desirability of fostering an increased sense of ownership among IA members, it must be determined whether farmer members of Plaridel's IAs have and will continue to participate in all repairs, rehabilitation, general O&M activities, run by either the Irrigation Agency or the Irrigation Association before turnover, to create a higher sense of ownership over their irrigation system and thus increase their willingness to pay for the system's upkeep and improvement post- IMT.

In the IMT implementation process, mandated by NIAs national office, phases two to four, of five, involve tasks that engage the IAs in repairs and rehabilitation that need to be completed before turnover (NIA "Review of Irrigation Management Transfer Program", n.d.). These tasks and their expected outputs for each phase are (NIA "Review of Irrigation Management Transfer Program", n.d.):

Phase 2

- **Tasks:** Joint NIA-IA walk-through of the irrigation system and a consequent NIA-IA workshop on the assessment of the 'IA performance-list of issues to be addressed'.
- **Expected outputs:** Mobilize farmers to initiate system improvement and further develop the IAs capacity for the O&M of the system.

Phase 3

- **Tasks:** NIA-IA Action Planning Workshops to formulate proposals for physical improvement, improved system operation, improved maintenance, IA capacity build-up plan, monitoring & evaluation scheme, and the draft IMT contract.
- **Expected outputs:** Mobilize farmers to engage in system planning, monitoring and evaluation among other things.

Phase 4

- **Tasks:** undertake physical improvements drawn up in the various plans of phase three ensuring that the IAs participate in construction and a NIA-IA Assessment and Planning Meeting to establish accomplishments vs. targets.
- **Expected outputs:** Mobilize farmers to participate in system improvement and planning.

Therefore, if this mandated process is indeed followed by NIA staff implementing IMT in Plaridel, there is a strong likelihood of improving the IAs' sense of ownership over their

respective irrigation systems, despite the lack of resources to finance the physical improvements. In addition, in Plaridel's 'Combined Stage I & II" contract, there is a provision that states that all minor repairs and construction, under 100,000 PHP, shall be the responsibility of the IA and that all major repairs and construction, over 100,000 PHP, shall be the joint responsibility of the IAs and NIA, throughout the implementation phases of IMT (NIA "IMT Contract", n.d.). This will also increase the likelihood that Plaridel's farmer members will develop a sense of ownership over their irrigation systems.

However, given the limited funds available to NIA's regional office for the implementation of IMT in Plaridel, there is concern among both NIA staff and Plaridel's farmers that there are currently insufficient resources available to undertake the physical improvements needed (Farmer Group Interview 2-8; NIA Interview 10). Furthermore, as Plaridel is currently so far behind in the IMT implementation process (NIA Interview 6) NIA may not have the time to properly implement all of the IMT phases, meaning time constraints may prohibit involving the IAs in the construction process, even if they do find the funds to undertake the necessary physical improvements. Therefore, it can be concluded that although there exists the potential to achieve this requirement, it cannot be determined if there exists the available time and/or financial resources necessary to engage farmer members in the O&M functions that would in turn foster an increased sense of ownership of the irrigation system.

The last precondition or requirement that must be met is that IAs must have the capacity to influence those farmers who have not paid their fees through both incentives and enforceable sanctions (Attia, n.d.; Groenfeldt & Svendson, 2000; Gupta & Srivastava, 1999; International Water Management Institute, 2007; Lauraya, Sala & Wijayaratna, 1996; Ofrecio, 2006; Small & Carruthers, 1991; Vermillion, 1997; Vermillion & Sagardoy, 1999; Wijayaratna, 2004)

Incentives have been proven a valuable and at times essential tool for prompt ISF payments (Attia, n.d.; Gupta & Srivastava, 1999; Lauraya, Sala & Wijayaratna, 1996; Vermillion, 1997; Vermillion & Sagardoy, 1999; Wijayaratna, 2004). Incentives for ISFs

come in a variety of forms, which can include financial incentives, such as discounts for early payment, or social incentives, such as throwing a party for all farmers who are up to date with their ISFs (Small & Carruthers, 1991, p. 188).

The Philippines' NIA has used a variety of incentives to influence farmers to pay their ISFs on time or to catch up on back payments. Generally, this has had positive effects on collection rates, however, some of NIA's incentive schemes have been more successful than others (Groenfeldt & Svendson, 2000; Oorthuizen, 2003; Small & Carruthers, 1991). Those schemes that have failed to motivate farmers to pay their current and back accounts have been connected to poorly performing IAs (Groenfeldt & Svendson, 2000; Panella, 2004). In addition, many popular incentive schemes have also failed due to NIAs failure to pay the incentives to the farmer beneficiaries on time, or at all, due to a lack of financial resources (Groenfeldt & Svendson, 2000; International Water Management Institute, 2007; Ofrecio, 2006; Raby, 1997).

Currently, NIA is in the process of implementing a new incentive scheme for Plaridel's IAs. For the first year, 60 percent of all ISFs collected will go to NIA and 40 percent will go to the IAs. In the second year, the proportion will be reversed, giving NIA 40 percent and the IAs 60 percent. In the third year, when the IAs will have complete responsibility over their respective irrigation systems, they will retain 100 percent of the ISFs collected. However, for the first two years the IAs must reach an ISF collection rate of 70 percent to be eligible to receive their specified portion of the fees *(*NIA Interview 8 and Farmer Group Interview 1).

In addition to the above incentive scheme, if farmers opt to pay before their bill is due they will receive a 10 percent discount. The scheme also provides a 30 percent reduction off all back-account penalties (NIA Interview 7**).** NIA is implementing these incentives in the hopes that they will help the IAs in motivating farmer members to pay their ISFs. With ISF collection rates in Plaridel's IAs ranging from 60 to 70 percent, these incentives are expected to provide a welcome help (NIA Interview 8 and Farmer Group Interview 1-8).

However, all of Plaridel's IAs are currently in negotiations with NIA to change the incentive scheme to a 50/50 split and to eliminate the minimum collection rate of 70 percent from the terms of the contract (Farmer Group Interview 4-6 and 8). Irrespective of which incentive scheme is implemented, it can still be said that the first part requirement that IAs must have the capacity to influence those farmers who have not paid their fees through incentives, is currently being met. However, this is reliant on NIA paying the IAs their incentives in a timely manner, which they have known to have problems with in the past (Groenfeldt & Svendson, 2000; International Water Management Institute, 2007; Ofrecio, 2006; Raby, 1997).

The second part of this requirement that must be appraised is: whether Plaridel's IAs have the capacity to influence those farmers who have not paid their fees through enforceable sanctions. Sanctions for the failure to make prompt payment of ISFs have been proven to be an exceedingly successful collection tool, if properly implemented (International Water Management Institute, 2007; Korten & Siy, 1989; Panella, 2004; Sangupta, 1991; Small & Carruthers, 1991; Vermillion & Sagardoy, 1999). Properly implementation means that the sanctions are of an appropriate magnitude relative to the value of water and production (Small & Carruthers, 1991, p. 170). Sanctions can be financial (fines), social (denied access to social events), legal (foreclosure on land), or in terms of denying access to water for irrigation (Small & Carruthers, 1991, p. 170). As well, sanctions have been shown to be most effective when they gradually become more serious, and when they are administered by the farmer users themselves (Panella, 2004, p. 103).

From its inception, NIA has attempted to impose numerous different sanction methods on delinquent farmers since its establishment, such as warning letters, fines and taking delinquent farmers to court (NIA “Operation and Maintenance of National Irrigation Systems”, n.d.). However, these have generally been unsuccessful, as they are usually not adequately enforced, because the farmer is either poor (NIA “Operation and Maintenance of National Irrigation Systems”, n.d.), or they are unenforceable, as with the physical impossibility of cutting off farmer’s access to irrigation water (Araral, 2006; Raby, 1997;

Sampath & Young, 1990; Wijayaratna, 2002; Wijayaratna, Pintor, Valdez, Laitos & Solis, 1996). This lack of enforcement power, or willingness to enforce, has created the perception among farmers that "non-payment or partial payment [is] not considered as a crime" (Oorthuizen, 2003, p. 28). This ineffectual dynamic has produced severe financial difficulties for NIA. For example, in 2004, “NIA estimated that some 567,041 farmers had outstanding balances with the agency totaling... $[US]125.9M" (Araral, 2006, p. 253). These events have also been occurring in AMRIS, usually to a greater degree. For example, one study found that "the incidence of free riding (ISFs) in AMRIS ranges from 52 to as much as 79 percent against the 43 percent national average" (Araral, 2006, p. 253). This low payment rate has been attributed directly to the lack of credible enforcement of sanctions by NIA (Araral, 2006, p. 239).

In Plaridel it has also been very challenging for NIA to enforce sanctions through their ‘synchronous system’. The nature of the ‘synchronous system’ is such that every farmer receives water at the same time and that there are insufficient infrastructural barriers for one farmer to be denied access to water (NIA Interview 1). NIA has tried to implement various sanctions, sending out warning letters or attempting to take farmers to court in some, rare and extreme, cases (NIA Interview 1). However, none have been successful, as the farmers know that they will not be able to cut off their access to water, which is largely the only thing that could ensure that they would pay their fees (NIA Interview 2). Typically, NIA is only able to recuperate back-fees from delinquent farmers when the farmers sell their land, as farmers are legally required to pay all outstanding ISFs before they can sell (Farmer Interview 1).

Members of NIA and Plaridel’s IAs agree that the IAs will likely experience post-transfer difficulties similar to those that NIA has endured in the past (Farmer Group Interview 2-8 and NIA Interview 2, 10). The only advantage that the IAs stated they might have over NIA is with respect to the implementation of social sanctions. However, they believe, this will only be effective if the farmers know one another well or live in close proximity to each other, otherwise they too may have no effect (Farmer Group Interview 3, 5 and 6). The IAs can resort to taking delinquent farmers to court, however this can be costly and

the delinquent farmers tend to be those farmers who truly cannot afford their fees; therefore court decisions in these cases even when decided in favor of the IA are unlikely to garner the IA any payment.

Thus, the IAs have inadequate means to enforce sanctions imposed on farmers who have not paid their ISFs. Therefore, it can be said that there is a very low likelihood that Plaridel's IAs will have sufficient capacity to collect Irrigation Service Fees from their members on a sustained basis. Nor is it likely that they will have the capacity to properly manage their financial resources. Therefore, it can be said that this accepted 'best practice' for IMT implementation is not currently being adhered to in Plaridel and that there is a chance that they will fall into the 'vicious cycle of irrigation management'.

Best Practice #5: Financial Resources Must be Available to Farmers and IAs Who Are Unable to Profitably Sustain the Operation of Their Farm or Irrigation System Independent of the Irrigation Agency

The next 'best practice' that the international irrigation community has set out for the implementation of IMT is: sufficient financial resources must be available to farmers and IAs who are unable to profitably sustain the operation of their farm or irrigation system independent of the Irrigation Agency (Attia, n.d.; FAO & INPIM, 2001; FAO & INPIM, n.d.; International Water Management Institute, 2007; NIA "Irrigation Management Transfer", n.d.; Panella, 2004; Sander, 1979; Svendsen, 1992; Svendsen, Trava & Johnson, 1997; Thompson, 1995; Uphoff, Ramamurthy & Steiner, 1991; Vermillion, n.d.; Vermillion & Sagardoy, 1999; Wijayaratna, 2004). The main reason why the above has been deemed a 'best practice' is because it has been shown that if adequate resources are not made available to the farmers and IAs during the implementation of IMT, there is a far greater likelihood that they will be unable to implement all of the roles and responsibilities delegated to them under IMT and therefore eventually fall into the 'vicious cycle of irrigation management'.

Therefore, for farmers and IAs to be successful independent of the irrigation agency, the national government and irrigation agency must provide access, for both IAs and farmers, to a sufficient level of temporary financial support to enable and encourage them to assume their duties under IMT, if they are unable to do so on their own. However, if the irrigation agency is unable to provide these temporary financial supports, the farmers and IAs must have access to a sufficient amount of low-interest credit.

However, before these two requirements of this 'best practice' are determined to be present in Plaridel, it must first be determined whether Plaridel's farmers and IAs are in need of financial support and/or access to credit in order to profitably sustain their farm and/or irrigation systems independently of NIA.

Firstly, with respect to Plaridel's farmers, as detailed in the fourth 'best practice', ISF collection rates for all of Plaridel's IAs range from 60-70% (Farmer Group Interview 2-8). Although there are a variety of reasons given for the low collection rates, the main reason according to Plaridel's farmers is that some farms are simply not productive or profitable enough to afford their ISFs, much less meet their families' basic needs (NIA Interview 1; Farmer Group Interview 1, 4 and 8)

Figure 5.2 shows a breakdown of the total costs and profits for an average, one-hectare, palay farm in Plaridel, for the 2009-2010 dry season (6 months).

Figure 5.2: Total costs and profits from a 1 ha farm in Plaridel for one cropping season

Cost and Return Survey Form: Rice Production

Material Input	**Total Cost** (PHP)
1. Seeds	2,900
2. Fertilizer	8,100
3. Pesticide	2,388
4. Ameliorants	756
Total Material Costs	**14,144**
Labor Input	
1. Seedbed preparation, care and management	1,300
2. Cleaning/repairing dikes	1,000
3. Land preparation	4,000
4. Pulling and Hauling of seedlings	2,100
5. Planting	3,200
6. Application of fertilizers, pesticides etc.	1,500
7. Threshing	840
Other Fees and Expenses	
8. Irrigation Service Fee	1,000*
9. Interest on loan	2,500**
10. Agricultural Land Tax	65
Total Labor Costs	**17,505**
Total Production Cost (Labor + Mat.)	31,649
Palay Net Profit	63,000 (126,000 per year)
Net Income	31,351 (62,702 per year)

*Did not pay full amount of approximately 2,500 PHP
**Private lender (with very high interest rates)

Source: Municipal Government Official Interview 3

As seen above, this farmer will make approximately 62,700 PHP per year profit, or approximately 1,425 US$. Although this appears, on the surface, to provide enough profit to pay the irrigation fees of approximately 2,500 PHP for the season (Farmer Group Interview 2), the farmer was only able to pay 1,000 PHP due to household expenses, the high cost of production, and the necessity of paying outstanding debts (Municipal Government Official Interview 3).

The struggle of this farmer to pay his ISFs can be best understood when comparing his income to that of Central Luzon. In 2009, the average income of a Central Luzon Filipino family was 221,000 PHP and their annual average expenditure was 189,000 PHP. This means that the average income of a farming family in Plaridel is more than 40 percent less than the average income in Central Luzon and that after farm expenses less than one third of that income remains for family expenses. (Number of Families, Total and Average Annual Family Income and Expenditure by Region: 2009)

Therefore, although this farmer, whom a Municipal Government Official indicates as being a fair representation of a majority of Plaridel's farmers (Municipal Government Official Interview 3), has made a profit this season, his inability to pay his ISFs will only compound his debt load for future seasons. It is also important to keep in mind that Figure 5.2 is representative of a successful cropping season and that a poor cropping season would result in a higher likelihood that the farmer would be unable to pay any of his fees.

In Plaridel, when a bad cropping season occurs, farmers usually turn to 'loan sharks' to borrow the money they need as the banking system is inaccessible to them (discussed later in this section). This is problematic for Plaridel's farmers as the banks in Plaridel charge an average of 18 percent per annum, whereas 'loan sharks' charge on average 10 percent per *month* (Farmer Group Interview 2-4, 6 and 8). This makes it challenging for farmers to profitably sustain their farms as paying inflated debts to 'loan sharks' is burdensome on their already meager earnings and always takes priority (Farmer Group Interview 2,4 and 8) as loan sharks are more likely to put pressures on the farmers such as

"daily visits, threats of foreclosure, [and] put[ting] the honor of the farmer… on the line" (Frias, 2010). This also greatly affects the IAs financial viability, as they are only likely to receive their ISF payments after the farmers have paid their debts to the 'loan shark,' as well as paid for all of the necessary material and labor costs of their own farm (Farmer Group Interview 2-8).

Owing largely to the above reasons, it is seen that many of Plaridel's farmers are currently unable to profitably sustain their farms. Therefore, for these farmers to be successful, independent of NIA, NIA must provide access to temporary financial support to encourage and enable Plaridel farmers to assume the duties assigned to them under IMT. Secondly, if NIA is unable to provide sufficient temporary financial support and incentives, the farmers must at least have access to sufficient low-interest credit sources.

Moreover, Plaridel's IAs have also expressed concern over their ability to pay for specific costs being delegated to them under IMT. Some of these concerns relate to the everyday maintenance of their irrigation systems, such as hiring laborers. However, most pertain to their ability to generate capital replacement funds and emergency funds (Farmer Group Interview 2-8). Similar cost concerns have been problematic for IAs implementing IMT worldwide (Gupta & Srivastava, 1999; NIA "Irrigation Management Transfer", n.d.; Svendsen, Trava & Johnson, 1997; Vermillion, n.d.). If as a result, Plaridel's IAs are unable to maintain their irrigation systems in both the short and long term, the profitability and survivability of the IA will come under threat (NIA "Irrigation Management Transfer", n.d.).

For the above reasons, it can be anticipated that Plaridel's IAs will have difficulties obtaining sufficient funds to profitably sustain their IAs. For Plaridel's IAs to be successful, independent of NIA, NIA must provide Plaridel's IAs with access to temporary financial support to enable and encourage farmers and IAs to assume their duties under IMT. Secondly, if NIA is unable to provide sufficient temporary financial supports and incentives, the IAs must then at least have access to sufficient low-interest credit sources.

Do these temporary financial support and/or low-interest credit sources exist in Plaridel?

Firstly, with respect to temporary financial support, NIA has 'provided' two forms of this to Plaridel's IAs under IMT. The first of these is the cost-sharing program for all 'major', (10,000 PHP or more) construction projects, where NIA pays for all materials and equipment and the IAs pay for all other costs, such as Labor (NIA "IMT Contract", n.d.). Although this is helpful to the IAs, they have identified two main problems with this financial support. The first is that there is a stipulation that NIA will only share the cost for these projects if the IAs reached a 70 percent collection rate (Farmer Group Interview 7), as discussed in the previous section, this may be challenging for the IAs to accomplish. Secondly, even though NIA will carry the burden of the majority of the costs, the 'other' costs may still be too much for the IAs to provide (Farmer Group Interview 2-8). Therefore, this 'temporary financial support' that NIA is providing may prove to be inaccessible to Plaridel's IAs.

The second form of temporary financial support the IAs received under IMT relates to emergency funds, which are actually provided by the national government, not NIA. In the past, the national government has given subsidies to farmers after El Nino events or other natural calamities and will continue to do so in the future as they have funds set aside for such occasions (Farmer Group Interview 2). However, the amounts of these emergency support funds are not guaranteed and Plaridel's farmers, along with NIA, have stated that these subsidies are never nearly enough to enable them to "get back on their feet" (Farmer Group Interview 2; NIA Interview 8*).* Therefore, although some temporary financial support is available to Plaridel's farmers and IAs, they do not meet the needs of Plaridel's farmers and IAs to run profitable and sustainable farms and IAs, independent of NIA. Moreover, Plaridel farmers do not have easy access to low-interest credit. Although banks and co-operatives do technically provide loans to farmers in Plaridel, with approximately 18 percent interest rates, the administrative and financial obstacles to obtaining these loans are huge, if not insurmountable, for most of Plaridel's farmers (NIA Interview 8; Municipal Government Official Interview 3 and 4; Farmer Group Interview

1). To obtain a loan a farmer must usually meet the following main requirements (Cooperative Rural Bank of Bulacan, 2010):

- Be 18 – 60 years old.
- Be physically fit.
- Own a profitable farm and can confirm he/she has a good and reliable cash flow, which can provide a stable income for the client and his/her family.
- Have 2 co-signers.
- No past-due loan records from other banks, suppliers or creditors.
- Passed the 'Credit and Background Investigation'.
- Have 1,000.00 PHP of personal savings.
- Provide post-dated checks to the Bank before the release of loan.
- Have 2 valid pieces of identification.
- Hold a 'Residence Certificate'.
- Certification from the Land Bank of the Philippines stating that the applicant has no past due loan records.
- Others…

Plaridel's farmers have stated that these requirements exclude the vast majority of farmers in the municipality from being able to obtain bank loans. Only the very successful farmers of the municipality meet these requirements (Farmer Group Interview 3-7). In fact, many farmers and municipal officials stated that the fact that they must obtain two pieces of valid identification is enough of an impediment for farmers to be unwilling to obtain loans from a bank as the paper work and fees behind obtaining an ID is time consuming and overwhelming (Municipal Government Official Interview 3; Farmer Group Interview 3-6). In addition, one of Plaridel's banks stated that usually they cannot give loans to farmers as they do not have sufficient collateral or credit history (Municipal Bank Official Interview 1).

Unfortunately, the agricultural cooperatives in Plaridel typically impose the same barriers to entry as the banks (Municipal Government Official Interview 3). As well, over the past

decade, the number of agricultural cooperatives in Plaridel has been significantly reduced, largely as a result of farmers defaulting on their loans (Municipal Government Official Interview 3). Consequently, many farmers in Plaridel have been obligated, and sometimes prefer, to borrow money from 'loan sharks' as there are no pre-requisites to acquiring a loan. However, instead of the standard 18 percent per annum interest rate, loan sharks charge on average 10 percent per *month*. The onerous terms of these, albeit readily available, loans present a considerable obstacle to the farmer's ability to sustain profitability (Farmer Group Interview 2, 4 and 8).

Although Plaridel's IAs have never before had to search out credit, as NIA had hitherto assumed all IA debt, the IAs current obligation to achieve financial independence from NIA will highlight the importance of access to low-interest loans. Plaridel's IAs are currently having trouble collecting ISFs, a problem that is predicted to persist in the near future. Consequently, IA members have expressed concern that they will be unable to meet the banks' requirement of having a 'good, stable cash flow' (Cooperative Rural Bank of Bulacan, 2010). In addition, IAs do not have sufficient collateral as under IMT NIA will retain ownership of the irrigation system (Ofrecio, 2006, p. 1). Therefore, it is observed that Plaridel's IAs will likely encounter many of the same barriers to obtaining low-interest credit that farmers have customarily faced, as although access to low-interest credit sources is ostensibly available to all of Plaridel's farmers and IAs, in real terms the majority of farmers and many of Plaridel's IAs, are incapable of overcoming barriers to obtaining them.

Plaridel's farmers and municipal officials have expressed concern that the lack of temporary financial support or low-interest credit also impedes farmers and IAs from accessing resources that would enable them to become financially self-sufficient over the long-term (Farmer Group Interview 2, 4 and 8*;)*. The most common example cited was with respect to purchasing hybrid seeds. Hybrid seeds usually yield between 200-300 cavans per hectare, depending on the inputs and weather conditions of the farm (Municipal Government Official Interview 3). Although this is significantly higher than the average 110 cavans per hectare, Plaridel's farms yield with 'certified seeds' hybrid

seeds typically cost approximately two times more (Municipal Government Official Interview 3). Although there are subsidies available from the national and municipal governments (Municipal Government Official Interview 3) without access to temporary financial assistance or low-interest credit these improved varieties remain inaccessible to Plaridel's farmers.

What is likely to happen if financial resources do not become accessible to Plaridel's farmers and IAs through NIA, banks or cooperatives in the near future? Plaridel's IAs state that there is a chance they could turn to their Congressmen for funds for larger infrastructure projects (Farmer Group Interview 2-8) and that some may be able to turn to their barangay captains for smaller financial needs if they are experiencing major financial difficulties *(*Farmer Group Interview 4, 7 and 8). However, these opportunities are not guaranteed and if they do not present themselves it is likely that the IAs will fall into the 'vicious cycle of irrigation management'. The farmers on the other hand will usually have no choice but to fall further into debt, with many of Plaridel's farmers having to sell their land as the only way to pull themselves out of debt (Farmer Group Interview 2 and 8).

Chapter Six: Measuring Plaridel's Success: Operations and Maintenance and Water Availability

This chapter will analyze whether the operations and maintenance related 'best practices' for the implementation of IMT are currently happening in Plaridel. These being, firstly, that IAs must have the capacity to perform all operations and maintenance related roles and responsibilities delegated to them under IMT. And secondly, that IAs must have a clearly recognized and sustainable water right and service.

Best Practice #6: IAs Must Have the Capacity to Perform All Operations and Maintenance Related Roles and Responsibilities Delegated to Them Under IMT

The next 'best practice' that must be determined to exist in the implementation of IMT in Plaridel is: do IAs have the capacity to perform all operations and maintenance related roles and responsibilities delegated to them under IMT (Araral, 2006; Bandyopadhyay, Shyamsundar & Xie, 2007; Groenfeldt & Svendson, 2000; International Water Management Institute, 2007; NIA "Irrigation Management Transfer", n.d.; Lauraya, Sala & Wijayaratna, 1996; Merrey, 1997; National Economic and Development Authority, 2004; Oorthuizen, 2003; Panella, 2004; Sampath & Young, 1990; Shivakoti, Vermillion, Lam, Ostrom & Pradhan, 2005; Vermillion, 1997; Wijayaratna, 2004). In addition, it must be determined if there exists a properly functioning irrigation system at the time of turnover, as it increases the chances of the IAs being able to successfully perform these roles and responsibilities (FAO & INPIM, 2001; International Water Management Institute, 2007; Shivakoti, Vermillion, Lam, Ostrom & Pradhan, 2005; Svendsen, Trava & Johnson, 1997; Vermillion, n.d.; Vermillion, 1997; Wijayaratna, 2004).

Before these can be determined it must first be understood what is meant by both 'operations' and 'maintenance' in this context. NIA defines 'operations' under IMT as "the activities involved in diverting water from the source and conveying and distributing it to the point of application in the farmers' fields" (NIA "Review of Irrigation Management Transfer Program", n.d.). In the case of Plaridel the source means the gates of the lateral canals as it is NIA's responsibility to deliver the water to that point under the 'Combined Stage I & II' Contract. Secondly, NIA defines 'maintenance' under IMT as "the activities undertaken related to keeping the irrigation system in good operating condition at all times within the limitations of available resources to attain maximum use and economic life of the system facilities" (NIA "Review of Irrigation Management Transfer Program", n.d.). Therefore, all of the operations and maintenance roles and responsibilities delegated to Plaridel under IMT will fall under these two broad themes.

The consequences of Plaridel's IAs' inability to fulfill the roles and responsibilities

delegated to them under IMT, for both the short and long-term viability of their irrigation systems, cannot be understated. Without the proper maintenance of their irrigation canals and the subsequent timely and equitable delivery of water to all farmer members, the IAs will quickly fall into the 'vicious cycle of irrigation management' (Panella, 2004). In fact, some Filipino researchers state that, "O&M is the… activity on which the success or failure of an irrigation association depends" (Illo & Volante, 1984, p. 16). The immediate consequences of the failure of the IAs to perform these two vital tasks include, among others: a rapid deterioration of the irrigation systems' infrastructure (Sampath & Young, 1990); a rapid decline in the ability and willingness of farmer beneficiaries to pay their ISFs (Uphoff, Ramamurthy & Steiner, 1991, p. 22); an increase in the number of conflicts between farmer beneficiaries (Araral, 2006, p. 68); and a decline in productivity (Uphoff, Ramamurthy & Steiner, 1991, p. 412).

Under the 'Combined Stage I & II' contract Plaridel's IAs will be delegated the following maintenance roles and responsibilities from NIA (NIA "IMT Contract", n.d.):

1. Prepare yearly operations and maintenance plans (jointly with NIA) for all infrastructure covered by the IA and implement the tasks outlined in them.
2. Create and implement rules and regulations for the maintenance of the irrigation system, including enforcing penalties and fines for all violators.
3. Undertake all minor constructions and repairs of the infrastructure covered by the IA.
4. Communicate and cooperate with NIA in all major construction and repairs of the infrastructure covered by the IA (for example, NIA will usually provide the heavy equipment and materials and the IA will provide the fuel and labor (NIA "Review of Irrigation Management Transfer Program", n.d.).

With respect to the first maintenance responsibility delegated to Plaridel's IAs, all of Plaridel's IAs stated that, although they do not have experience in preparing operations and maintenance plans, as they will be preparing them jointly with NIA, they are confident that they will be able to easily complete the task (Farmer Group Interview 2,3 and 6-8). With respect to the implementation of the tasks outlined in these plans, which

consist of tasks such as, clearing debris from the canals, small repairs to the canals to minimize leakage, and greasing the gates (NIA "Review of Irrigation Management Transfer Program", n.d.), all of Plaridel's IAs stated that they were currently capable of completing most, if not all, of them as most of the tasks are relatively straightforward and a large number of the farmers already possess the necessary skills and knowledge to complete them (Farmer Group Interview 2, 3 and 5-8).

However, Plaridel's IAs are concerned about their ability to pay for farmers, or day laborers, to complete these tasks, as well as their ability to rent the necessary equipment, as NIA does not currently have a sufficient amount of equipment for all IAs to borrow them in a reasonable time frame (Farmer Group Interview 2, 3 and 5-8). This is because, as was determined in the fourth 'best practice', it is unlikely that Plaridel's IAs will have the capacity to collect a sufficient amount of ISFs from their members on a sustained basis. In addition, when asked if the farmers would work without compensation if their IAs were having difficulties paying for labor most farmer members interviewed said it was unlikely (Farmer Group Interview 3-8). Therefore, unless Plaridel's IAs do indeed collect a sufficient amount of ISFs once these tasks are delegated to them, or if they are able to find alternative revenue source(s), it seems unlikely that Plaridel's IAs will be able to perform half of the first maintenance responsibility delegated to them under IMT.

The second maintenance responsibility delegated to Plaridel's IAs under IMT is: Creating and implementing rules and regulations for the maintenance of the irrigation system including enforcing penalties and fines for all violators. As discussed earlier the only penalty that a farmer in violation of the rules will be obligated to respond to is the suspension of their water rights (NIA Interview 2). However, as Plaridel uses a gravity irrigation system it is effectively impossible for the IA to cut service to any one farmer, as all water is controlled at the headworks and will remain under the authority of NIA. As a single turnout gate is all that separates a farmer from water access, all he or she has to do to obtain it is to open the gate when no one is there, usually at night. One NIA fieldworker stationed in Plaridel spoke of his frustrations on this matter. He said that it's almost impossible for him to enforce the rules, as the farmers know that "they will still be

able to receive the water anyway" (NIA Interview 2). Therefore, it has been determined that Plaridel's IAs will be unable to perform the second maintenance responsibility delegated to them under IMT.

The last two maintenance responsibilities delegated to Plaridel's IAs under IMT are: undertaking all minor constructions and repairs of the infrastructure covered by the IA & communicating and cooperating with NIA in all major construction of repairs of the infrastructure covered by the IA. Plaridel's IAs' insufficient access to both temporary financial support and low-interest credit sources seriously impedes their ability to create replacement capital funds as their current collection rates are too low to reasonably assume that they will be able to generate these funds on their own. As the irrigation systems in Plaridel are in dire need of repair (Farmer Group Interview 2-8*)* it would be virtually impossible for Plaridel's IAs to complete major construction projects, even if NIA provides partial assistance, as the cost of the required 'minor' and 'major' construction far exceeds the financial capacity of the IAs (Farmer Group Interview 4, 5 and 8).

Therefore, if Plaridel's infrastructure is not rehabilitated before the implementation of IMT, the IAs will not be able to undertake all minor and major construction works. However, if the irrigation systems are rehabilitated before IMT, the IAs would still find it extremely challenging to undertake these maintenance roles and responsibilities, although there would remain the possibility to do so if their ISF collection rates increased, or if they were able to find access to credit or other financial support.

Under the 'Combined Stage I & II' contract Plaridel's IAs will be delegated the following operations related roles and responsibilities from NIA (NIA "IMT Contract", n.d.):

1. Prepare yearly operations and maintenance plans (jointly with NIA) for all infrastructure covered by the IA and implement the tasks outlined in them.
2. Prepare irrigation management plans and cropping calendars for the area covered by the IA (with the assistance of NIA).

3. Arrange the master list of all those who use irrigation water in the IA.
4. Create and implement rules and regulations for the O&M of the irrigation system including enforcing penalties and fines for all violators.
5. Measure, monitor and record water flows in the lateral and sub-lateral canals.
6. Monitor and distribute water equally to all the sub-lateral canals at turnouts and uphold at all times the farmer's right to have access to water.

Plaridel's IAs indicate that they would be able to complete yearly operations, irrigation maintenance and management plans (#1 and 2); arrange the master list of users (#3) and measure, monitor and record water flow (#5) without significant difficulty as they are comprised of fairly easy and straightforward tasks and because NIA will assist them.

However, Plaridel's IAs stated that they will have significant difficulty completing the second half of the first, the fourth (same as the 2nd maintenance responsibility, discussed above) and sixth operations responsibilities delegated to them under IMT for two main reasons. Firstly, because they are already fighting over the distribution of water within their IAs and, secondly, because most farmer beneficiaries do not trust their fellow farmer members to fairly distribute the water to all farmer members of the IA (Farmer Group Interview 2-8). For example, one typical complaint made to municipal staff is that some farmers are intentionally blocking the passage of irrigation water to other farmers downstream if equal distribution does not provide them with the amount they desire (NIA Interview 8; Municipal Government Official Interview 3). As these actions usually occur at night, it is next to impossible for other farmers to prevent this from happening, as they do not have the time or means to monitor all upstream gates (Municipal Government Official Interview 3). 'Strengthening the level of cooperation and trust within IAs will allow more equitable water allocation and enable them to complete these two operations responsibilities delegated to them under IMT. Addressing this obstacle will become more challenging in the future as Plaridel's farmers' water rights are becoming less secure over time, as will be discussed further in the next chapter.

One of the most common issues and constraints affecting the management of irrigation systems worldwide is the heavily deteriorated condition of infrastructure (Wijayaratna, 2004, p. 13). This is a huge barrier for affected IAs as it impedes them from obtaining reliable and sustained access to irrigation, ultimately reducing the overall productivity of the area concerned (Shivakoti, Vermillion, Lam, Ostrom & Pradhan, 2005).

As a consequence, some irrigation management specialists have stated that a precondition for IMT should be that the portion of the irrigation system's infrastructure being turned over to farmer groups be turned over in a 'fair condition' (Svendsen, Trava & Johnson, 1997). 'Fair condition' meaning "the hydraulic infrastructure is in operating conditions capable of delivering water to farms in sufficient amount to satisfy crop needs and in a timely manner" (Svendsen, Trava & Johnson, 1997), and that if they are not in fair condition, that rehabilitation should be undertaken (Svendsen, Trava & Johnson, 1997).

Rehabilitation of irrigation infrastructure prior to IMT has become increasingly important in Asia where "the older public schemes reach the age of 30-40 years in most countries" (Wijayaratna, 2004, p. 37). However, it has been observed that these governments are often unwilling or unable to complete the necessary improvements (Svendsen, Trava & Johnson, 1997). Improvements can be extremely costly, as they are usually a "significant departure from the mere cosmetic or light rehabilitation, or upgrading, which is typically financed" (Shivakoti, Vermillion, Lam, Ostrom & Pradhan, 2005, p. 286). In the Philippines, NIA has acknowledged the importance of the rehabilitating ageing irrigation infrastructure before they turn over the irrigation systems to the IAs (NIA, “Rehabilitation and Improvement of National and Communal Systems”, n.d.). In fact, NIAs goal is to rehabilitate all irrigation infrastructure being turned over to IAs, and in some cases, even provide an "expansion of service areas and provision of additional structures like adequate control structures, drainage systems, on-farm facilities, and service roads" (NIA, “Rehabilitation and Improvement of National and Communal Systems”, n.d.). However, due to severe financial constraints and the extent to which the irrigation infrastructure across the country has deteriorated, NIA is having extreme difficulties improving all of the infrastructure (Araral, 2006, p. 68). Specifically, in 2002

approximately 80 percent of NISs in the Philippines were in need of some form of rehabilitation or improvement. The extent of this problem is represented in Table 6.1, which lists the percent of NISs that were in need of rehabilitation, by type of repair, as of 2002.

Table 6.1: Percent of NISs in need of rehabilitation, by type, in 2002

Type of Facility	Total	% Needing Rehabilitation
1. Head Works	145 units	34%
2. Main Canal	3,917 kms	61%
3. Control Structures Main Canal	11,423 units	53%
4. Lateral Canal	10,299 kms	63%
5. Control Structures Lateral Canal	39,949 units	56%
6. Service/ Access Roads	13,967 kms	74%

Source: Araral, 2006, p. 136

In Plaridel, the situation is no different. Plaridel's IAs are demanding that the following infrastructure be rehabilitated or they will not sign the 'Combined Stage I & II' IMT contract with NIA (Farmer Group Interview 2-8; NIA Interview 10):

- Relining the canals with concrete.
- Improving farm to market roads.
- Renovating working stations.
- Repairing or replacing all broken gates.

Figure 6.1: Broken gate that makes it impossible for the IA to properly regulate the flow of water

Photo credits: Jennifer Bedore

In addition, the IAs are demanding that NIA increase their equipment stocks as currently there are not enough to go around. This results in the IAs not having sufficient equipment to conduct some of the maintenance responsibilities delegated to them under IMT as purchasing the equipment is financially prohibitive (Farmer Group Interview 2-8; NIA Interview 10). For example, currently there is only one backhoe for 12 working stations, this has resulted in the improper maintenance of many of the canals in Plaridel (Farmer Group Interview 3,5 and 6), one such obstructed canal is shown in the picture below.

Figure 6.2: Unmaintained canal in Lagundi, which is said to have occurred due to a lack of necessary equipment

Photo credits: Jennifer Bedore

NIA is in agreement with the IAs that rehabilitation needs to take place and that additional equipment must be acquired before IMT, if the IAs are going to successfully undertake the roles and responsibilities delegated to them (NIA Interview 3, 8 and 10). NIA's Bulacan office alone had been implementing hundreds of millions of dollars of rehabilitation projects since 2006, which takes up a majority of their IMT budget (NIA

Interview 8). However, they have been focusing on the main canals and headworks as NIA indicates that the lateral and sub-lateral canals are of a less pressing importance (NIA Interview 8) The NIA staff implementing IMT believe that, although it cannot be guaranteed, it is possible that Plaridel's IAs' rehabilitation and equipment demands could be met in the future, once the priority projects were completed, but could not specify a date (NIA Interview 3 and 8). Plaridel's IAs are hoping that the funds do become available, as one small steel gate alone costs upwards of 40,000 PHP (NIA Interview 9) and to repair all of the items they have requested from NIA would cost millions (Farmer Group Interview 5), but they are not optimistic (Farmer Group Interview 2-8).

As a result of their lack of confidence in NIA, some IAs stated in confidence that if NIA is unable to complete the repairs requested, they might still sign the IMT contract. However, they also indicated that they would then require a greater share of the ISFs collected to finance undertaking the operations and maintenance roles and responsibilities delegated to them under IMT (Farmer Group Interview 3, 5).

Therefore, it has been determined that there is a low likelihood that Plaridel's IAs will receive a properly functioning irrigation system at the time of turnover as NIA is financially incapable of undertaking the necessary rehabilitations. Consequently, it can be said that the likelihood of Plaridel's IAs being able to perform all of the O&M related roles and responsibilities delegated to them under IMT is thereby further reduced. Thus there is a high likelihood that Plaridel's IAs will fall into the 'vicious cycle of irrigation management'.

Best Practice #7: IAs Must Have a Clearly Recognized and Sustainable Water Right and Service

Without a clearly recognized and sustainable water right and service the chances of an IA being successful post-IMT are low (Araral, 2006; FAO & INPIM, 2001; International Water Management Institute, 2007; Panella, 2004; Sampath & Young, 1990; Svendsen, Trava & Johnson, 1997; Sander, 1979; Sangupta, 1991; Shivakoti, Vermillion, Lam, Ostrom & Pradhan, 2005; Vermillion, n.d.; Vermillion, 1997; Wijayaratna, 2004). This 'best practice' has been deemed one of the key ingredients to an IAs success post-IMT. If an IA does not have a reliable and sustainable flow of water to its gates, it must have legal recourse to access that water. The only way this can be ensured is to have a clearly recognized and sustainable water use right, meaning its water right is strong, well defined and secure (Svendsen, Trava & Johnson, 1997).

IAs that do not have this right are (Svendsen, Trava & Johnson, 1997):

1. Less likely to invest in improvements to their irrigation systems.
2. Encouraged to think and behave in the short-term.
3. More likely to incur heavy expenditures in legal costs to defend their poorly-defined water right.
4. More likely to experience a reduction in water supply.
5. Less likely to pay their ISFs.
6. More likely to experience system collapse.

A clearly secure and recognized water right will only become more important for IAs as time goes on. Of the world's total water withdrawals, 70 percent is from agriculture and in developing countries, this figure averages 85 percent of the total (International Water Management Institute, 2007, p. 40). However, as "the world's welfare improves, demands from other water sub-sectors are increasing. Domestic water supply, industry and manufacturing, and the environment itself, are now in direct competition with the agricultural sector for increasingly scarce water resources" (International Water Management Institute, 2007, p. 40). In addition, growing populations, climate change,

and pollution are reducing the total amount of available water (Shivakoti, Vermillion, Lam, Ostrom & Pradhan, 2005, p. 24). It is therefore not surprising that agricultural sectors in countries all over the world are already feeling pressure on their water resources (Attia, n.d.; FAO & INPIM, 2001; National Economic and Development Authority, 2004; Shivakoti, Vermillion, Lam, Ostrom & Pradhan, 2005; Svendsen, Trava & Johnson, 1997; Wijayaratna, 2004), or that one of the most common issues affecting the management of irrigation systems worldwide is an unreliable supply of water due to both competing users and shortage of supply (Wijayaratna, 2004, p. 8).

In the Philippines the water resources available to all sectors is becoming increasingly scarce. It is estimated that the Philippines has the second lowest per capita freshwater stocks in Asia (National Economic and Development Authority, 2004, p. 46). These stocks are rapidly decreasing due to the "over extraction of groundwater, salt water intrusion, water pollution, denuded forests/watersheds and lack of catchment basins" (National Economic and Development Authority, 2004, p. 46). In addition, the El Nino phenomenon along with the Philippines' extreme vulnerability to climate change has made them highly vulnerable to the rapid loss of their fresh water stocks (Rincon & Virtucio, n.d., p. 20). Engineer Samuel Contreras, from the Department of Agriculture, stated that due to the above reasons, as well as the rapidly increasing population of the Philippines, competition among water users (principally agricultural, domestic, and industrial sectors) has been drastically increasing over the past decade (Conteras, n.d.). He believes that without an increase in water productivity and ensuring water security in the agricultural sector, the Philippines will be unable to meet the needs of all of its irrigation users in the near future (Conteras, n.d.). While more significant challenges loom for the entire agricultural sector of the Philippines, AMRIS, and therefore Plaridel's IAs, are already experiencing the effects of dwindling supply and strong competition amongst user groups.

The Angat Watershed provides irrigation water to NIA's AMRIS system (serving approximately 30,000 has), potable water to Metro Manila and other neighboring provinces through the Metropolitan Waterworks and Sewerage System (MWSS) (4,000

million liters per day) and is also used as a source for hydroelectric power generation (capacity of 218,000 kWh), which mainly serves the areas of Bulacan and Metro Manila (NIA "Irrigation Delivery", n.d.). The National Water Resources Board (NWRB) controls the allocation of water rights for these three uses in the watershed and is also the agency NIA's IAs must go through to individually register their water right (NIA "Irrigation Delivery", n.d.).

Initially, Metropolitan Manila had no water rights to the Angat watershed. However, in 1998, the national capital region was granted temporary water rights from Angat during emergency situations. However, over time, they gained permanent rights through the NWRB due to the increasing needs of their rapidly growing population. Slowly, the allocation of water rights came to be weighted in favor of domestic consumption in Metro Manila, and thus reduced the amount of water available to NIA (NIA Interview 1). The following is the current allocation of water rights by use in the Angat watershed (NIA Interview 10):

- Metro Manila, domestic: 36+ cubic meters per second
- NIA's AMRIS, irrigation: 22 cubic meters per second
- DENR, river maintenance: 2 cubic meters per second
- National Power Company: 0 cubic meters per second

The NWRB is legally permitted to appropriate NIA's water rights in favor of Metro Manila's domestic use as, under the *Water Code of the Philippines,* domestic use takes priority over agricultural use (National Water Resources Board, n.d.). Although this is true, the agricultural sector believes that they are at an unfair disadvantage in protecting their stock of water rights as they do not have enough money or power to be fairly represented on the NWRB's board of directors, who make all of the decisions with respect to water rights allocation for Angat (Farmer Interview 1; Municipal Government Official Interview 3; NIA Interview 10).

NIA's inability to secure its water rights and the consequences of this on the farmers of AMRIS where made evident during the drought of 1998 (Rincon & Virtucio, n.d., p. 20). In 1998, due to an El Nino event, there was an extreme shortage of potable water in Metro Manila. In this emergency situation, the NWRB decided to temporarily allocate all of the water for irrigation in the Angat Dam to the MWSS. In return, the MWSS stated that it would reimburse the farmers for their lost crops resulting from the lack of irrigation water available to the AMRIS farmers that cropping season (Rincon & Virtucio, n.d., p. 20; NIA Interview 1). The outcome of this reallocation to Metro Manila was a decrease in the total agricultural production of more than half (Provincial Government Official Interview 1) and 10 percent of AMRIS's farm land unable to realize a harvest at all (NIA Interview 8). However, the MWSS has still not repaid the farmers of the AMRIS system for their lost crops (NIA Interview 8; Farmer Interview 1).

Subordinating agricultural water rights during periods of scarcity is not uncommon in AMRIS. A staff member from NIA's water management department stated that before Metro Manila was allocated water rights by the NWRB, there were water shortages due to El Nino events that were severe enough to impact AMRIS's production levels. However, these occurred only every 10 to 15 years. Now that MWSS has gained water rights, these shortages are occurring on average every 2 to 5 years (NIA Interview 3). A recent similar event occurred while this research was being conducted, wherein, Plaridel was promised irrigation water from Angat in June, 2010, however by the time the research was finished, in July they had still not received any water, nor was there any indication as to when it would be coming (NIA Interview 3; Farmer Group Interview 2-8). This resulted from the water level of the Angat dam being too low and yet continuing to supply all water to the MWSS (NIA Interview 3; Farmer Group Interview 2-8).

Unfortunately, Plaridel's and AMRIS's ability to maintain their water rights will only become more difficult over time. This is because Metro Manila's population continues to rise (Provincial Planning and Development Office, 2010, p. 20), the quantity and the quality of the Angat watershed continues to degrade (Rincon & Virtucio, n.d., p. 20) and it appears as though Bulacan's dwindling domestic water supply will be replaced with

water from Angat. (Provincial Government Official Interview 1).

Bulacan currently obtains 97 percent of its domestic water supply from groundwater. However, due to massive over extraction, many coastal towns of Bulacan, up to 40 kilometers from the shoreline, experience salt-water intrusion to many of their ground water sources and many more are at "critical" risk of intrusion (Provincial Government Official Interview 1). For example, in Plaridel, they have already lost 2 pumping stations to salt water intrusion and are constantly looking for new places to set up wells to address existing shortages of water. They are currently in the process of setting up two new wells in the municipality (Municipal Government Official Interview 7), however, exiting groundwater supplies are only expected to last for another five to ten years before salt-water intrusion and other contaminants render the remaining water saline (Municipal Government Official Interview 5 and 6). Therefore, the board of directors of Plaridel Water District, along with the rest of the province of Bulacan, are looking to Angat for their future water needs (Municipal Government Official Interview 7*;* Provincial Government Official Interview 1).

By way of the proposed Bulacan Bulk Water Project, the province intends to secure permanent water rights from Angat's already overextended supply. It proposes to take 230 million liters of water per day from the Angat dam (Provincial Government Official Interview 1), treat it and send it through a series of pipelines to the cities and municipalities in Bulacan and Metro Manila that need it the most. The NWRB has already allocated them temporary rights to do so, as well as much room to grow (Provincial Government Official Interview 1). However, the project was supposed to be implemented in 2007 but is currently on hold. Firstly, Bulacan's memorandum of agreement fell through with the MWSS, due to a change in the administration, who they were partnering with to erect and operate the plant (Provincial Government Official Interview 1). Secondly, the former vice governor of Bulacan opposed the project (Provincial Government Official Interview 1).[4] Therefore it still remains to be seen if

[4] The former vice governor supposedly opposed the project due to public outcry opposing further privatization of the dam, as two companies privatized MWSS in the late 1990s (Provincial Government

NIA's water rights will be diminished in order to help provide for Bulacan's and Metro Manila's domestic water needs. However many are confident that it will push through as the domestic water supply of Metro Manila and Bulacan is dwindling every day (Provincial Government Official Interview 1).

So what are the chances of AMRIS's farmers being able to maintain their current water rights? It appears as though this will depend on the domestic water suppliers of Metro Manila and Bulacan finding alternative water sources, as NIA has been seemingly unable to protect their water rights in Angat from such powerful forces. As well, NIA has been unable to find any viable alternative bodies of water to help meet their current and future demands (NIA Interview 10). Currently, the MWSS and Bulacan are looking for alternative sources, the most promising so far being Laguna de Bay (Farmer Group Interview 3 and 5) and the Upper Pampanga River (NIA Interview 3). However, these projects are still in early stages and none have been committed to as of yet. As well, they both require substantial investments in infrastructure so they will likely not be implemented unless absolutely necessary (Provincial Government Official Interview 2).

Therefore, it can be said that although AMRIS's, and thus Plaridel's, IAs have legally recognized water rights, through the NWRB, these water rights are neither clearly recognized nor sustainable, as they are not strong, well defined, or secure. This has resulted in Plaridel's IAs having unreliable water service as they are unable to defend their water rights against the more powerful MWSS. This scarcity will continue to increase into the future due to increased pressure from competing stakeholders. It has therefore been determined that this 'best practice' is not being implemented in Plaridel. This makes Plaridel's farmers extremely vulnerable to the 'vicious cycle of irrigation

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Official Interview 1). This may have been fuelled by the recent dispute between the Power Sector Assets and Liabilities Management Corp. (PSALM), who is charged with managing the Angat Dam, and a group of petitioners (comprised of the "Freedom and Debt Coalition and four other "caused oriented" groups). These 'caused oriented' groups recently filed a petition "before the Supreme Court seeking to stop the privatization of the… hydroelectric power plant component... of the Angat Dam in Bulacan", asking for a restraining order against PSALM from proceeding with their deal with the Korea Water Resources Corporation (K-Water), for the management and operation of Angat Dam. The Petitioners believing that it is not in the best interest of the Filipino people to lose control of vital natural resources by selling them to foreign entities (SunStar, 2010).

management' as well as to the unsuccessful implementation of IMT.

If Plaridel's IAs are to have a fighting chance at success post-IMT, their water rights need to be strengthened so that they can sit at a bargaining table as equals with the other, more powerful, stakeholders. This would require the clarification of their currently weak water rights, which would most likely require action on the part of a national legislative body or the executive branch of the government (Rincon & Virtucio, n.d., p. 21). This will be no easy task as they are dependent on voters who value drinking water more than farmers.

Chapter Seven: Conclusions

It has been established in the previous chapters that the accepted requirements or preconditions for 'best practices', with respect to the implementation of IMT, are not currently being observed in the case of Plaridel, Bulacan. So what does this mean for Plaridel, the Philippines, and all other countries of the world implementing IMT? This chapter will attempt to answer this question through the subsidiary research questions of this thesis.

Subsidiary research question 1: Given the present course of IMT implementation in Plaridel, what degree of success, in terms of productivity, profitability and sustainability, are Plaridel's IAs likely to achieve post-IMT?

Referring back to the 'vicious cycle of irrigation management' (see Figure 5.1), which specifies that the presence of even a single of its constituent parts can serve as a catalyst for an irrigation system's entry into the "downward spiral" (Araral, 2006, p. 132), it can be seen that there is an extremely high likelihood that Plaridel's IAs will fall into the 'vicious cycle' post-IMT. This is because Plaridel's IAs currently have all five of the 'vicious cycle's' components. Therefore, it is also highly improbable that Plaridel's IAs will be productive, profitable or sustainable post-IMT.

Subsidiary research question 2: What are the main impediments, if any, to adhering to the 'best practices' for IMT implementation in the municipality?

It has been determined that the largest impediments NIA faces to adhering to the 'best practice' for IMT implementation in the municipality is the absence of clearly recognized and sustainable water rights and service (discussed in Best Practice #7) and the severe lack of financial resources. NIA management staff at the Bulacan office stated that they would need a budget five times larger than what they currently have to adequately implement IMT in Plaridel (NIA Interview 4 and 6). They also indicate that they fully understand that IMT, at present, cannot be properly implemented in Plaridel, given their

existing financial constraints. They further indicate that they nonetheless had no choice but to implement IMT given the national government's explicit requirement to do so (NIA Interview 6).

Implementing IMT in the absence of an adequate financial base is not a circumstance that is particular to Plaridel. The shortage of funds available to NIA has resulted in IMT being poorly implemented in regions throughout the Philippines (Raby, n.d.; Araral, 2006). As well, the lack of government financial support for IMT has been a fundamental problem to its implementation in many areas of the world (International Water Management Institute, 2007; Raby, n.d.; Thompson, 1995; Uphoff, Ramamurthy & Steiner, 1991).

Irrigation experts have found that IMT has been moving away from its original objectives of achieving national rice self-sufficiency and improving the livelihood of farmers, to an exclusive focus on reducing the state's financial obligations (Zialcita, 1984, p. 277). In other words, the implementation of IMT is not achieving the positive goals that it purports to provide to the general public. Instead, NIA is implementing IMT solely out of the necessity of becoming financially viable, which has resulted in the rapid implementation of IMT without sufficient supports, leading NIA to delegate irrigation management duties to unsustainable, or marginally viable, IAs (Panella, 2004; Raby, 1997). This is exacerbated by farmers who are incapable of paying their full ISFs in a timely manner, thus severely restricting the capacity of their respective IAs to gain financial independence (see Best practice #5).

How might this situation change in the Philippines? Many of those interviewed in this research indicate that a fundamental shift in the priorities of the national government must occur for these problems to be resolved. Currently, the rhetoric of the national government, focused on promising better programs and policies to achieve rice self-sufficiency and improving the livelihoods of farmers, has not been followed with sufficient financial resources for their implementation. The main reason for this is that the agricultural sector is simply not a priority (NIA Interview 6; Provincial Government Official Interview 1).

However, another way in which these problems might be lessened, without having to rely on changing government priorities, would be to implement a pilot project in Plaridel that deals with both the supply and demand sides of water resources management as well as the insufficient financial resources available to properly implement IMT.

With respect to the supply side of water resources management an Integrated Water Resources Management (IWRM) approach would be of great benefit to the Angat watershed in view of facilitating a legal, regulatory and institutional framework that allows for the fair and enforceable allocation of water rights between all stakeholders.

IWRM is a participatory planning and implementation process that brings all stakeholders together to determine how best to meet their long-term water resource needs while maintaining essential ecological services and economic benefits (USAID, 2006). The premise of this model is that if all parties participate in the water allocation and rule creation process they will be more willing to abide by those mandates. Furthermore, through engagement with the IWRM process, stakeholders begin to view water resources as a common asset of all stakeholders and accordingly something that should be jointly managed for the benefit of the collective (FAO & INPIM, 2001, p. 5).

In this framework, all relevant stakeholders of the Angat watershed should be brought together to reach an agreement regarding the legal, regulatory and institutional frameworks that are needed for the fair and enforceable allocation of water rights between all stakeholders. This process should be facilitated by an international development organization that is experienced with IWRM. Although the main focus will be at the watershed level, there requires buy-in and cooperation at all levels of government. Therefore, the following stakeholders should be involved in the IWRM process:

National:

- NWRB
- DA (Department of Agriculture)

- DENR (Department of Environment and Natural Resources)
- NIA

Watershed or Provincial (in the case Angat):

- MWSS
- NIA (Bulacan-Aurora-Nueva Ecije Office)
- NPC (National Power Corporation)
- Provincial Environment and Natural Resources Officer (PENRO)
- Bulacan: Relevant provincial government departments and officials
- Metro Manila: Relevant government departments and officials
- Local Water Utilities Administration
- NGOs

Municipal (Plaridel)

- NIA (AMRIS division)
- IAs
- Relevant municipal government departments and officials
- Municipal Agricultural Office (MAO)
- NGOs

In order for this process to have the greatest chance of succeeding, these actors must collectively define: what they are going to plan (what goal(s) they want to achieve), how they are going to plan it (what the planning process will be), when they are going to plan it (timeline), and who is going to plan it (i.e. deciding if there are additional stakeholders that should be involved), before the IWRM process is undertaken. In essence, one must plan the process through which the substantive solutions will be achieved (Boothroyd, 2006).

In addition, it is essential that the stakeholders themselves establish the ground rules for conduct between stakeholders and for the process itself. This ensures that all stakeholders

are willing to participate, thus guaranteeing that this process is as successful as possible (Boothroyd, 2006).

With respect to the demand side of water resources management, NIA, or an experienced international development organization, would require Plaridel's farmers and IAs to conserve those water resources already available to them in order to reduce the risk of low-crop yields. A prominent example of water scarcity being addressed successfully is observed in a project recently undertaken in Andhra Pradesh, India, entitled "Andhra Pradesh Farmer Managed Groundwater Systems" (APFAMGS) (FAO & INPIM, 2001, p. 1). The APFAMGS project was initiated in response to a situation where, like Plaridel, they no longer had reliable access to irrigation water and thus were experiencing diminishing yields and rising levels of debt (The Economist). Accordingly the principal objective of the project was to reduce the amount of irrigation water needed by farmers for the daily irrigation of their farms.

The APFAMGS project sought to enhance water use efficiency by providing farmers with the data, skills and knowledge necessary to monitor and minimize their irrigation water requirements (FAO & INPIM, 2001, p. 2). Farmers learned these skills at "Farmer Water Schools", which focused on teaching different cultivation techniques and cropping patterns that could adapt to the varying availability of irrigation water. They also emphasized conservation practices such as water budgeting and selecting crops that require less irrigation water (FAO & INPIM, 2001, p. 5). Additionally, to ensure that farmers would have a support system to help mitigate threats to their farm's sustainability they were grouped under local 'Groundwater Management Committees' (FAO & INPIM, 2001, p. 4), which provide long-term support and manage future members trainings (FAO & INPIM, 2001, p. 4).

This project achieved its goal of reducing the amount of irrigation water needed by farmers for the daily irrigation of their farms, and thus significantly reduced their risk of crop failure (FAO & INPIM, 2001, p. 3). The main reason the project's proponents give for its success is that it allows the farmers to make all of their own decisions, resulting in

wide-spread farmer support for the program and positive long-term behavioral change in conserving water resources in the region (FAO & INPIM, 2001, p. 3).

With over 10,000 farmers having attended the "Farmer Water Schools" in Andhra Pradesh since the inception of the program (FAO & INPIM, 2001, p. 7) it can be seen what kind of far reaching effect this pilot project could have for the availability of water in the Angat watershed. This bottom-up approach to water conservation also fits in well with the implementation of IMT in the municipality as it places the responsibility of water management with the IAs and farmers. It also helps to build their capacity to make informed decisions and find sustainable farming solutions, which would enhance Plaridel's farmers in adapting to the implementation of IMT in the municipality. Thus, if this model were successfully implemented in Plaridel many of the best practices that were not met would be easily attainable, such as:

- **Best Practice #2.** IAs must be 'strong' enough to mobilize farmer members to undertake the roles and responsibilities that will be delegated to them under IMT.
- **Best Practice #4.** IAs must have the capacity to collect Irrigation Service Fees (ISF) from their members on a sustained basis and to properly manage their financial resources.
- **Best Practice #6.** IAs must have the capacity to perform all operations and maintenance related roles and responsibilities delegated to them under IMT.

And to a certain degree:

- **Best Practice #7.** IAs must have a clearly recognized and sustainable water right and service.

Therefore, if both the supply and demand side of water resources management can be addressed through this pilot project, along with the provision of sufficient financial resources to properly implement IMT in the municipality, Plaridel will stand a far greater chance of successfully implementing IMT.

Subsidiary research question #3: How can the study inform the implementation of IMT in other areas of the Philippines and worldwide?

Plaridel can be seen as a cautionary tale for the Philippines and other countries that aspire to successfully implement IMT. Plaridel shows that when reducing financial burdens is the only, real, motivator for implementing IMT, disastrous results will likely ensue. Under such circumstances, it is probable that insufficient financial resources will be allocated for its implementation and therefore the affected IAs will have a high likelihood of falling into the 'vicious cycle of irrigation management'.

Indeed, it may be the case in the Philippines, and other developing countries implementing IMT, that IMT appears to be an easy way out (Bandyopadhyay, Shyamsundar & Xie, 2007; International Water Management Institute, 2007). However, for IMT to work "difficult, painstaking efforts... from highly skilled and committed people" (Korten & Siy, 1989, p. 148) are needed as "it is not possible to design a model that can cater to different physical, institutional, socio-economical and cultural conditions that are evident not only across regions and countries but often also within countries themselves" in a short time frame with insufficient resources (International Water Management Institute, 2007, p. 11).

As the world's population is expected to rise to 8 billion people in the next 20 to 30 years, irrigated agriculture is "expected to provide the basis for 80 percent of the additional food production required" (Wijayaratna, 2004, p. 4). In Asia, many countries must "figure out how to double agricultural production in the decades ahead" (Shivakoti, Vermillion, Lam, Ostrom & Pradhan, 2005, p. 12). Therefore, effective irrigation management is essential to ensuring that the world will have enough food to eat in the near future. As IMT is currently the irrigation management practice of choice in so many countries worldwide, IMT planners and implementers must ensure that careful consideration is given to the nature of all IMT-related policies, the ingredients necessary for policy success, and their influence on the lives of those who hold stake in them. The current favorable bias towards IMT worldwide is in large part based on results that are uneven precisely

because many of the requirements or preconditions for success are absent - or even if they are present, that there are underlying complexities in the constraints farmers face in their livelihood income generation and thus there remains significant systematic research to be conducted (Vermillion, 1997, p. 256). This case study of Plaridel provides some preliminary insights into how addressing the requirements of successful IMT can be a step in the right direction. However, the irrigation community has a long way to go in protecting the worlds agricultural and water resources.

Limitations and Directions for Further Research

There are two main limitations to this research. The first is that this research deals with several broad themes, any one of which could be a topic on its own. I therefore made the choice in some instances to forgo a more in-depth analysis to enable the larger picture to emerge. The second is that although the 'best practices' used in this research to evaluate Plaridel's implementation of IMT were based on a review of all of the current literature on the topic, as I stated in the relevance and rationale section, much research remains to be completed with respect to all aspects of IMT. Therefore, it is not unreasonable to predict that these 'best practices' will likely change over time as more research is conducted. Additionally, it is important to note that the best practices were based on 'expert knowledge' alone. Meaning that if local, or unofficial knowledge (for example farmer's or NIA field or regional staff members' knowledge) was used to form the best practices, they may have been different. For example, they may have been more focused on short-term goals rather then long-term.

With respect to future research, there is a plethora of potential research topics in Plaridel, the Philippines and worldwide, that are of crucial relevance to IMT. With respect to Plaridel, it would provide the irrigation management community with much needed follow-up information if a study was conducted post-IMT in the municipality. With respect to further research in the Philippines and worldwide, there is still a huge gap between the theory and practice of IMT and therefore any community level research studying the implementation and/or impacts of IMT on IAs and the agricultural sector, with respect to their long-term viability, would be invaluable to the agricultural community.

Works Cited

Agriculture Business Week (2008, July 20). The Philippines can be rice self-sufficient, again. Retrieved from http://www.agribusinessweek.com/the-philippines-can-be-rice-self-sufficient-again/

Araral, Eduardo (2006). Decentralization Puzzles: A Political Economy Analysis of Irrigation Reform in the Philippines. (Doctoral dissertation). Retrieved from Ann Arbor. (3215225)

Araral, Eduardo (2009). "What Explains Collective Action in the Commons? Theory and Evidence from the Philippines, *World Development* 37 (3), 687-697.

Asian Development Bank (1994). Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the Republic of the Philippines for the Rural Infrastructure Development Project. Asian Development Bank.

Asian Development Bank (2008). *Irrigation Management Transfer: Strategies and Best Practices*. Delhi: Sage Publications.

Asian Productivity Organization (2004). *Improved Irrigation Management for Improved Irrigation Management held in Sri Lanka, 3-8 June 2002*. Asian Productivity Organization.

Attia, Bayoumi (n.d.). Decentralization and Participatory Irrigation Management. Retrieved from http://www.idrc.ca/en/ev-88800-201-1-DO_TOPIC.html

Bagadion, Benjamin U (1989). The evolution of the Policy Context: An Historical Overview. In Frances F. Korten and Robert Y. Siy (Eds.), *Transforming a Bureaucracy: The Experience of the Philippine National Irrigation Administration* (1-19). West Hartford, CT: Kumarian Press.

Balea, Judith (2010, April 20). Philippines unlikely to meet rice self-sufficiency target. Retrived from http://www.abs-cbnnews.com/business/04/19/10/philippines-unlikely-meet-rice-self-sufficiency-target

Balisacan, A.M. (2000). Pathways of Poverty Reduction Rural Development and Transmission Mechanisms in the Philippines. Paper from Asian Development Bank '01: *Asia and Pacific Forum on Poverty: Reforming Policies and Institutions for Poverty Reduction.*

Bandyopadhyay, Sushenjit, Priya Shyamsundar & Mei Xie (2007). *Yield Impact of Irrigation Management Transfer: Story from the Philippines*. The World Bank.

Bankoff, Greg (2007). Dangers to going it alone: social capital and the origins of community resilience in the Philippines*, Continuity and Change,* 22, 327-355.

Benzidane, Hanane, Danielle Blond & Johanna Mazur (2008). *Sustainable Livelihoods: Poverty Reduction & Micro-Enterprise Promotion*. Plaridel, Philippines.

Boothroyd, Peter (2006). Developing Community Planning Skills: Application of a Seven-Step Model. Appendix 3. Strategic Plan. UBC Department of Family of Family Practice, 27-31.

Bruns, Bryan (1993). Promoting Participation in Irrigation: Reflections on Experience in Southeast Asia." *World Development,* 21, 1837-1849.

Bulacan Province (1997). *Provincial Physical Framework Plan. 1998-2007*. Province of Bulacan, Philippines,

Bureau of Insular Affairs (1903). *Fourth Annual Report of the Philippine Commission*. Washington: U.S.G.P.O.

Business Mirror (2010 June 15). Noynoy Aquino Agriculture Plans. Retrieved from http://www.agriculture-ph.com/2010/06/nonoy-aquino-agriculture- plans.html

Central Intelligence Agency (2010). The World Factbook: Philippines. Retrieved from https://www.cia.gov/library/publications/the-world-factbook/geos/rp.html

Climate Change Commission Office of the President (2009). National Framework Strategy on Climate Change 2010-2022. Philippines.

Contreras, Engr. Samuel (n.d.). Water Technologies with an Environment and Human Face: A New Paradigm for Sustainable Agricultural Development. Power Point presentation. Department of Agriculture: Bureau of Soils and Water Management, Philippines.

Cooperative Rural Bank of Bulacan (2010). *Livelihood Credit Assistance Program for Individual Loan.* Bulacan, Philippines.

de los Reyes, P. Romana & Sylvia Ma. G. Jopillo (1989). The Impact of Participation: An Evaluation of the NIA's Communal Irrigation Program. In Frances F. Korten and Robert Y. Siy (Eds.), *Transforming a Bureaucracy: The Experience of the Philippine National Irrigation Administration* (90-116). West Hartford, CT: Kumarian Press.

FAO (2003). *Irrigation Management Transfer IMT Profile for: Philippines.* FAO.

FAO (2008). Evaluation of FAO cooperation with India: Andhra Pradesh Farmer Managed Groundwater Systems. Retrieved from http://www.fao.org/pbe/pbee/common/ecg/378/en/Microsoft_Word__Management_Response_FAO_cooperation_with_India.pdf

FAO & INPIM (n.d.). Focusing on Increasing Provincial Productivity: Rice Self-Sufficiency Plan 2009-2010. Retrieved from http://www.grain.org/research_files/Rice%20Self-%20Sufficiency%20Plan%202009-%202010.pdf

FAO & INPIM (2001). Overview Paper: Irrigation Management Transfer, Sharing Lessons from Global Experience. International E-mail Conference on Irrigation Management Transfer. WUA Legislation Country Profiles: Philippines. Retrieved from http://www.fao.org/nr/water/docs/irrigation/Overview.pdf

FAO Water (n.d). Andhra Pradesh Farmer Managed Groundwater Systems (APFAMGS) Project: Demand Side Management of Groundwater. Retrieved from http://www.fao.org/nr/water/projects_andra.html

Frias, Herminio A (2010). Sustainable Rural Livelihoods: Opportunities and Challenges in Plaridel. Powerpoint presentation. Municipal Agricultural Office of Plaridel, Philippines.

Giordano, Meredith A., Madar Samad, & Regassa E. Namara (2006). *Assessing the outcomes of IWMI's research and interventions on Irrigation Management Transfer*. Colombo, Sri Lanka: IWMI.

Godilano, Esteben Celeste (2009). Spatial Impacts of Climate Change in the Philippines: Challenges and Opportunities for Food and Water Security. Presentation for the consultation on "Charting Our Water Future: A Multi-Stakeholder Policy Program Dialogue", Luzon.

Groenfeldt, David (2004, July 28). PIM or IMT. Retrieved from http://www.inpim.org/leftlinks/Newsletters/N5/n5a4/view.htm

Groenfeldt, David (1997). Transferring Irrigation Systems form the Systems to Users: Questions of Management, Authority, and Ownership. Paper presented at 96th annual meeting of the American Anthropological Association, Washington, DC.

Groenfeldt, David & Svendsen, Mark (Eds.). (2000). *Case Studies in Participatory Irrigation Management. WBI Learning Resources Series*. Washington, DC: World Bank Institute.

Gupta , Deepak & L.P. Srivastava (1999). *Status of Participatory Irrigation Management in India: A Documentary Critique*. New Delhi: Institute of Social Studies.

Illo, Jeanne Frances I. & Jesus R. Volante (1984). *Organizing Farmers for Communal Irrigation: Operation and Maintenance in the Aslong and Taisan Irrigation Systems.* Naga City: Research and Service Center.

International Commission on Irrigation and Drainage (n.d.). *ICID 2nd Regional Afro-Asian Conference. An Innovative Method of Irrigation System Management in the Philippines. Manila 5-9 Dec. 1978, Manila.*

International Water Management Institute (2007). *Irrigation Management Transfer: Worldwide Efforts and results*. Rome: IIMI.

Johnson, S.H., D.L. Vermillion, & J.A. Sagardoy (1995). *Irrigation Management Transfer: Selected papers from the International Conference on Irrigation Management Transfer*. Rome: IIMI.

Kelly, Philip F (1998). The Politics of Urban-Rural Relations: Land Use Conversion in the Philippines, *Environment and Urbanization*, 10(1), 35-54.

Kikuchi, Masao, Atsushi Maruyama, & Yujiro Hayami (2001). Phases of Irrigation Development in Asian Tropics: A Case Study of the Philippines and Sri Lanka, *The Journal of Development Studies,* 39,109-138.

Korten, Frances F. & Robert Y. Siy, (Eds.). (1989). *Transforming a Bureaucracy: The Experience of the Philippine National Irrigation Administration*. West Hartford, CT: Kumarian Press.

Lauraya, Fay M., Anonia Lea R. Sala, & C.M. Wijayaratna (1996). *Research Interventions to Strengthen Irrigators' Associations. IIMI Country Papers, The Philippines No. 7.* Colombo, Sri Lanka: IIMI.

Manaytay, Antonio M (2008, August 6). Rice self–sufficiency plan: Will it benefit the farmers? Retrieved from http://www.insidemindanao.com/article71.html

Mansuri, Ghazala & Rao, Vijayendra (2004). "Community-Based and -Driven Development: A Critical Review, *The World Bank Research Observer,* 19, 1-39.

Merrey, Douglas J. (1997) *Expanding the Frontiers of Irrigation Management Research: Results of Research and Development at the International Irrigation Management Institute 1984 to 1995.* Colombo Sri Lanka: IIMI.

Municipality of Plaridel (1998). *Comprehensive Development and Land Use Plan for Plaridel 1999- 2004*. Province of Bulacan.

Municipality of Plaridel (2002). *Physical and Socio-Economic Profile*. Plaridel, Philippines: The Province of Bulacan.

Municipality of Plaridel (2007). *Comprehensive Development and Land Use Plan for Plaridel*. Province of Bulacan.

Municipal Planning and Development Coordinator (2008). Basic Statistics on Plaridel. MPDC.

National Economic and Development Authority (2004). *Medium-Term Philippine Development Plan: 2004-2010*. Manila: NEDA.

National Statistics Office (2009). Number of Families, Total and Average Annual Family Income and Expenditure by Region: 2009. Retrieved from www.census.gov.ph.

National Water Resources Board (n.d.). *Water Code of the Philippines and the Amended Implementing Rules and Regulations*. Quezon City, Philippines: NWRB.

Nemenzo, A.M.R. (2008). Digging deeper towards debt and land inequality. Freedom from Debt Coalition.

NIA (n.d.). *A Primer on the Program on Rationalizing and Improving Public Service Delivery.* Quezon City, Philippines: NIA.

NIA (n.d.). IMT Contract. National Irrigation Administration.

NIA (n.d). Institutional Development. Retrieved from www.nia.da.gov.ph.

NIA (n.d). Irrigation Delivery. Retrieved from www.nia.da.gov.ph.

NIA (n.d). Irrigation Management Transfer. Retrieved from www.nia.da.gov.ph.

NIA (n.d.). Operation and Maintenance of National Irrigation Systems. Retrieved from www.nia.da.gov.ph.

NIA (n.d.). Rehabilitation and Improvement of National and Communal Systems. Retrieved from *www.nia.da.gov.ph.*

NIA (n.d.). Review of Irrigation Management Transfer Program. Powerpoint presentation for all NIA farmers implementing IMT. NIA.

NIA (1990). *A Comprehensive History of Irrigation in the Philippines*. Quezon City, Philippines: NIA.

NIA (2008). *Profile of ANGAT MAASIM RIS.* San Rafael, Philippines. National Irrigation Administration.

NIA (2010, April 11). Impacts of Irrigation Management Transfer. Retrieved from www.nia.da.gov.ph

Office of the President Adviser on Global Warming and Climate Change (2009). Accomplishment Report 2009. Philippines.

Ofrecio, Bayani P. (2006). Participatory Development and Management: A Cornerstone of Philippine Irrigation Program, *Journal of Developments in Sustainable Agriculture*, 1, 1-5.

Oorthuizen, Joost (2003). *Water, Works and Wages: The Everyday Politics of Irrigation Management Reform in the Philippines*. New Delhi: Orient Longman Private Ltd.

Oryza (2010, January 22). Philippine Government to Review Rice Import Plans. Retrieved from http://mail.ricenetwork.com/forums/showthread.php?p=4734

Panella, Thomas Robert (2004). Irrigation Reform in the Philippines: Irrigation Management Transfer and the Vicious Cycle of Irrigation Management. (Doctoral dissertation). Retrieved from Ann Arbor. (3146971)

Philippine National Government (1963, June 22). Republic Act No. 3601: An Act Granting the National Irrigation Administration. Retrieved from http://www.lawphil.net/statutes/repacts/ra1963/ra_3601_1963.html

Philippines Maps (n.d). Maps of Western Visayas. Retrieved from www.philippinemaps.ph.

philSTAR (n.d.). Inaugural Speech of President Benigno S. Aquino. Retrieved from http://www.philstar.com/Article.aspx?articleid=589090

PPDO Research, Monitoring, and Evaluation Division (2010). The Planning Environment: Where are we now? Powerpoint presentation. Province of Bulacan.

President of the Philippines (1974, September 11). PRESIDENTIAL DECREE No. 552. Retrieved from http://www.lawphil.net/statutes/presdecs/pd1974/pd_552_1974.html

President of the Philippines (2007, February 20). President of the Philippines Administrative Order No. 171. Creating the Presidential Task Force on Climate Change." Retrieved from http://www.klima.ph/pdf_resource/AO_171.pdf

Province of Bulacan (2009). *Medium-Term Agriculture Development Plan 2009-2013*. Bulacan.

Provincial Agriculture Office (n.d.). Commodity Roadmap for Rice. Powerpoint presentation. Province of Bulacan.

Provincial Planning and Development Office (2010). *The Planning Environment*. Malolos, Philippines: The Province of Bulacan.

Raby, Namika (n.d.). Participatory Irrigation Management in the Philippines: National Irrigation Systems. EDI Participatory Irrigation Management Case Studies Series.

Raby, Namika (Ed.). (1997). *Participatory Irrigation Management in the Philippines: The Learning Process Approach in the National Irrigation Systems. International Workshop on Participatory Irrigation Management. Cali, Colombia. February 9-15, 1997.* n.p.

Resurreccion. Lyn (2010, April 25). New Technologies can make RP self-sufficient in rice. Retrieved from http://pepeng.naga.ph/2010/04/25/new-technologies-can-make-rp-self-sufficient-in-rice-business-mirror/

Rimban, Luz (2005, September 28). Billions in farm funds used for Arroyo campaign. Retrieved from http://www.pcij.org/stories/2005/farmfunds.html

Rincon, Maria F.G. and Felizardo K. Virtucio, Jr (n.d). Climate Change in the Philippines: A Contribution to the Country Environmental Analysis. Retrieved from http://siteresources.worldbank.org/INTPHILIPPINES/Resources/PhilippineCEACC1July.pdf

Sampath, R.K. and Robert A. Young (Eds.). (1990). *Social, Economic, and Institutional Issues in Third World Irrigation Management. Studies in Water Policy and Management, No. 15.* Oxford: Westview Press.

Sander, William (1979). *The Impact of Two Communal Irrigation Projects in the Philippines.* Institute of Economic Development and Research.

Sangupta, Nirmal (1991). *Managing Common Property: irrigation in India and the Philippines.* New Delhi: Sage Publications.

SAPRIN Secretariat (2002). The impact of Agricultural Sector Adjustment Policies on small Farmers and Food Security, *Structural Adjustment: the SAPRI report. The policy roots of economic crisis, poverty and inequality.* Washington, D.C.: SAPRIN.

Sering, Atty. Mary Ann. Lucille L (2009). National Strategic Framework on Climate Change. Powerpoint presentation.

Shivakoti, Ganesh P., Douglas L. Vermillion, Wai-Fung Lam, Elinor Ostrom &Ujjwal Pradhan (2005). *Asian Irrigation in Transition: Responding to Challenges.* New Delhi: Sage Publications.

Siy, Robert Y (1982). *Community Resource Management: Lessons from the Zanjera*. Quezon City, Philippines: University of the Philippines Press.

Siy, Robert Y (1989). A Tradition of Collective Action: Farmers and Irrigation in the Philippines. In Frances F. Korten and Robert Y. Siy (Eds.), *Transforming a Bureaucracy: The Experience of the Philippine National Irrigation Administration* (20-30).West Hartford, CT: Kumarian Press.

Small, Leslie E. and Ian Carruthers (1991). *Farmer-Financed Irrigation: The Economies of Reform*. Cambridge: Cambridge University Press.

SunStar (2010, May 19). Groups protest Angat Dam privatization. Retrieved from *http://www.sunstar.com.ph/manila/groups-protest-angat-dam-privatization*

Svendsen, Mark (1992). *Assessing Effects of Policy Change on Philippine Irrigation Performance. Working Papers on Irrigation Performance 2*. Washington, D.C.: International Food Policy Research Institute.

Svendsen, Mark, Jose Trava, & Sam H. Johnson III (Eds). (1997). *Participatory Irrigation Management: Benefits and Second Generation Problems. Lessons from an international Workshop held ar Centro Internacional de Agricultura Tropical (CIAT). Cali, Colombia. 9-15 February 1997.* n.p.

Tapay, Nenita. E., S. Greg & D.Hammond (1987). Evaluation of Communal Irrigation System Performance in the Philippines: The Case of Farmer Irrigation Organization. *Agricultural Administration and Extension,* 25,127-141.

Teruel, R.G. & Y. Kuroda (2004). An Empirical Analysis of Productivity in Philippine Agriculture 1974-2000, *Asian Economic Journal,* 18, 319-344.

The Economist (2010, 20 May). Making farmers matter: And monitor, budget, manage and prosper. Retrieved from http://www.economist.com/node/16136354

Thompson, John (1995). Participatory Approaches in Government Bureaucracies: Facilitating the Process of Institutional Change, *World Development*, 23(9), 1521-1554.

Turral, Hugh (1995, September). Recent Trends in Irrigation Management Changing Direction for the Public Sector. *Overseas Development Institute*. Retrieved from http://www.odi.org.uk/resources/download/2164.pdf

Uphoff, Norman (1986). *Improving International Irrigation Management with Farmer Participation: Getting the Process Right*. . Boulder, Colarado: Westview Press.

Uphoff, Norman, Priti Ramamurthy & Roy Steiner (1991). *Managing Irrigation: Analyzing and Improving the Performance of Bureaucracies.* London: Sage Publications.

USAID Environment (2006, December 6). What is Integrated Water Resources Management? Retrieved from http://www.usaid.gov/our_work/environment/water/what_is_iwrm.html

Vermillion, Douglas (n.d.). Impacts of Irrigation Management Transfer. Retrieved from www.oieau.fr

Vermillion, Douglas (1997). *Impacts of Irrigation Management Transfer: A Review of the Evidence. Research Report 11*. . Colombo Sri Lanka: IIMI.

Vermillion, Douglas L and Juan A. Sagardoy (1999). *Transfer of Irrigation Management Services: Guidelines. FAO Irrigation and Drainage Paper 58.* Rome: FAO.

Wijayaratna, C.M (2002). *Organizational Change for Participatory Irrigation Management. Philippines October 23-27th, 2000*. Tokyo: Asian Productivity Organization.

Wijayaratna. C.M. (Ed.). (2004). *Linking Main System Management for Improved Irrigation Management. Report of the APO Seminar on Linking Main System Management for Improved Irrigation Management held in Sri Lanka, 3-8 June 2002*. Asian Productivity Organization.

Wijayaratna, C.M. & Douglas L. Vermillion (1996). *Irrigation Management Turnover in the Philippines: Strategy of the National Irrigation Administration. Short Series on Locally Managed Irrigation, Report No. 4.* Colombo, Sri Lanka: IIMI.

Wijayaratna, C.M., Eleanor M. Pintor, Ma. Delia M. Valdez, Robert W. Laitos, & Ma. Victoria V. Solis (1996). *Farmers Organizing Farmers: A methodological Study of Farmer Irrigators' Organization Program in the Philippines*. Colombo, Sri Lanka: IIMI.

World Bank (1990). *The World Bank Participation Sourcebook*. Washington, D.C.: World Bank.

World Bank (2005). *Community Driven Development and Social Capital: Designing a Baseline Survey in the Philippines*. Washington, D.C.: World Bank.

World Bank (2010). The World Bank: Data. Retrieved from data.worldbank.org

Yap, Dr. Nonita T (2009). Global Climate Change Challenge: Opportunities for Filipinos in Canada. Powerpoint presentation. Vancouver.

Zialcita, Fernando Nakpil (1984). Kinsman and Voluntary Association in Two Ilocano Communities. (Doctoral dissertation). Retrieved from Ann Arbor. (8620928)

Appendix

List of interviewees and their respective roles/affiliations

All interview participants are listed in alphabetical order. These interviews were conducted in Plaridel, Philippines:

Farmer Interview 1. Personal interview. 10 June 2010.

Farmer Interview 2. Personal interview. 7 July 2010.

Farmer Group Interview 1. Personal interview. 10 June 2010.

Farmer Group Interview 2. Personal interview. 23 June 2010.

Farmer Group Interview 3. Personal interview. 24 June 2010.

Farmer Group Interview 4. Personal interview. 25 June 2010.

Farmer Group Interview 5. Personal interview. 29 June 2010.

Farmer Group Interview 6. Personal interview. 29 June 2010.

Farmer Group Interview 7. Personal interview. 1 July 2010.

Farmer Group Interview 8. Personal interview. 2 July 2010.

Farmer Group Interview 9. Personal interview. 2 July 2010.

Municipal Bank Official Interview 1. Personal interview. 12 July 2010.

Municipal Government Official Interview 1. Personal interview. 18 June 2010.

Municipal Government Official Interview 2. Personal interview. 25 June 2010.

Municipal Government Official Interview 3. Personal interview. 2 July 2010.

Municipal Government Official Interview 4. Personal interview. 2 July 2010.

Municipal Government Official Interview 5. Personal interview. 12 July 2010.

Municipal Government Official Interview 6. Personal interview. 12 July 2010.

Municipal Government Official Interview 7. Personal interview. 16 July 2010.

NIA Interview 1. Personal interview. 16 June 2010.

NIA Interview 2. Personal interview. 16 June 2010.

NIA Interview 3. Personal interview. 22 June 2010.

NIA Interview 4. Personal interview. 22 June 2010.

NIA Interview 5. Personal interview. 22 June 2010.

NIA Interview 6. Personal interview. 22 June 2010.

NIA Interview 7. Personal interview. 22 June 2010.

NIA Interview 8. Personal interview. 22 June 2010.

NIA Interview 9. Personal interview. 25 June 2010.

NIA Interview 10. Personal interview. 28 June 2010.

Private Financier Interview 1. Personal interview. 16 June 2010.

Provincial Government Official Interview 1. Personal interview. 11 June 2010.

Provincial Government Official Interview 2. Personal interview. 11 June 2010.

Provincial Government Official Interview 3. Personal interview. 24 June 2010.