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Background Papers

Multi-Functional Roles of Irrigation
Participatory Irrigation Management

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Background Paper on

Multi-Functional Roles of Irrigation¹
with special reference to paddy cultivation

1. Rationale

The value of irrigation water encompasses more than the net economic returns of the crops produced, and an understanding of those other values is essential to establishing sensible water policies. The multiple values of irrigation are particularly evident in paddy cultivation where water supports a sustainable, artificial ecology which is the basis for the characteristic socio-cultural systems of Southeast Asia. Water is not only an economic good in this context, but also an environmental good, a social good, a cultural good, and even a religious good. This paper presents an overview of the many roles that paddy cultivation plays, based on a conference held on March 20-21, 2002: "Multi-Functional Roles of Paddy Field Irrigation in the Asia Monsoon Region".² Through looking at the particular multifunctional features of paddy cultivation, this paper seeks to contribute to a deeper understanding of multifunctional roles common to irrigated agriculture and indeed, agriculture in general.

The multifunctional concept of agriculture as used here, was first articulated in the 1992 Earth Summit, in the context of discussion the contribution of agriculture to environmentally sustainable development. Since then the concept of multifunctional roles has been applied more generally not only to environmental benefits but to all the various functions of agriculture that extend beyond the production of food and fiber. "These goods can be defined quite broadly, but generally include rural community values such as a large number of independent, family farms, strong local economies that both rely on the economic output local farms and supply them with agricultural goods and services, rural employment, and the continued health of rural culture. Environmental goods usually mentioned include contributions to biological diversity, clean water and air, bio-energy, and improved soils. Other multifunctional products include regional or national food security, landscape values, food quality/food safety, and improvements in farm animal welfare. The concept of multifunctionality does not imply that these goods accrue automatically, as inevitable outcomes of any and all approaches to farming. These outcomes vary widely based on

¹ This paper has been drafted by David Groenfeldt, an independent consultant in Santa Fe, New Mexico (USA).

² "Multi-Functional Roles of Paddy Field Irrigation in the Asia Monsoon Region" held in Otsu, Shiga, Japan, 20-21 March 2002, organized by the Japanese Society of Irrigation, Drainage and Reclamation Engineering (JSIDRE), The Japanese Institute of Irrigation and Drainage (JIID) and the Shiga Prefectural Government.

farming practices, farm size, farm location (by country, eco-region, and local environment) and interaction of these variables” (deVries 2000).

In the context of paddy cultivation in Monsoon Asia, the multifunctionality concept offers a useful perspective to capture the historical richness of the co-evolution of society and rice agriculture that has dominated the historical development of the region. The social foundation of Monsoon Asia was formed by the people who developed and are sustained by water and rice (Mizutani 2002). Paddy cultivation in this region is intrinsically multi-functional, serving many needs of society. But what precisely are these functions, and how important are they?

2. Overview and Stock-Taking

Countries in the monsoon region of Asia have a long history of collective, small-scale paddy cultivation. A typical rural landscape is that of paddy fields stretching as far as the eye can see, or terraced paddy fields on mountain slopes. This peaceful appearance masks a great deal of hard labor inputs for irrigation and drainage facilities, terrace construction, land preparation, planting, harvesting, threshing, etc. The unique social requirements of cooperative labor and synchronized cropping patterns (to share the water and combat pests) have resulted in strong village-level political organizations and mechanisms for cooperation at larger levels within the watershed. The special features of paddy-based rural societies have been acknowledged by historians at least since Karl Wittfogel in the 1930s. Wittfogel’s central thesis; that the challenge of capturing irrigation water from major rivers gave rise to despotic states in Ancient Egypt and Mesopotamia, did not apply to monsoon Asia where hydraulic societies were based on smaller water sources and cooperation among and within village communities.

Is the spirit of cooperation and shared values an outmoded legacy of the past which must give way to monetary calculations of productivity and profit? Or can cooperation among rural communities be enhanced and extended even to the urban population who desire traditional foods and appreciate the traditional landscape of paddy fields? As the traditional landscape has become increasingly threatened by urban encroachment, many countries of monsoon Asia are taking stock of the role that paddy cultivation plays in the totality of their social, cultural, spiritual, economic, and ecological well-being. What does paddy cultivation “do” for society today, and what do we hope that paddy cultivation will “do” for society in the future?

The starting point for considering the multiple roles of paddy cultivation is the integration of paddy cultivation with traditional rural society, and the integration of those traditional values into the modern and increasingly urban culture of Southeast Asian countries. Paddy cultivation, and the water that makes that cultivation possible, is an integral dimension of the cultural values that give meaning to people's lives. A study in the Lake Biwa watershed in Japan found that non-farm households place as a high value on irrigation water quality as do farming households (Horino and Noguchi 2002). If more studies were to be undertaken (see concluding section, below, on Recommendations), they would probably find that urban residents would willingly pay - either through food prices or direct subsidies - for maintaining small-scale paddy cultivation within their local areas.

While the agrarian landscape in many Southeast Asian countries faces urgent threats to its traditional appearance (as more farmers leave agriculture and their lands are taken over by urban expansion or industrial agriculture), the citizens of those countries carry inside them the possibility for revitalizing small-scale paddy cultivation. Those citizens might support policy measures aimed at preserving paddy cultivation, simply on the basis of their own sense that local paddy cultivation is somehow "good". Or conversely, do those citizens prefer that their rice be grown as cheaply as possible (presumably on large industrial farms) so they can use the money saved for other priorities?

In order for citizens to have an informed opinion about the future of paddy cultivation in their countries, they need an understanding about the multi-functional roles of that cultivation. An overview of the various ways that paddy cultivation can be seen as beneficial is outlined below in terms of four broad categories: (1) Economic and productive functions, (2) Environmental functions, and (3) Socio-cultural functions and (4) Rural development functions.

Economic and Productive Functions

Rice production is, of course, the primary function of paddy cultivation, and the primary user of irrigation water. In China, more than 50% of the total water supply for agriculture is used for paddy rice (1995 figures cited in Huaung 2002). Average rice yields will need to increase from the present 6.3t/ha to 9.3t/ha assuming self-sufficiency within the existing sown area, while total agricultural water use will need to remain constant because of strong demands from other sectors. New technologies are anticipated as the only solution to these constraints, including improved on-farm irrigation practices, new and higher yielding rice varieties, and land consolidation to create larger farms that can be more easily mechanized (Huaung, p. 129).

In Malaysia, recent policies have focused on rice production in eight large irrigated Granary Areas totally 212,000 hectares. These areas have received technical and management interventions aimed at improved water control for increased rice productivity (Keizrul 2002). Paddy cultivation outside these areas will be phased out in favor of more remunerative cash crops, fruit orchards (papayas, starfruit, mangoes, etc) and industrial tree-crops (oil palm, cocoa, etc), and aquaculture. Within the Granary Areas, recognition is given to broad-based rural development stimulated by the increased rice production. The multiple functions of paddy cultivation (discussed below) are acknowledged in the government's policy within the Granary Areas, but are not considered sufficiently important to overcome the relatively poor economics of rice production in small-scale irrigation systems outside the designated Granary Areas.

In Myanmar, surplus rice production is an important national objective, to ensure food security and to generate export revenues (U Kyaw San Win 2002). The policy focus is on enhancing agricultural production in general, and paddy production in particular. The primary input besides land, is water, with 90% of harnessed water used for agriculture. A key priority within the agricultural water sector is the more efficient use of water through on-farm improvements and water management training.

A focus on water saving measures is important to every country where water is a limiting input. In China, a great deal of research has gone into "water saving irrigation" (WSI) techniques of rice production which allow rice to attain its full biological potential with far less water inputs (Feng and Li 2002). These practices result in "real" water savings and have deep impacts on water circulation, rural economy, food security, labor allocation, and the environment. Given the right conditions, WSI rice can be significantly more profitable than conventionally grown rice, allowing paddy farmers to meet the increased competition from global markets.

Box 1

Environmental Services of Paddy Cultivation in Malaysia

Groundwater recharge. Under flood irrigation, paddy fields are usually filled with a water depth of 100 to 150 mm and this standing water is maintained until prior to harvesting. Some water percolates through the heavy soils and moves into the ground. Though much of this water flows underground back into the streams from which it was abstracted, an estimated 7% remains in the aquifer and contributes to the stock of groundwater available for later use.

Air-cooling effect. The standing water in paddy fields plays an important role in redistributing solar energy through evapotranspiration. As water evaporates from the paddy water surfaces and from the rice plants, the evaporation process removes heat from the air, thus lowering the atmospheric temperature.

Water purification. Paddy fields can help as a purification zone for nitrogen discharged from other sources. Observations have shown that 80-90% of NO₃-N in irrigation water was removed when contaminated water passed through the paddy field over a season.

Flood Control. The field levees of paddy field function like the dikes of dams. Paddy fields surrounded by bunds 30cm high can store and regulate the discharge of heavy rainfall. The total water storage capacity of paddy fields in Malaysia is estimated at around 1800 million cubic meters.

Soil Erosion Control. Paddy fields retain the soil of their own fields, and also trap sediment eroded from upland fields and suspended in the irrigation water.

[Based on Keizrul 2002]

Thailand produces rice for itself and for much of the world; nearly 40% of international rice trade comes from Thailand. The current focus of agricultural policy is to reduce the vulnerability to over-supply conditions through diversification to non-rice crops.

However, the same conditions that contribute to Thailand's comparative advantage in rice production - ranging from farmer knowledge and attitudes to the design of irrigation systems built for paddy - pose challenges when applied to non-paddy crops (Jesda 2002);

The economic value of paddy fields is not always limited to rice production, or to off-season dry-land crops, but also from fish and ducks. Fish living in the paddies eat rice pests (algae and insects), while producing nutrients for the rice, and protein (or cash) for the farm family. Ducks have a similar function and produce enough meat to compensate for any fish that they might eat as well. Rice-fish-duck culture can increase rice production (up to 35 to 30%) while providing farmers with improved nutrition, extra income, and reduced application of fertilizers and pesticides (Keizrul 2002). Aquaculture in irrigation reservoirs is also important, particularly in small village-owned tanks such as those in Sri Lanka (Dharmasena 2002).

Environmental Functions

Paddy fields comprise an artificial environment that operates in concert with the natural environment. Rather than having an “impact” on the environment, paddy fields become part of a new environment with ecological processes that reflect the influences of both man and nature. Do paddy fields “consume” water, or merely divert some of the riverine flows onto the land (paddy fields) where the water cascades from field to field until re-entering the river downstream? Many of the water control features of paddy field irrigation have direct economic value: flood prevention, groundwater recharge, prevention of soil erosion and landslides, and water and air purification (see Box 1). The economic values of these environmental services are difficult to assess, since there is no standard methodology for doing so (see discussion below under “Issues”). Estimates of the value of only the flood prevention services of paddy cultivation in Japan, range from US\$16 billion to US\$24 billion; two different studies of the value of paddy-related water purification in South Korea give estimates of US\$ 1 billion and 5 billion (Kwun 2002).

Habitat value. The biological function of the paddy landscape lies in the wetland habitat it provides to animal and plant forms. These habitats have importance for ecosystem health and biodiversity both locally and for the global ecosystem through migratory birds (e.g., cranes) and insects.

Eco-tourism. One potential way of harnessing the landscape for economic purposes is through eco-tourism. In Bali, rural hotels located in the midst of paddy lands use this as a feature to attract tourists, and arrange farm visits for the guests. While such cases are still very unusual, the phenomenon of agricultural tourism is growing in many countries.

Socio-cultural Functions

Throughout the rice producing regions of Southeast Asia, the integration of paddy cultivation and local cultures has been evolving for thousands of years. Religious rituals are tied to the rice cycle, and cultural identity is tied to rice production. In Bali, the indigenous associations of rice irrigators sharing water from a common source (*subak*) serve as religious and social communities as well as a productive unit (Sutawan 2002). Balinese culture cannot be separated from the subaks, although ill-conceived development projects have attempted to separate the subaks from their culture by imposing conventional irrigation designs onto the island’s carefully crafted local canal and water control systems (Box 2).

Box 2***Ignoring Multifunctional Roles in Bali***

Between the period from 1979 to 1989, through the Bali Irrigation Project, most of the subaks in Bali have been upgraded. Many traditional and smaller ones have been even integrated physically into several single, larger irrigation systems so that they become more permanent (Sutawan 2002). Prior to outside interventions by agricultural development programs, Balinese farmers met annually in regional water temples to set cropping patterns, which often involved staggering irrigation schedules from one irrigation system to the next. Ritual ties between water temples emphasized the interdependency of upstream-downstream relationships, and the temples also helped solve quarrels over water rights. With the arrival of the Green Revolution, religious ceremonies continued to be held in the water temples, but farmers were encouraged to plant rice as often as possible and the temples lost control of cropping schedules. Yet these traditional schedules had important effects on both water sharing and pest control. By enabling the farmers to synchronize cropping patterns, the temple networks provided a mechanism to facilitate water sharing, and also enabled the farmers to synchronize harvests and thus create brief fallow periods over large areas, thus reducing rice pest populations by depriving pest populations of their habitat. The success of fallow periods as a pest control technique depended on the extent and duration of the fallow period. Unless all of the fields in a large area were fallow at the same time, pests could simply move from field to field. Through the ADB-financed Bali Irrigation Project, however, the use of pesticides was promoted rather than synchronized fallow periods. The pesticides caused pervasive pollution of the soil and water, destroying the paddy habitat for fish and ducks, and causing health problems for humans as well.

Based on Lansing (1996).

Landscape Value. The human appreciation of the spacious, tranquil verdant landscape is an expression of aesthetic values. Many people, both urban and rural, enjoy the scenery of paddy fields (and other forms of agriculture) and may be willing to pay for this experience (Nakashima and Kinoshita).

Rural Development Functions

The rural development benefits of paddy cultivation (and agriculture in general) go far beyond the primary crop production activity. It affects almost all sectors of the economy. The development strategies of many Southeast Asian countries have used rice-based agriculture as the cornerstone of broad-based economic growth. For example, in Malaysia's Muda irrigation scheme (100,000 ha) investments in improved water management and cultivation practices resulted in higher farm income (from double cropping and higher yields) providing farmers with more disposable income, which in turn stimulated retail trade, service industries, and so on (Keizrul 2002). The rice based agricultural economy in this case, is the engine that drives other sectors of the rural economy.

In Sri Lanka, a settlement strategy has been adopted to slow urban growth through enhanced economic opportunities in rural areas. Irrigation development, including both paddy and non-paddy crops, provides continuous production opportunities, thus allowing farm families to earn a viable income and remain on the farm (Dharmasena 2002).

Social capital and decentralized governance. Traditionally, small-scale paddy-based irrigation systems were built and managed by the farmers themselves. Today, participatory management of local irrigation systems is an important trend as a way of improving management and reducing operating costs. A multi-functional aspect of this approach is the strengthening of social capital that participatory irrigation management stimulates. The skills and experience that farmers gain through the cooperative management of their irrigation system can be applied to other entrepreneurial endeavors and thereby contribute to broad-based rural development. This phenomenon of participatory management is equally relevant to small systems, which may be entirely under the management of local water user associations, and large-scale irrigation systems, where the lower sections are managed by water user associations.

In nearly all countries of Southeast Asia, these local-level irrigation institutions are an important feature of decentralized governance and contribute to the capacity and viability of local levels of government. In Vietnam, an ongoing government program builds the capacity of agricultural cooperatives and then transfers to them the responsibility for managing irrigation schemes that had been under state control (Ha Luong 2002). In the Philippines, the government has actively promoted joint management between water user associations and the National Irrigation Administration, and is gradually transferring more management authority to the associations (Pascua 2002). In Japan, the institution of the Land Improvement District (LID) is a well established part of rural management: Farmers sharing a common irrigation source petition the government to establish a legal entity which has the authority to operate and maintain the irrigation facilities on which they depend (Taniyama 2002). In this process of irrigation management transfer, the farmers are becoming more than “farmers” cultivating paddy and other crops; they are becoming the managers of public assets (the irrigation canals, small dams, and other water control structures) and public water resources.

Multifunctional water user associations. The water user associations - whether traditional (Balinese subaks), or newly established through government programs (as in Vietnam and the Philippines), can themselves serve multiple functions. In addition to their primary role of irrigation management, some subaks in Bali, for example, have started business enterprises such as seed certification farming, tractor leasing, and money lending. Bulk purchase of agro-inputs, and group marketing arrangements are other ways that the organizational structure of the subak can give extra value over and above water management (Sutawan 2002). In the

Philippines, some of the water user associations are also becoming involved in upstream watershed protection and reforestation (Pascua 2002).

3. Key Issues for Consideration

The multifunctional roles outlined for paddy cultivation also apply to other types of irrigated agriculture, although perhaps not so dramatically. Paddy fields can store vast amounts of water and create ecological oases for migratory birds, but even an irrigated wheat field plays a role in the local environment. Examples of landscape value and religious significance of water and the crops it produces can be found not only in Monsoon Asia but in the arid Middle East as well. The richness of paddy cultivation and the societies that have grown up around it provide an easy backdrop for considering multifunctional roles that have generic and global relevance.

Several issues stand out as deserving of special attention: (1) The dominance of OECD countries in promoting the concept and the relative silence of developing countries; (2) The practical implications of multi-functionality and how it can be incorporated into rural development policies, and (3) the methodological challenges of measuring and comparing the values of multiple functions as a tool for policy making. The very interesting and contentious issue of how international trade can address the multiple functions of agriculture lies beyond the scope of this paper, but it is hoped that this paper can illuminate some of the relevant issues within the larger debate.

1. The dominance of wealthy countries in the discussion of multifunctional roles. Is a concern about multi-functional roles a luxury for the wealthy countries to debate, or is there something of relevance to poor countries as well? A similar challenge surrounded the environment debate prior to the 1992 Earth Summit. It was easy for the wealthy OECD countries to advise poor tropical countries to conserve their rainforests, but the necessity of resource development appeared to leave those countries with no other option than to sell their timber to the highest bidder. In hindsight it is clear that wise management of natural resources is a fundamental responsibility of governments, and no less so governments of poor countries where the natural resources comprise a major portion of the total assets. Can similar value shifts may be expected in the area of agriculture? Will developing countries take measures to protect certain aspects of their agrarian culture, or will they adopt a Western industrial model of agriculture as representing the only path to development?

2. Better methodological tools are needed for measuring multifunctional values. Economists have made important contributions in taking into account both market and non-market values of

paddy cultivation in particular, and agriculture in general (e.g., OECD 2001). However, there are widely differing estimates of value, due partly to different assumptions, and also due to uncertain scientific data regarding, for example, the environmental interactions of paddy agriculture. Deeper understandings of the cultural and social values will require assessments that go beyond economic analysis and include open policy debates at local and national levels. Research on citizen attitudes and preferences about water use, landscapes, production practices, and foods (e.g., Horino and Noguchi 2002) can contribute valuable information to these discussions. The voices of rural food producers, as well as other rural residents, need to be carefully expressed and heard by the urban policy makers who ultimately determine national development policies.

3. Meeting the challenge of economically sustainable multifunctional agriculture. Even with better understanding of the theoretical value of multifunctional paddy cultivation, there is a tremendous challenge of finding practical ways for farmers to earn an adequate economic return so they can afford to farm, and their children (or other young people) will want to continue in farming. The example of paddy cultivation in Bali (Sutawan 2002) is a sobering reminder that even when the multifunctional values are very high, and the system is ecologically very efficient (rice, fish, ducks, etc), the market-based economics of production are insufficient to attract young farmers. Finding creative solutions to this kind dilemma will require “multifunctional responses”. Some initial thoughts for discussion are presented below.

4. Recommendations

The implications of the multifunctional concept are that agricultural development, and particularly the development of paddy-based agriculture, has been based on incomplete understandings and valuations. The ubiquitous Benefit/Cost ratio which underlies every donor-financed project, needs to be re-adjusted to take into account many additional externalities. Clearly if the multifunctional concept had been current twenty years ago, the nature of many irrigation development projects would have been quite different. What are the implications for ongoing and future investments in irrigated agriculture? Three recommendations are offered here, expanding on the three “issues” outlined above:

1. Expand the discussion of multifunctional roles to address the concerns of developing countries. The controversies surrounding agricultural subsidies and trade policies should not interfere with the urgent need to discuss, debate, and even argue about the substance of the multi-functional concept. Ultimately the debate is based on social and cultural values surrounding lifestyles, ethics, rights, the natural environment, the definition of poverty and

perhaps other issues. Is poverty defined on the basis of per capita GDP or on the basis of educational and health indicators, or on the basis of other qualitative variables that may be defined quite differently in different cultures? By exploring these issues within a framework of openness and objective concern about finding an appropriate development path, agricultural policy makers can contribute to a new era of rural development that builds upon the multifunctional resources of irrigation and irrigated agriculture.

2. *Develop new methods and approaches for capturing the multi-functional benefits of irrigated agriculture.* Many branches of science (agriculture, biology, ecology), social science (anthropology, sociology, economics, development communications) and the humanities (religious studies, philosophy) must join the search for better understanding about the many types of external benefits and costs captured within the term, “multifunctional” as it relates to irrigated agriculture. But invitations to join the discussion should not be limited even to this group, but should also be extended to other representatives of civil society, including spiritual leaders, political leaders, farmer groups, consumer groups, journalists, young people, elders, and anyone else who can add important perspective to these issues. A platform is needed which will provide a neutral space for discussing multifunctionality - and the future of agrarian life - in a broad context. Future international conferences on water and agriculture will also provide valuable opportunities for carrying the discussion forward.
3. *Take risks to find economically viable solutions to multifunctional agriculture.* New solutions need to be found to preserve the desirable aspects of traditional agrarian lifestyles. These solutions will almost certainly entail transformation of those lifestyles, but in a way that is culturally connected to the past, while opening doors to the future. Balinese rice farmers cannot afford to continue agriculture as currently practiced, yet the non-market aspects of their traditional agriculture have a high value to them and to their society. Nor can government subsidies come to the rescue; an economically sustainable solution has to be found. Creativity is required. Stakeholders need to be identified; who reaps the non-market multifunctional benefits of paddy cultivation? How can they contribute? What is their willingness to pay and how can their willingness be enhanced, e.g., through social marketing about the importance of the paddy landscape? On the tangible market benefits of agriculture, how can these be increased? Are there high value traditional crops that can find a market? The Santa Ana tribe of Pueblo Indians in New Mexico, USA produce traditional varieties of maize and other crops which they market over the internet (www.cookingpost.com). The tourist population in Bali might offer easier opportunities for niche marketing of traditional foods. Experiments with new approaches will be risky and will require the support of government and donor agencies in the effort to find workable solutions.

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Background Paper on
Participatory Irrigation Management¹

Introduction

For the past two decades, irrigation agencies around the world have been involved in transferring some of their management roles to farmers. The process has been highly varied, but the overall trend has been quite consistent: Governments have very deliberately attempted to reduce their management roles, particularly at the very lowest ends of large systems, and have encouraged farmers to do more. The process of actually transferring specific management responsibilities from government bodies to organized groups of farmers has become known in the literature as irrigation management transfer, (IMT). The trend of promoting increased management involvement of farmers, either through formal management transfer or through other less formal mechanisms, has become known as participatory irrigation management (PIM). This paper provides an overview of both trends using the PIM nomenclature as a shorthand description of both PIM and IMT. Following a discussion of the rationale for PIM, the paper presents an overview of different expressions of PIM, identifies some issues and challenges, and offers some recommendations for future action.

1. Rationale: What is PIM and Why Is It Important?

Participatory Irrigation Management (PIM) is an approach to irrigation that emphasizes the Dublin principle of subsidiarity: Do as much as you can locally, and reserve government support for those levels of the irrigation system that cannot be managed effectively through local resources alone. The definition of “local management” is context-specific, depending on many factors; the division between local and non-local management is necessarily relative and dynamic. A viable water users association (WUA) in one area might be limited to a few farmers from one part of one village, but in another context, a WUA might encompass dozens of villages, thousands of farmers, and take the form of a multi-tiered business with a complement of technical staff.

PIM is more than an approach to irrigation management; it is also an approach to rural development that focuses on people: participatory rural development. A participatory approach is not the only option to development; indeed it is a rather recent trend. Nor is PIM

¹ This paper has been drafted by David Groenfeldt, an independent consultant in Santa Fe, New Mexico (USA).

the sole option for improving the performance of irrigation systems, or even irrigation institutions. Institutional reforms in the irrigation sector can include many non-participatory actions such as organizational streamlining, improving staff competence through training and capacity building, improving information flows, etc. This paper focuses attention on processes that seek to empower local communities through transferring management functions into their hands.

Why is PIM important? There are two different types of rationale for giving attention to PIM. The first is a political rationale: PIM is a major topic “in the news”, and we need to understand what it’s about, because in one way or another, we (irrigation policy makers and other stakeholders) will be asked to have an opinion about it. The second reason is more substantive: Participation is an important way to increase overall development and livelihood impacts from irrigation investments. There are very sound, substantive reasons for adopting a PIM approach, and there are also situations where PIM is unlikely to work. Understanding the nature of PIM can help orient new investments towards greater effectiveness and efficiency. Both levels of rationale, the political and the substantive, have their own importance, as discussed below:

Rational #1 - The Politics (and Economics) of PIM

PIM holds the promise of significant cost reductions to the government (by transferring expensive management functions to farmers), and improved water management. Farmers are more willing to pay for their irrigation service when they are in control, and the total cost recovery picture tends to improve, helping the agencies that manage the main system become financially self-sustaining, or at least minimizing their financial losses. The economics of PIM is highly attractive to international finance agencies such as the World Bank who want to ensure that irrigation loans yield adequate rates of return and provide a basis for profitable irrigated agriculture.

This message, that PIM provides a “win-win” solution to the negative feedback loop of [poor maintenance => poor water control => poor cost recovery => poor maintenance] lies at the heart of PIM’s current popularity with donors and governments. The social benefits of participatory development (see below) are inconsequential in this perspective, but the economic benefits are adequate to justify enthusiasm for the PIM approach. World Bank irrigation investment projects, for example, nearly always include a “PIM component” that prescribes transfer of certain management functions to WUAs which are established expressly for this project purpose. PIM as a visible outcome or product has become part of mainstream irrigation thinking, while the complicated social process of promoting participation and stimulating establishment of WUAs receives much less attention.

Rationale #2 - The Substance of PIM

The participatory approach places greater reliance on farmers' own resources and initiative, with less reliance on outside (government) services. In a very direct sense, farmers' labor and skills substitute for technical staff of the irrigation agency who were previously in charge. The irrigation agency continues to have an important role, but the focus shifts to "upstream" services: main system management, technical regulation and guidance, training, etc. The basic concept of subsidiarity, that water management should be handled locally where this is possible, is consistent with a wealth of social science findings about the advantages of local decision-making and community empowerment (Cernea 1991). From a perspective of rural development and livelihood security, strengthening local capacity for resource management is a key objective of development actions. In economic terms, PIM processes build two kinds of capital: (1) productive capital (better maintained irrigation infrastructure) and (2) social capital (new institutions such as WUAs, and strengthening of existing community-level institutions).

The success of PIM outcomes - sustainable WUAs that can manage irrigation water and infrastructure - depends on the nature of the PIM processes - establishing the enabling conditions (incentives) and organizational capacities within which WUAs can become established and flourish. However, the very popularity of PIM outcomes has created a sense of impatience about the process. In many irrigation investment projects, the attention given to PIM is very visible in the project concept, but is poorly supported in the actual implementation of the project, and even more rarely reviewed in post-project evaluations.

2. Overview and Stock-Taking

Stakeholder participation gained popularity among some donor agencies (e.g., USAID) and governments (e.g., The Philippines) in the late 1970s and early 1980s when it was conceived as organizing groups of farmers in community-based systems, and at the lower end of large canal networks, to cooperate with each other and with the government irrigation department which operated the main system. The 1984 FAO "Expert Consultation" on *Participatory Experiences in Irrigation Water Management* outlined the desired role of farmers as follows: "The farmers...must organize themselves to deal with water scheduling, distribution, system operation and maintenance, and related issues of distribution of work, assessment and collection of farmers' contributions. The timely and efficient interaction of the organizations of water users with local authorities, irrigation agencies and agricultural extension services is another factor of major importance" (FAO 1985, p.1). Case studies featured in the 1984 Consultation included national programs in Indonesia and the Philippines, and pilot projects

in Gal Oya, Sri Lanka (Wijayarathna 1985), and Pochampad, India (Singh 1985).

While these programs were considered successful in improving maintenance, deliveries, and cost recovery, they did not attract significant interest from the major bilateral agencies such as the World Bank and ADB, or from major professional bodies such as the International Commission for Irrigation and Drainage (ICID). This complacency changed when Mexico embarked on a program to transfer management of large irrigation “modules” to the control of farmer associations which were established expressly for the purpose of accepting management responsibilities from government. These associations were large enough to allow a dramatic reduction in the professional workforce of the National Water Commission (CNA in its Spanish acronym), while providing farmers with management autonomy. Farmers elected representatives to oversee the technical staff hired by the association, who performed management functions previously handled by the CNA.

Mexico’s transfer program began in 1989, the same year that the socialist paradigm was undergoing the shock of the dismantling of the Soviet Union. Assumptions about the necessary role of government in even large-scale irrigation management were called into question and PIM became part of the answer to the new question: What is the proper role of government in resource management? A new set of PIM challenges became evident in the former Soviet Republics where water user institutions were needed to take the place of dismantled central agencies and the decentralized multi-functional collectives and state farms. Major PIM programs were initiated as components of irrigation rehabilitation loans to Kazakhstan, Uzbekistan, Azerbaijan, Tajikistan, Kyrgistan, and to the surrounding former communist countries of Bulgaria, Romania, Slovenia, and Albania. One of the models used in developing these programs was that of Turkey’s PIM program, itself inspired by Mexico’s experience.

While PIM was being introduced in Eastern Europe and Central Asia, PIM programs in other parts of the world, many having been initiated during the 1980s, took on a sharper focus as both donors and host country policy makers embraced PIM policies as central components of irrigation reform programs. In 1995 the Economic Development Institute of the World Bank launched an International Network on PIM (www.inpim.org) with founding country members from Egypt, Morocco, Mexico, Albania, Turkey, India, Pakistan, Nepal, China, Vietnam, and Indonesia, all countries where PIM programs were being pursued on a national level. A workshop organized in 1997 by the World Bank and IWMI to review “second generation” challenges of PIM, focused on the cases of Mexico, Colombia, Argentina, Turkey, and the Philippines (Groenfeldt and Svendsen 2000). Other important PIM programs were taking place in Tunisia, Senegal, Niger, Madagascar, Kenya, Sudan, Jordan, Lebanon, Syria, Yemen, Iran, and Sri Lanka.

Nearly every country with an irrigation sector has now adopted deliberate measures to strengthen the management role of farmers in an organized fashion. These countries include not only the recipients of development assistance, but also many OECD countries such as the USA, Canada, France, Japan, Australia, and New Zealand. The logic of PIM transcends national, cultural, and economic boundaries; it is a good idea for many reasons. However, the nature of each PIM case reflects a unique blend of local conditions and national priorities. Three general categories or levels of PIM can be distinguished:

Type 1 - Transfer of assets and management to the farmers

Type 2 - Transfer of management but not assets to the farmers

Type 3 - Strengthening farmer management capacity without management transfer

A fourth option is that of transferring assets and management not to the farmers themselves, but to a private company. Third-party privatization, in contrast to a privatization to the farmers themselves (PIM Type 1), lies outside the topic of participatory irrigation management, since the farmers' management role is, in principle, unchanged when there is a simple substitution of private owner in place of the public sector owner.²

Type 1 PIM - Transfer of Assets and Management to the Farmers.

The most dramatic form of PIM is the transfer not only of management functions, but the legal ownership of the irrigation facilities (canals, pumps, diversion structures, dams, reservoirs, etc.). This is a form of privatization, but directed to the farmers themselves, who become cooperative owners of the system they are using. While considered an extreme policy step, this kind of privatization actually mimics the management arrangements found in traditional, community-managed irrigation systems which have always been in the hands of the farmers who use and operate them. The case of New Zealand stands out as a rare example of this type of PIM, where government has removed itself from the management of all irrigation facilities, maintaining only a regulatory role. The key feature of this approach is that government forfeits any future claim to the infrastructure on the 105,000 ha of irrigated area which it formerly built, owned, and managed.

The (1990) Irrigation Scheme Act allowed the government to sell all its irrigation projects and to put an end to public involvement in irrigated agriculture. The privatization

² The only examples of 3rd-party privatization, which this author is aware of, are in Chile, where in at least one system, the government has contracted with a private company to operate a reservoir, and distribute water to farmers, and in France where Ondo (formerly Lyonnaise des Eaux) is serving in a similar capacity in one irrigation system, on a trial basis. France also offers a number of cases of public-private irrigation partnerships that have many private sector features while offering farmers the security of the public sector.

process was finalized in 1996, when irrigators became the legal owners of the irrigation projects in which they operated. The government's policy was generally favorable to irrigators. Many projects were handed over along with an initial subsidy, either because the projects were downsized, or because significant rehabilitation was required. The sale prices resulted from direct negotiations between the government and a team of irrigator representatives, where the government's objective was to quickly abandon its involvement in commercial irrigation, rather than to maximize the financial returns from the sale of assets (Farley and Simon, 1996).

Type 2 PIM - Transfer of Management but not Assets

The "standard" type of irrigation management transfer arrangements, as found in Mexico, Turkey, Andhra Pradesh (India), and Albania, provides for legal transfer of management roles, as well as some transfer of assets. In most cases, the management transfer is presented to farmers as an option, with the possibility of maintaining the current arrangements of agency-management if that is the desire of the farmers. However, since the PIM option always comes with incentives to attract the interest of the farmers (e.g., promises of rehabilitation, more assured water supply, etc) it is only very unusual cases where farmers refuse to participate in the program. More common than outright refusal is the inability to organize locally to take advantage of the PIM program.

An exception to "optional" PIM has been the reforms introduced in Andhra Pradesh in 1997. The new law enacted to support establishment of WUAs (the Farmer Managed Irrigation Act) created a new boundary between the management authority of the WUAs and the state Irrigation Department. According to the new law, the Irrigation Department is no longer authorized to finance maintenance of the canal network that lies within the jurisdiction of the WUA (typically having a command area of about 500 hectares). Farmers do not have a choice about becoming a member of the WUA or accepting responsibilities for irrigation O&M of their secondary canal, just as those same farmers do not have a choice about being residents of their communities. They may choose to participate or not participate in the decisions of the WUA, but they cannot ask the government to intervene in making those decisions, or provide the financing for O&M. In practice, there is a great deal of government support to the WUAs to help them undertake their new level of management, as discussed below.

Four examples of "Type 2" PIM are presented in this section, to illustrate the range of approaches being taken to transfer management to farmers, while retaining government control of the infrastructure itself: (1) The case of Mexico is discussed first. Here the government promoted the establishment of new organizations — water user associations

(modulos) — to which irrigation management below the main system level could be transferred. (2) The second case is that of Turkey where a similar process was followed. The important difference between the approaches in Turkey and Mexico was that the water user associations created in Turkey were based on existing local government structures. Typically the WUA president is also the mayor of a town within the irrigation area, and the WUA becomes almost a branch of local government administration. (3) The third case is that of Andhra Pradesh, India, where, as noted above, WUAs have been created by law, and every irrigation system is now managed either wholly (for small systems) or in the lower reaches (for large systems) by the WUAs. Because the transfer is not voluntary, the support functions of the state become especially critical to the overall success of the program. There is no option for a problematic system reverting to direct management by the Irrigation Department. (4) Finally, a fourth case is from the USA, the Columbia River Irrigation System, which is almost a case of “Type 1” PIM except that the infrastructure is not turned over to farmers. The WUA is responsible for all O&M from the headworks on down, but the government retains ownership of the water control structures, and ultimate responsibility for implementing necessary rehabilitation or replacement.

PIM in Mexico

By the end of February 2000 Mexico’s IMT³ program had transferred irrigation infrastructure commanding 3.2 million hectares to 474,000 water users organized into 427 Civil Associations (Modulos). The area represents 95 percent of the intended target. Of the 82 irrigation districts in the country, 72 districts have undergone total transfer, 7 districts have undergone partial transfer, and 3 irrigation districts are still pending. The program has also resulted in the creation of 10 umbrella organizations grouping some of the *modulos* into larger entities (Garces-Restrepo2001). At the national level, the Association of Water Users Associations (ANUR, its Spanish acronym) provides training support to its members, partly replacing agency-led training efforts.

The new institutional arrangements require the WUAs to provide many support services previously handled by the government, such as legal procedures, provision of agricultural inputs, agricultural extension and financial management and training. The cost of O&M and administration of the transferred systems in 2000 was reported to be in the order of 1.3 billion pesos (roughly US\$ 139.78 Million at April 2000 exchange rate); this amounts to US\$ 43/ha. Of this amount, the farmers contribute 72% and the GOM the remaining 28%. Prior to transfer the payments percentages were almost reversed, with the GOM contributing 85% and

³The term “IMT” is used in the Mexico example, because this is a direct translation of the Spanish term, *transferencia*. Elsewhere in this paper the term PIM is used to refer generally to processes of both IMT and PIM.

users only 15%. Thus, the IMT has produced a dramatic impact in bringing down government public expenditures in support of irrigation districts. Cost-savings to government is also tied to staff reductions. By the end of 1994 when about 75 percent of the total area to be transferred under the program had been turned over, agency staff numbers had reduced from 7,808 prior to transfer, to 2,134.

Has O&M improved? Inadequate maintenance of the infrastructure was a major motivating factor in the transfer program, as the irrigation facilities were in danger of becoming unusable. Following transfer, maintenance continues to pose problems for the WUAs, primarily due to difficulty in collecting enough revenue from members and because of prior neglect of the lower end of the system prior to transfer. Farmers, however, appear satisfied with the results of transfer. A 1997 study shows a widespread perception by farmers that water management improved after transfer (Palacios 2000). Research and field-based oriented studies carried on by the International Water Management Institute found modest improvements in the quality of water services after transfer. Perhaps more importantly, the studies indicate there has been no deterioration of the O&M service since transfer.

PIM in Turkey

In the early 1990s, Turkey began a concerted program of converting its department-run irrigation systems into locally-operated ones. Today, more than 80 percent of the large-scale irrigation in the country is managed by locally-controlled irrigation districts. The transfer was initiated by DSI, the Turkish national water resources agency, inspired by experience in Mexico and elsewhere. The primary driver for the change was labor costs which spiraled out of control in the late 1980s and early 1990, starving the agency of funds to maintain irrigation and drainage facilities. Transferring management to local control was seen as a way of containing these costs by devolving responsibility for employing staff (Svendsen 2001).

Turkish irrigation districts represent a variation on the standard model in that they are actually associations of relevant local governments rather than unions of farmers. However, because irrigated agriculture is a central feature of village life in affected areas, and because local leadership is directly elected by voters, many of whom are farmers, there are generally effective accountability links between irrigation district governance and the farmer clients of the systems. Systems are governed by a five-member executive committee elected by a general assembly of around fifty, comprising local government officials and some farmer representatives. Day-to-day management is in the hands of a technically trained manager and small staff, hired by the executive committee.

What is transferred: Under the transfer agreement, the WUA becomes responsible for providing, and financing, all O&M services within the irrigation system. Ownership of facilities is not transferred and remains with the state. Likewise because of the loosely-defined character of Turkish water rights, there is no transfer of any formal right to use water to the WUA. DSI local offices are given freedom to be flexible in reaching agreements with the WUAs regarding the amount of support that DSI will provide at different stages in the transfer process. DSI retains responsibility for operating and maintaining reservoirs and main canal facilities for most schemes. It coordinates with local WUAs on annual delivery schedules, but has ultimate control of bulk water deliveries by virtue of its control over reservoir operations. Presently no bulk water charges are levied by DSI for these services. DSI also retains *de facto* responsibility for cleaning main drains and for operating any drainage pumping stations required for disposing of drainage water. Transfer agreements between DSI and the WUAs call for joint annual inspections of facilities, and permission from DSI is required to modify or expand canals or other DSI facilities being operated and maintained by the WUA. One important unresolved issue is the financing of future rehabilitation work.

Results of Transfer: Staffing intensity on IA-managed schemes is only 56% of that prevailing when DSI was the sole managing entity, showing strong gains in operational efficiency from the transfer program. For DSI, the transfer program has resulted in significant declines in its own O&M staff levels, principally affecting unionized skilled and unskilled labor. The WUAs are currently charging about US\$78 per hectare in irrigation fees, which is 13% less than DSI charges farmers on the schemes which it still controls; however, the WUA collection rate is far higher. In 1999, WUAs succeeded in collecting 79% of the amounts due to them from water users, while DSI collected only 43% of its collectibles. Per hectare operating costs on the schemes still managed by DSI are roughly double those on IA-managed schemes. Maintenance quality on WUA-managed schemes is largely unknown; per hectare expenditure levels and the inherent incentives which promote maintenance deferral suggest the need for a program of regular maintenance monitoring by DSI (Svendsen 2001).

PIM in Andhra Pradesh, India

Andhra Pradesh is the fifth largest state in India, with a population of 73 million and nearly 5 million ha of irrigated lands. Faced with the familiar problems of deteriorating infrastructure, poor irrigation performance, low cost recovery, and increasing expenses, the government initiated a series of reforms, including: (1) Three-fold increase in water charges from 1996/97 season, (2) Passing of the Andhra Pradesh Farmers' Managed Irrigation Systems Act (APFMIS) in 1997; and (3) Creation of WUAs (as discussed below) with a capacity-building campaign. The objective was to build local organizations rapidly, from the WUAs at the minor canal level to federated WUAs at the secondary canal level, and later project (or

scheme) level. The ultimate objective was to develop self-financing and autonomous irrigation schemes managed by WUAs. It was planned that there would be a farmers' apex committee at the state level, to integrate the network of WUAs into a forum for state-wide decision making. The short-term objective was that WUAs and the Irrigation Department should become financially autonomous for revenue generation for O&M. New investment would continue to be financed partly by the government, but with users or prospective users contributing through cost-sharing arrangements.

In accordance with the terms of the 1997 law, more than 10,000 WUAs were created in a state-wide election process that same year. The WUAs vary in size between 200 and 3,000 hectares. The elected presidents of WUAs form a higher-level Distributory Committee (DC) at the secondary canal level. Since the formation of WUAs, the emphasis of government support has been on large meetings and consultations with WUA presidents, training courses, short workshops and dealing with the WUA presidents as the chief contact person of the WUA. The WUAs have become influential, and farmers now go to the WUA president for concerns about water allocation, and not to Irrigation Department staff. At the same time, there is a growing sense of competition with some village governments (*panchayats*) which feel that it could have handled water management since farmers often belong to the same village (Raju 2001).

Results of the Transfer. Since adoption of the APFMIS Act of 1997, significant government finances have been passed through the WUAs as management subsidies and maintenance contracts. Users have identified and executed the works. Benefits are accrued in a short time and are distinctly visible. WUAs appear very satisfied with the process and results of the new participatory arrangements for maintenance and repairs. The high level of public awareness about the reform program has raised the aspirations of water users and has put pressure on WUA leaders and Irrigation Department staff to perform at a high standard. According to one senior-level irrigation department officer, the major achievements of the reform program are: a) water now reaches the tail ends of canals, often for the first time, b) WUAs are taking care of all O&M at the minor canal level, and c) the Irrigation Department is relieved from having to deal with routine O&M problems.

PIM in the United States: The Columbia Basin Project⁴

The Columbia Basin Project (CBP) is a large multi-purpose, reservoir-based project located on the Columbia River in the state of Washington in the USA. The irrigated area is about 230,000 hectares, which is divided into three districts. All water used by the irrigation system

⁴ Based on the paper,

must be lifted 85 meters, from which point it is distributed to the command area, largely by gravity flow. Today, each farmer-controlled district consists of 2,000 to 2,500 landowners and is controlled by a five- to seven-person board elected from among the water users. Seventy-four percent of all landholders have less than 160 acres of irrigated land in the project. Districts purchase water from the US Bureau of Reclamation and then resell it to their members.

For over five years the districts negotiated with the Bureau over water and cost allocation and which works should be reserved by the Bureau, managed jointly between districts, and transferred to individual districts. After coming to agreement in 1969, the Bureau transferred management of the system to three farmer-governed irrigation districts. Farmers generally favored the transfer of management. Their primary interests were in obtaining more local control over water allocation, water fee structures, O&M expenditures, and drainage ways and in minimizing water charges. The Bureau's main interest was in shedding responsibility for delivering water to individual farms and handling special water sales. It preferred to focus mainly on construction and regulation of water and land use at the basin level. Full responsibility for managing the main and subsidiary canal network was transferred to the three districts. This also included responsibility to fully finance the cost of O&M and develop a capital replacement fund to pay for all future costs of rehabilitation. Farmers pay a 30% surcharge over the routine O&M fee to build up this fund (Vermillion 1997).

The districts have the status of semi-municipal corporations, legally constituted by the state government for the purpose of irrigation and drainage. They are tax-exempt, not-for-profit entities constituted by the water users. A formal water right is granted to each district by a concession from the state government. The right is divided into basic allotments for water users, measured in volume of water per unit of land per season. The districts have the powers to make their own rules and sanctions (subject to environmental policy and general regulatory constraints), plan and implement O&M, set budgets and water charges, hire and fire staff and apply very strong sanctions. Since transfer the districts have seized and resold more than 20 farms because of failure of owners to pay the water charge. Water is not delivered if water charge payments are in arrears. The districts can raise sideline revenue to help contain inflation of water charges. This includes the right to sell excess water to users outside the district. The districts agreed that the Bureau should retain ownership of system infrastructure, because they wanted to avoid liabilities attached to ownership.

The Bureau has the right to take over management of the system again if the districts should fall behind in their agreed repayment schedule for construction, fail to pay the agreed costs of O&M for the works retained for management by the Bureau, or fail to properly maintain the system. The Bureau conducts technical audits every three years to ascertain whether the

districts are maintaining agreed performance standards. The districts are obligated to comply with recommendations for essential and important preventive maintenance.

PIM in Japan

For more than 50 years, irrigation improvements in Japan have been implemented through water user associations established to help finance, operate, and manage the new facilities. There is no transfer of management, because the management is under the control of the association from the very beginning. The associations, called Land Improvement Districts (LIDs) are formed upon request from at least 15 farmers, who request an improvement to their irrigation. The request could be for a new irrigation diversion, improvements to an existing system, or the linkage of several existing system under a new diversion weir (a typical case). As part of their request, the farmers must agree to organize into a LID which is a legal body defined by a special law (in 1949). The LID agrees to pay a negotiable portion of the capital cost, and the full costs of subsequent O&M. Today there are 7,700 LIDs controlling 3.2 million hectares and comprising 4.5 million members. The average size, which varies considerably, is 400 hectares and 600 persons. Most headworks and main canals, and all secondary systems, are managed by LIDs through a small technical staff, hired by the LID itself.

While the government provides no subsidies for O&M, LID budgets often depend in part on municipalities and private businesses who have an interest in assured water supply, e.g., in cases where municipal water is conveyed through LID infrastructure. Nearly half the country's total fresh water passes through LID-managed control structures. The LID arrangement is an institutionalized part of Japan's water management system, working closely with the Ministry of Agriculture, Forestry and Fisheries, and with local government bodies.

Type 3 PIM - Capacity Building Without Management Transfer

In many PIM reform efforts, the outcome, whether intentional or not, has been more one of capacity building and improved farmer participation in joint-management (with the agency), rather than genuine transfer to farmer control. This type of approach, based largely on the experience of the Philippines, takes a participatory development model as the paradigm. With the important exception of Andhra Pradesh (see above), this participatory approach can be referred to as the "Asian" approach to institutional reform in the irrigation sector, in contrast to the "American" approach based on IMT of the Mexican variety.

Since the early 1980s, the Philippine program has had an objective of full management transfer to WUAs at the secondary canal level (lateral canals), yet today less than 5% of these

canal networks have been transferred. Is this a failure? There have been many changes in the way irrigation is managed in the Philippines, as a result of the “participatory approach” and a great deal of training and capacity building for agency staff and farmers. The results of such inputs cannot be measured simply by whether management contracts have been signed with WUAs or not. In this section we examine two examples of PIM that have resulted in significant positive change in the way irrigation is managed, but with little transfer of management responsibility.

PIM in the Philippines

When the National Irrigation Administration (NIA) was restructured in 1974, the goal was that NIA would become completely self-financed. The formation of irrigator associations (IAs), and the progressive devolution of functions became NIA strategies to balance costs and revenues. It was also anticipated that improved communication between NIA and the cultivators through the formally organized IA would result in (1) a better planned cropping calendar and sharing of water among farmers; (2) increased irrigated area; and (3) increased cropping intensity, which would then increase the willingness of irrigators to pay their irrigation service fees. Increased contact and communication between NIA and IA would lead to better system maintenance at the tertiary level, and subsequently, the contracting of IAs for O&M at the secondary level; and finally, the federating of IAs would lead to system turnover at the lateral (secondary system).

The focus on the PIM activities in the Philippines has been on formation of IAs at the level of secondary canals (laterals) varying between 75 to 1100 ha and from 40 to 850 farmer members. NIA, with initial support from the Ford Foundation, pioneered the use of social organizers in forming IAs, and implemented a series of training programs for both farmers and NIA staff about the new arrangements of jointly managed irrigation systems. The innovative work of NIA in opening management to farmer involvement received attention from social scientists at the time, as documented in two publications from 1988. A field study of reforms in large-scale (national) systems, conducted by the Institute of Philippine Culture, was published under the title, “Partnership in Irrigation: Farmers and Government in Agency-Managed Systems.”⁵ A second study reported on changes within NIA and was entitled, “Transforming a Bureaucracy: The Experience of the Philippine National Irrigation Administration.”⁶ The paradigm of these studies, and of NIA’s approach, was one of participatory management involving agency staff and farmers (organized into IAs) as joint

⁵ by Sylvia Ma. G. Jopillo and Romana de los Reyes, published by Institute of Philippine Culture, Quezon City, 1988.

⁶ Edited by Frances Korten and Roberty Siy, published by Kumarian Press, Hartford, CT (USA), 1988.

managers of the irrigation systems. The contracts between the IAs and NIA were not seen as a “transfer” of management, but as a mechanism for clarifying their respective roles so they could manage the system in partnership.

Currently⁷ the formation of IAs is nearly complete. In 90% of cases there is one IA per lateral (distributary). The main functions of the IA are collecting irrigation service fees, and cleaning/maintaining the canals under a maintenance contract agreement with NIA. The IA receives a rebate as an incentive for the collection of fees. Currently, 15,20 IAs covering 456,536 ha have contracts with NIA for O&M and/or collection of irrigation service fees. As a result of the increased management role of farmers, NIA staffing in large national irrigation systems dropped from 5,660 to the 4785 (15% reduction) from 1992 to 1996 primarily from the replacement of ditch tenders upon retirement and the takeover of their functions by contracted IAs (Raby 2000).

Despite the increased rate of fee collection and the greater involvement of the IA in canal maintenance activities, however, the sustainability of the management arrangements is in doubt. A report by the Institutional Development Department of NIA states that approximately “10% of the IAs are very functional; 50% are moderately functional and 40% not functional”. At the same time, international attention on irrigation reforms has shifted elsewhere, to the more dramatic cases of management transfer such as Mexico and Turkey, as discussed above.

PIM in Sri Lanka

In 1988, after a decade of pilot programs inspired by the Philippines experience, the government of Sri Lanka adopted a national policy of participatory irrigation management. The new program called for transfer of operation and maintenance of minor irrigation schemes and distributary canals of medium and major schemes to farmer organizations. The devolution of responsibilities did not include transfer of full control by farmer organizations over O&M plans or budgets, water charges or staff. Farmer organizations must obtain approval from the Irrigation Department before making special repairs other than weeding or desilting. All irrigation schemes greater than 80 ha would remain the property of the government. The Department of Agrarian Services exercises regulatory control over farmer organizations, including regulating elections, auditing accounts, and approving business transactions.

⁷ The research on which this report is based was conducted in 1996 and reported in Raby (2000). Unfortunately there has been little analysis since then, in spite of the historical importance of the Philippines in PIM reform efforts.

Farmer organizations have a mandate for O&M in distributary (secondary) canals, but under the approval of the Irrigation Department. Field channel (tertiary canal) groups of about 15 to 20 farmers were formed. Each group nominates a representative to the distributary (secondary) canal organization which is a legal entity registered with the Department of Agrarian Services. In some schemes, these distributary canal organizations are federated to the level of the entire scheme, but this ultimate body is not recognized as a legal entity. Government field operations staff generally remain assigned to the schemes after transfer and function under supervision of the Irrigation Department. The government continues to provide partial funds for maintenance and assumes responsibility for future rehabilitation. Government funds for maintenance are generally channeled through the farmer organizations as service contracts (Samad and Vermillion 1999).

Impact of the PIM Program. No significant changes in operational procedures were made following the PIM program; decisions about planting dates and irrigation scheduling are still taken in pre-season cultivation meeting attended by farmer representatives and officials of the irrigation and agriculture departments, the same as before transfer. Irrigation Department staffing is also generally unchanged, despite the turnover of the distributary and field channel networks to farmer organizations. However, farmer leaders interviewed agreed that the establishment of farmer organizations improved communication between farmers and the irrigation department and that agency staff were more sensitive to their concerns than before. Government spending on O&M has been significantly reduced after transfer, as a result of the cheaper maintenance contracts with farmers. Little of this cost is recovered from farmers, however. Cost recovery in transferred schemes remains very minimal and the cost of irrigation to farmers has remained the same as before transfer (Samad and Vermillion 1999).

In short, management turnover of distributary canals in Sri Lanka includes only weak legal status for the WUA, no binding agreements between the agency, WUA and farmers, continuity of government staff in the scheme and a continuing supervisory and financial role for the government in O&M and rehabilitation. The modest reforms have produced no significant improvements in total cost efficiency, quality of O&M or agricultural or economic productivity of irrigated agriculture.

Is PIM a failure in Sri Lanka? Or do the benefits not show up through conventional quantitative evaluations of impact? It would be interesting to survey farmer opinion about their perceptions and levels of satisfaction, as was done in Mexico (see above). There also the production benefits from the management transfer program could not be clearly documented, and the conclusion drawn was merely that the post-transfer management was not noticeably better or worse than pre-transfer management, there were significant cost savings to government.

Conclusions on Types of PIM:

The variety of PIM outcomes reflects a diversity of objectives and emphasis (e.g., management transfer in Mexico vs. joint management in the Philippines), as well as success and failure in meeting those objectives. The cases presented above can be considered successful, since their objectives have been substantially realized. Many more examples could be cited of PIM programs that failed to meet their primary objectives, yet have had some impact on the way irrigation is managed, and on the respective management roles of farmers and the irrigation agency. For example, the PIM programs undertaken during the late 1990s in several Indian states (Orissa, Tamil Nadu, and Haryana) as a condition of World Bank loans, are disappointing in terms of the management functions actually transferred to farmers, yet there have been important positive outcomes: Newly established WUAs facilitate farmer cooperation in irrigation management, and agency staff have developed a new and more constructive working relationship with farmers through these new organizations. While the aim of these programs was to transfer management to farmers (as in Mexico) the actual result has been more of a “joint management” along the Philippines model.

3. Key Issues

All three types of PIM outlined above offer clear potential benefits to both farmers and irrigation agencies. The former popularity of Type 3 PIM (joint management) has been largely replaced by the current vogue of Type 2 approaches (management transfer). Type 1 PIM (New Zealand) remains the exception for reasons of farmers’ capacity to take over full ownership, and government’s unwillingness to relinquish that control. The option of privatization to 3rd party ownership is also a rarity (Chile, France) but an important dimension of the general trend of increased involvement of the private sector in water management. This section identifies two policy issues arising from the experience of PIM reforms over the past two decades.

Are there not more than two Key issues? It seems that every conference on IMT or PIM produces a long list of issues that need to be addressed for more successful projects in the future.⁸ Many of these issues can be addressed more effectively if two fundamental questions

⁸ A very comprehensive set of issues relating to IMT is found in the Overview Paper for the FAO-INPIM E-Mail Conference on Irrigation Management Transfer. The paper is available on the FAO website: <http://www.fao.org/ag/AGL/aglw/waterinstitutions/overview.stm>. Another source of current PIM issues is found in the keynote paper from the 6th Seminar on PIM organized by INPIM in Beijing, April 2002. That paper, “Options for Institutional Reform in the Irrigation Sector” (by S. Johnson, S. Svendsen, and F. Gonzalez) proposes eight “guidelines” for designing effective reforms. The paper is available on the INPIM website at www.inpim.org.

are considered at the outset of the PIM program: (1) What are we trying to do? and (2) How can we do it? The second question provides a check on the first; if no realistic strategy can be devised, then the objectives might need to be modified.

Issue #1. Clarity of Objectives

PIM reforms have mixed and often hidden objectives that need to be debated and clarified prior to the implementation process. What are the rural development objectives that PIM reforms are trying to meet? If the objective is primarily to minimize recurrent costs to government from irrigation O&M, then a reasonable PIM approach might emphasize management transfer without too much concern about the nature of the group to whom management is being passed. Are women represented? Do the poor have a voice? These are questions of limited concern in terms of implementing management transfer. Leadership of the WUA by the wealthiest farmers is acceptable if they can manage the irrigation system successfully. However, if “pro-poor” rural development is an objective along with cost savings and improved productivity (and most PIM programs reflect a similar mix of objectives), then transferring management to the WUA is only one step in a larger process. Ensuring that the WUA meets the interests of all segments of stakeholders becomes an important dimension of the PIM program. Building the capacity of the WUA members to meet their irrigation management obligations becomes integrated with broader objectives of building social capital through the process of forming the WUA. PIM becomes not only a means of improving overall irrigation system performance, but also a path to social development and capacity building.

Issue #2. Matching PIM Objectives with the Right Inputs

PIM reform efforts usually under-estimate the investments needed to realize the desired objectives. What kinds of inputs are required to transfer management in a manner that is both economically efficient and socially empowering to all segments of the local communities? The basic steps to implementing a PIM approach are well understood, based on a wealth of experience from around the world (Vermillion and Sagardoy 1999). These steps include:

- Building consensus and support for PIM among both farmers and agency staff;
- Reorienting irrigation agencies in attitude, skills, and structure;
- Organizing and capacity-building among farmers to help establish WUAs;
- Establishing supporting policies and legal frameworks;

These steps are well known, but are inconvenient to follow; they are complicated, slow, and expensive. Many externally financed PIM programs give strong emphasis to the last item (establishing supporting policies and legal frameworks) but try to cut corners in working with

both farmers and agency staff to build the needed capacity for a viable program. The results are “paper” WUAs that lack both legitimacy and capacity, are controlled by the strong-men of the community, and are neither willing nor able to replace the management functions of the irrigation agency. This is the inherent danger of Type 2 PIM approaches. The danger of Type 3 approaches is that they focus too much on capacity building and remain hesitant to transfer real management functions to the WUAs that have been so painstakingly established.

4. Recommendations

The principles of participatory irrigation management offer tremendous potential for improving the lives of farm families, while saving the government scarce funds that are needed for other development priorities. PIM offers an important vehicle for “leveraging” rural development and making the whole process of social and economic development more effective. What needs to be done to realize more of the potential benefits of PIM?

- *Broaden the policy debate on PIM to include other sectors of government and civil society.* The management arrangements through which irrigation facilities are designed, financed, operated, and maintained have very important implications for rural development equity and opportunity among the diverse stakeholders of irrigated agriculture. Irrigation is not just about water and engineering, nor is it just about agriculture. Irrigation systems have far-reaching impact on the lives of farm families, and what is even more important to consider is the potential ways that irrigation systems can have a greater impact on rural livelihoods. The importance of participation to rural capacity building and community empowerment was not even imagined in the last generation of conventional irrigation projects. The objective of those projects was food production, and the government assumed management control because that appeared to be the only way to get the job done. Experience over the past two decades (and more) has shown that not only CAN farmers handle a great many management functions, but also that there are many kinds of benefits to greater participation: better management of the water and infrastructure (in many cases), the development of new skills and capacities among the individuals involved, and establishing new kinds of institutions (WUAs) that enrich the development potential of rural areas. Just as the message of the 2nd World Water Forum was “Making water everybody’s business,” the recommendation for irrigation policy today should be to “make irrigation management everybody’s business”. The result would be policies that contribute to and are integrated with broad rural development objectives.

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- ***Treat “participation” as a serious objective of irrigation development.*** While PIM has received generous lip-service and rhetorical support from nearly all the the key actors in irrigation development - donors, government agencies, consulting firms, NGOs, etc - the follow-up to this rhetoric needs to be strengthened. The problem is not a lack of sincerity about PIM so much as a lack of understanding about what is involved in shifting to a genuinely participatory mode of irrigation management. The root problem to this situation is traced to the narrow field of debate within the professional irrigation community. Specialists in social development, NGOs, and representatives of the farming community need to have much greater roles in setting irrigation policies and designing as well as implementing the PIM components of irrigation projects. These are the people who will ensure that the participatory objectives - which everyone can agree on - are matched by the right processes (awareness campaigns, trained organizers, well crafted laws, training for agency staff, reforms to the policies and structure of the irrigation agency, etc) to meet those objectives.
 - ***Learn from experience.*** There is an urgent need for new ideas, information sharing, discussion, and debate about both the process of implementing PIM reforms, and new approaches to PIM so that hard-won experience can be shared and incorporated into new programs. Nearly every country is involved in some type of PIM reform efforts and there is a wealth of experience to explore, but we are still “information poor” regarding the results (and even the process) of PIM efforts. Recent initiatives to share experience, such as the FAO-INPIM E-mail Conference (FAO 2001) and the 6th International Seminar on PIM held in Beijing in 2002⁹ have been extremely valuable, but the PIM information base continues to be disappointingly small given the scale of irrigation investments. The International Water Management Institute (IWMI) ended its research program on irrigation management transfer several years ago. Donors and national agencies are reluctant to critically monitor and evaluate implementation of PIM programs which rarely work out as planned. Given the high level of investments in PIM-related irrigation reforms, it is irresponsible to give so little attention to evaluation and learning that could be applied to new programs. New PIM programs needlessly repeat the mistakes of the past, at great - but unaccounted - costs to both borrowers and lending agencies.

The PIM of tomorrow will not look like the PIM of today or yesterday. The context of agriculture is changing, and the nature of PIM will reflect these changes. New roles for the private sector can be anticipated through the as yet undocumented experience of Chile and France. The increasing availability of technologies that intensively control water application

⁹ The presentations made at the 6th Seminar in Beijing are available on the INPIM website, www.inpim.org.

(e.g., variants of drip and sprinkler technologies) will relax the need for group management of the irrigation system, but may enhance the need for other types of cooperation, e.g., to ensure the sustainability of the water resource at the catchment level. As the number of part-time farmers increases (taking Japan as an illustration of this trend), the nature of farmers' management participation will shift to more indirect modes of involvement in the irrigation service. Professional managers will do the work, and participation will come to mean the involvement of farmers in holding those managers accountable to farmers' interests (as in Mexico's transferred systems). As the nature of irrigated agriculture changes, there will be new opportunities for participation and new challenges in negotiating roles among farmers, system managers, and other indirect stakeholders.

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