

## Participatory Irrigation Management

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Water development is critical for food security in many regions of the world. Irrigation has stabilized food production and prices. Meeting the challenge for the Increasing population from low performing irrigation systems requires technical, managerial and institutional interventions. Participatory irrigation management can offer one way of improving water user efficiency. Several countries around the world have attempted irrigation management transfer to water user associations. Though the approach is varied, the trend is consistent. This paper gives a brief overview of the different types of institutional arrangements of water user associations and suggests a realignment of incentives for promoting effective participatory irrigation management.

### Background:

Irrigation provides some 40% of the world's food from only 17% of the global cropped area. 2,400 million people depend on irrigated agriculture for food and livelihood. Water development is critical for food security in many regions of the world. Irrigation has stabilized food production and prices by enabling greater production control and scope for crop diversification. Irrigated agriculture is dominant user of water accounting for 80 percent of water consumption. With global population to increase to 7.9 billion in 2025, additional food will have to come from irrigated agriculture. Inappropriate management of irrigation has contributed to environmental problems including excessive water depletion, falling water tables due to excessive mining and ---, water quality reduction, m water logging and salinization. Poor irrigation practices accompanied by inadequate drainage have often damaged the soil build up (Rosegrant et al 2002). FAO estimates about 20-30 million hectares of irrigated lands severely effected by salinity. An additional 60-80 million hectares are affected to some extent by water logging and salinity.

With severe competition for water among urban, rural, industrial and environmental uses irrigated agriculture clearly stands to loose. How do we meet the growing challenge of demand for food with low performing irrigation systems? Improving water use efficiency is shown to be an effective measure for increasing water productivity. Increasing water use efficiency must be made at the technical, managerial and institutional levels. Technical improvements include advanced irrigation systems such as drip, micro drip, sprinklers, conjunctive use of surface and ground water, use of waste and recycled water and precision agriculture through scada systems and computer controlled systems. Managerial improvements can include adoption of demand based irrigation scheduling systems and improved equipment maintenance. Institutional improvements may involve establishing water user associations, promoting Multistakeholder platforms and water rights, introduction of water pricing and improvements in the legal environment for water allocation. This paper focuses on the opportunities through participatory irrigation management and how a realignment of incentives can foster participatory irrigation management.

The historical evolution of irrigation development from a community activity to a public activity led to the construction of large irrigation systems which over time were difficult to operate and maintain and were becoming less sustainable due to inadequate O&M and collection of water charges. The period 1950-70 saw the large scale development of irrigation followed by a phase of irrigation improvement during the 70's and 80's. With world food prices close to historic lows and underperforming irrigation systems, investment in the irrigation sector by the donor

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community was gradually shrinking. With cost of new investments high (ranging from \$8000-15000 per hectare) and delays in implementing projects due to social and environmental issues, the growth of new irrigation projects is likely to be slow. According to Caruthers (1996), most irrigable areas are already developed and therefore an improvement in the maintenance of existing irrigation infrastructure will inevitably be an important component of an irrigation development strategy. The quest for a new paradigm of involving users in irrigation development to make them sustainable was considered critical. This new paradigm called participatory irrigation management came to be recognized as an important component of reforms in the irrigation sector. PIM has been adapted both in the developed and the developing countries, though the approach is diverse and varied; the overall trend is consistent with decentralization and devolution of powers to lower levels.

### **What is PIM?**

The term participatory irrigation management refers to the *participation of users –the farmers—in the management of the irrigation system*. The Handbook on PIM defines *Participatory Irrigation Management as the involvement of irrigation users in all aspects of irrigation management, and at all levels*. **All aspects** include planning, design, construction, operation and maintenance, financing, decision rules and the monitoring and evaluation of the irrigation system. **All levels** include the primary, secondary and tertiary levels. A more comprehensive variant of PIM is Irrigation Management Transfer (IMT). *IMT is the full or partial transfer of responsibility and authority for the governance, management and financing of irrigation systems from the Government to Water user associations* (Vermillion 2003). *PIM usually refers to the level, mode, or intensity of user participation that would increase farmer responsibility and authority in management process* (Svendsen et al). PIM emphasizes the Dublin Principle of subsidiarity. Groenfeldt (2003) states that PIM processes build two forms of capital: *productive capital* (better maintained irrigation infrastructure) and *social capital* (new institutions such as WUAs, skills, leadership and community action). In the governance paradigm, PIM can be considered as a partnership between governments, agencies and users. The first international seminar on participatory irrigation management saw the creation of the International Network on participatory irrigation management as a global network to facilitate and promote PIM through the learning and exchange of experiences. Ever since its creation, INPIM has been creating awareness on participatory irrigation management through national and international seminars, capacity building programs, publication of newsletters and the INPIM website.

### **Opportunities through PIM:**

Participatory irrigation management is an overarching concept giving roles to farmers to collectively decide in a manner that affects their lives. It provides opportunities for collective action, dialogue between users, agencies and governments. Community based and community driven approaches have come to be the norm in most rural development strategies. Effective participation gives opportunities for equity, better management, and improved collection of water charges. Studies of farmer managed systems indicate that the active participation of farmers in irrigation management helps ensure the sustainability of irrigation systems through predictable water deliveries and allocation of water, improved design and construction, reduced conflicts over water, improved maintenance of the irrigation system, accessibility to government and system personnel and increased agricultural productivity (Svendsen, et.al 1997).

**PIM and Rehabilitation:** Rehabilitation of irrigation systems to enhance productivity can be better when local knowledge, labor, money and other inputs are mobilized through water user

associations. Joint walk throughs by members, facilitation by community organizers in the rehabilitation of irrigation systems in Andhra Pradesh, enabled water user associations and farmers to identify and prioritize system deficiencies and remedy with low cost solutions. PIM creates opportunities for better targeting of rehabilitation programs by combining local and external expertise. When water user association's organizations are empowered to control investments in irrigation infrastructure they typically find many ways to reduce waste, control corruption, and spend money more wisely. Typically it was found that rehabilitation done through farmers associations were cheaper by about 20% as they had access to materials and markets and are able to exercise greater choice. When rehabilitation is linked with the formation of water user associations, it not only builds the capability of the WUA but also enables ownership of the irrigation system (Peter 1997).

**PIM and Drainage:** Drainage by its very nature has serious implications for irrigation and participation, as both complement each other. While irrigation deals with too little water, drainage deals with excess water in the wrong place, time and quality hampering irrigation. Drainage is a public good and hence requires the participations of all agricultural and nonagricultural users. Irrigators in the Godavari delta system of Andhra Pradesh had to sow crops two months later due to too much water in their areas, participation through water user associations enabled them to excavate minor drains through voluntary surrender of land. Participation helps to coordinate farmers and fishermen who rely on drainage water for irrigating their crops and fish.

**PIM and Water Rights:** Improved access to water is an important benefit that PIM can offer for farmers. Communication channels can help farmers to better know and plan when and how much water they can expect to receive. Participatory reforms can improve the capability of agencies to listen to water users. They can create and strengthen ways for agencies and farmers to jointly plan water allocation and resolve problems making them effective and transparent. Under the warabandi system, water rights are often designated as shares which often call diligent coordination and negotiation to get the right amount of water at the right time. The "second generation" issues in irrigation management transfer programs have identified the need to clarify and strengthen water rights as an important way to provide security to user organizations to enable them to invest in irrigation management. Clear authority regarding water is a central component of the ability of an irrigators organization to determine the services it wishes to receive.

**PIM and Gender:** Participatory irrigation management creates opportunities for mainstreaming women's participation and gender equity in irrigation management thereby reducing the risks of gender biases. Women undertake most agricultural occupations as men, in a way a much more than men in addition to other livelihood activities. The involvement of gender can make activities more effective, inclusive and equitable.

### **The New Reform Paradigm:**

Vermillion (2004) describes early reforms in the irrigation sector as modest with a primary focus on rehabilitation. The formation of small water user associations was often supplemental at the community or tertiary levels. Many of these WUAs were often created to satisfy donor requirement. Most of the WUAs created did not have an appropriate legal framework or sufficient power to take actions. Public irrigation agencies did not see the WUAs as a threat as long as WUAs cleaned canals, collected fees and were subordinate to the Irrigation agencies. This old paradigm does not dislodge the equilibrium of perverse, entrenched interests and hence would be unable to overcome the key threats facing irrigation agriculture such a financial and

physical non-sustainability of the irrigation system. Such weak attempts in the lack of a political will often led to the collapse of the WUAs soon after the donor project was over as seen in the case of India, Pakistan, Nepal and China.

The new reform paradigm in contrast focuses with politically driven reforms, the creation of large water user associations serviced by professional management and operating on economies of scale. Reforms in the late 1980's, in Mexico, Turkey, Andhra Pradesh and Indonesia, show that reforms were a part of a larger process of institutional reform through well defined legal frameworks and substantive roles in operation and maintenance of the irrigation system, a federated WUA Hierarchy, choice to raise resources, hire their own staff in some cases and a new accountability between the users and the agencies.

### **Institutional arrangements for PIM:**

Traditionally the irrigation sector has been managed by large centralized agencies at the federal or state level. The role and function of water user associations is critical to PIM. Apart from a wide variety of functions four factors namely regulation, ownership of structures and assets, collection of water charges, and responsibility of O&M are considered important to define the levels of participation. A range of arrangements can be found with total transfer of assets and management in the case of New Zealand, farmer managed schemes and small lift irrigation schemes to shared management with the irrigation agencies where the water user association and the agency share some or all of the functions. Table 1. shows a range of arrangements found in different countries. By no means this classification is pure there could be large variations in form and scope.

<b>RANGE OF INSTITUTIONAL ARRANGEMENTS</b>						
Activity	Full Agency Control	Agency O&M ( User input)	Shared Management	WUA Owned (Agency Regulation)	Full WUA Control	Irrigation Management Company/ Board
Regulation	Agency	Agency	Agency	Agency	WUA	Agency
Ownership of Structures & Assets	Agency	Agency	Agency	WUA	WUA	Company
O&M Responsibility	Agency	Agency	Both	WUA	WUA	Company
Collection of Water charges	Agency	Agency	Both	WUA	WUA	Company
Unit of Representation	Agency	WUA	WUA	WUA	WUA	Company and user committees
<i>Country Cases</i>	<i>Most developing countries</i>	<i>Srilanka, Thailand, Vietnam, Philippines</i>	<i>Andhra Pradesh, Turkey, Albania</i>	<i>Mexico, Dutch Water boards, Japan</i>	<i>New-Zealand, FMIS schemes of Nepal, Ground water irrigation</i>	<i>France, China, Australia, United States,</i>

Major PIM programs were initiated as components of irrigation rehabilitation loans in Albania, Armenia, Azerbaijan, Kazakhstan, Kyrgyzstan, Romania, Tajikistan, and Uzbekistan. PIM is not merely restricted to the recipients of development assistance but also to many OECD

countries such as USA, Canada, France, Japan, Australia and New Zealand. Most countries in the Asian continent have been focusing on PIM. Major programs are being launched in India, Pakistan, and China, Sri Lanka, Indonesia, Vietnam and Thailand. We will briefly review a few cases to see the status of PIM

**PIM in Sri Lanka:** Adopted PIM as a policy in 1988 to decrease recurrent expenditure and improve productivity, transferred the operation and maintenance of minor irrigation schemes and distributary's canals of medium and major irrigation schemes to farmers organizations. Despite the transfer the control of O&M budgets, water charges, staff were still under the control of the irrigation department. Farmer's organizations need to obtain approval from the irrigation department before making special repairs other than weeding or desilting. There has been a strong resistance to collect water charges.

**PIM in Philippines:** Philippines has a total irrigated area of about 1.37 million ha of which communal irrigation schemes (CIS) is around 510,417 ha and Schemes handled by the NIS is around 689,010 ha. Some 174,200 ha are privately owned irrigation schemes. Communal irrigation schemes are relatively small (<1000ha), the O&M is done by farmers themselves who also amortize the direct project cost. The irrigation systems operated by the NIA is over 1000 ha with O&M administered by NIA and paid for by farmers as an irrigation service fee (ISF). Philippines adopted an incremental voluntary approach to transfer management responsibility for irrigation systems from the National Irrigation Administration (NIA) to water user associations. WUAs were formed at the tertiary level and federated at the secondary level in the case of large schemes. In the case of small schemes, WUAs federated at the scheme level. The transfer is made possible through a system of contracts Type I – maintenance contract, Type II maintenance plus collection and Type III total irrigation management transfer contracts. By the late 1990's full transfer (Type III) has been implemented in 10-15% of the irrigation schemes, more than half were under type I. Though NIA is autonomous, its sustainability through collection of water charges has been quite low. Making it dependent on the government for financial support. It did suffer a major reversal when the populist government of Joseph Estrada announced abolition of water charges.

**PIM in Mexico:** By the end of February 2000, Mexico transferred 95 percent of its 3.2 million hectare to 427 water user associations (Modulos) serving 474,000 water users. 72 of its 82 irrigation districts have undergone total transfer, 7 partial transfer and 3 districts are yet to be transferred. The lessons of irrigation management transfer has drawn world attention and interest and is a part of a wide and ongoing reform in the country for over a decade. The water user associations employ their own staff, undertake O&M using the machinery that was given to them as a part of the inventory during the transfer, and collect the water charges. Prior to the transfer the water charge collection was about 15% with the balance being contributed through government subsidies, as against the current collections of over 80%. Water user associations have been given a water right concession. Water user associations (Modulos) are federated at the secondary level and the National level federation (ANUR) undertakes training and lobbying activities. Second generation problems are clearly emerging and would need to be tackled as they emerge. Research and field studies by IWMI have shown modest improvements in quality of water services and productivity after transfer. The quality of O&M in general has improved.

**PIM in Turkey:** Following Mexico, Turkey launched an ambitious transfer program through the DSI (Directorate of General Hydraulic Works), transferring 80% of its large scale irrigation systems. The primary driver for the reform was to a large extent fiscal crisis, unionized labor costs in the late 1980's. The Turkish transfer program however is unique in adopting the transfer to local governments such as municipalities rather than to association of farmers. Water user

associations are managed by a five member executive committee who are elected from a general assembly which ranges from 50-80 members and contain all the local village heads (mukthars) and Municipal chairman and farmer leaders. Reforms were linked to the accelerated transfer program and privatization program of the World Bank which enabled procurement of the machinery. Each of the WUAs has been provided with an office and computers and supported by two professionals, the general secretary who is an agriculture engineer and a accountant. WUAs under take O&M, levy and collect water charges, water management, settle disputes. The transfer is through a transfer agreement between the DSI and the WUA. Water charges collected by the WUA are about 13% less than what the DSI collects in its administered areas. The Collection rates are around 80% as against 43% by the DSI. DSI staff in O&M (unionized labor) has decreased substantially, so also the budget on O&M with WUAs taking up O&M.

**PIM in Andhra Pradesh:** AP is the fifth largest state in India with a population of 73 million and 4.84 million ha of irrigated lands. Deteriorating infrastructure, shrinking commands, and increasing cost of maintenance with over 80% going to the staff and a the election of a dynamic Chief Minister led to reforms in the irrigation sector. The author was instrumental in the reform program both in the capacity of Joint Secretary and Secretary Water Resources Irrigation. Intense consultations with farmers led to the enactment of revolutionary legislation called the AP farmer's management of irrigation systems Act 1997 and tripling of water charges. Elections were conducted in the state in 1997 (and in 2002) electing more than 10,000 water user associations to manage the major (>10,000 ha), medium (2000-10000 ha) and minor (<2000ha) irrigation schemes. The scheme is an example of excellent demonstration of political will, campaign modes of communications with a strong legal back up and enables empowerment of farmers to levy a special fee from its members, power to resolve conflicts. WUAs have carried out maintenance works over the last five seasons, involved in water management especially during the last three doubts. The high level of public awareness on the reforms through state, region and project wise meetings has raised the aspirations of the water users and has put pressure on WUA leaders and irrigation departments to perform at a high standard. The major achievements have been bridging the gap areas (tail end reaches), spreading maintenance throughout the system, construction of minor drains, maintenance of accounts and audit etc.

**PIM in Japan:** Japan's tradition of community participation and self managed irrigation systems were legalized and systematized after World War II through the Land reform law (1947) and the Land Improvement law of 1949. The Land Improvement law forms the legal basis for the creation of Land Improvement Districts. Despite 50 years, nearly 6,500 LID's manage Japan's 3.0 million ha. 15 farmers submit a request for a project or an improvement to their irrigation system to the local town or city or village, the plan must be approved by two third of the cultivators. After detailed consultations a detailed plan id developed by the engineers along with the bylaws. Local governments facilitate the process. Finally an application for the creation of the LID is made to the prefecture who finally notifies the creation of the LID. Once notified, participation is mandatory among all the farmers served by the irrigation scheme. LID's typically contribute about 10-20 percent of the capital cost and the rest is shared by local, national governments and the prefectures. The contribution of the LID is often given as a loan which is repaid over a period of 15 years. The LID undertakes irrigation and drainage development, O&M, collection of water charges and resolution of disputes. The LID arrangement is an institutionalized part of Japan's water management system, working closely with the Ministry of Construction as well as the Ministry of Agriculture, Forestry and Fisheries, and with local government bodies.

**PIM in United States:** Irrigation was the basis for economic development of the US west, which is largely arid. Much of the early irrigation development in the US west was based on privately

owned water companies operated for profit, but those were generally unsuccessful financially and did not survive. Modern irrigation districts started just over 100 years ago, largely as a way to finance irrigation development, with the passage of the first Irrigation District laws in California. The Reclamation Act of 1902 under which the US Bureau of Reclamation was established had a mandate to promote farmer management of irrigation districts. WUAs in the United States have a strong legal basis with clearly defined water rights. Water user organizations are of two types: irrigation districts and canal companies. Irrigation districts are local governments while the canal companies have the status of non profit corporations. Both of these organizations are run by an elected board of directors. WUOs collect fees (100%) through the tax collection system,. Water is managed by the ditch riders. Agricultural extension is available through state universities. Private companies provide a wide range of support for inputs, equipment, marketing and business matters. Despite strong support systems, the US WUOs too have problems similar to those of developing countries: inadequate maintenance, growing competition for water and low prices of crops.

**PIM in the Asian Context:** Contrary to the west where the WUA operate over large areas with professional management and recover a fairly a high cost of operation and maintenance, the irrigation systems in Asia are characterized by densely populated farmers doing subsistence agriculture. The farm size among Asian farmers, are small as opposed to large commercial farms in the west, farmers are generally poor and usually augment incomes through non agriculture related activities. Water user associations in Asia are usually around 500-750 ha. With about 500-600 farmers. In some countries such as India, the community is highly stratified on the basis of caste. Inequities among farmers in terms of farm size, access to credit and markets, caste structures make irrigation in Asia very complex. Most Asian irrigation is characterized by a monoculture of rice the staple crop. Rice supports a whole ecosystem a factor that is often ignored when terming rice as an inefficient and water consuming crop. The multifunctional roles of paddy as a crop call coordination with variety of users including a rich ecosystem. Participatory irrigation management can afford an excellent platform for the interaction of diverse sectors and users. The third world water forum has brought to focus the multifunctional roles of paddy. The Government of Japan in pursuit of its ministerial declaration at the third world water forum has created INWEPF, the international network on water ecosystems in paddy fields. The land scape of Asia offers a variety of PIM initiatives. China is piloting the self financed irrigation and drainage districts (SIDD), where the head works of the irrigation system are looked after by a company on corporate lines which sell water in bulk to the water user associations on a charge. Irrigation management companies in Vietnam are gradually converting to irrigation cooperatives and water user associations. A participatory irrigation management and development secretariat is under contemplation by the government of Cambodia. Thailand is piloting a number of experiments with farmer committees and federations. Pakistan federates water user associations in Area water boards. Thus

#### **PIM in Central Asia and South Eastern Europe :**

The Central Asian Countries of the former Soviet Russia are faced with a new challenge of restoring highly deteriorated irrigation systems following the collapse of the communist regimes and state farms. The collapse of market and the economy leaves no better option than participatory irrigation management to rehabilitate and restore the irrigation systems. Albania, Macedonia, Romania are pursuing vigorous PIM program through rehabilitation projects. Similarly, Kyrgyzstan, Armenia, Tajikistan, Georgia and Kazakhstan are pursuing programs that give central roles to the farmers. The seventh international seminar on participatory irrigation management in Tirana held in June this year focused on PIM in central Asian countries.

### **Conclusion and Recommendations:**

Despite a variety of institutional arrangements, each model has its own advantages and is specific to the context of the country. With the emergence of the private sector and the changing role of irrigation itself, new public private partnerships are likely to emerge. Presidents of Water user presidents in Andhra Pradesh have clearly occupied a political space leading to new relationships and arrangements. The scope and character of water user associations will have to enlarge to focus on issues relating to improved service delivery, integrated water resource management, basin and catchment management. Sustainability of the water user associations is key to its success. Participatory irrigation management affords opportunities for reforms in the irrigation sector. As farmers organizations take progressive roles and responsibilities, the role of the government and irrigation agencies need to change to a facilitator and a regulator. The likely roles are detailed elsewhere. For PIM to be successful, governments need to clarity of objectives, create an enabling environment, provide an appropriate framework, clearly identify champions of reforms and regularly monitor and evaluate water user associations (Peter 1997).

Sustainability of water user associations is dependent on a host of internal and external factors. Some of the key elements for promoting participatory irrigation management are:

#### **Realigning incentives for participation:**

#### **Redefining roles of Government:**

In the past governments have been solely responsible for development. In the irrigation sector, government's planned, designed and constructed irrigation projects. The general trend towards decentralization, fiscal crisis in governments, inadequate maintenance on irrigation systems, rehabilitation of irrigation systems, the growth of private sector, focus on other social sectors and highly staffed bureaucracies has lead governments to divest most of its roles to the private sector and to user organizations. Development is transitioning from top driven approaches which have failed to deliver to community based and community driven approaches. Participatory irrigation management offers a way out in bringing the users to focus. It reflects a win-win situation for governments and users. As WUAs progressively take over responsibilities, the role of the Government and irrigation agency would be to act as a regulator and a facilitator.

In 1996 and 1997 the government of the state of Andhra Pradesh, India, held many meetings with various government officials, thousands of farmers and others to develop and implement major reforms in the irrigation sector. The Andhra Pradesh Farmer managed Irrigation Systems Act, 1997 (APFMIS Act) was passed by the Legislative Assembly in April 1997. The Act mandates management transfer for all schemes in the state regardless of type or size. Following extensive consultations with farmers, water charges were more than tripled in the same month (from Rs. 60/acre to Rs. 200/acre), with the majority of funds going to water users associations that have taken over responsibility for management of each hydraulic level of canals. In June 1997, nearly 10,292 water users associations (WUAs) were created through a state-wide election. In November 1997, 174 Distributory Committees (DCs) were created through elections. (Peter 1997).

In South East Asia, Vietnam recently conducted a workshop on participatory irrigation management in April 2004 to operationalise and upscale PIM. There is a gradual effort to transition the irrigation management companies to form into cooperatives and water user associations. Cambodia is planning to set up a PIM directorate to promote PIM. Indonesia enacted a new water law 99 in 2001 which transfers management of all public irrigation systems

in the country to water user associations. Government will facilitate the irrigation management transfer, focus on capacity building and rehabilitation linked to WUA initiatives and contributions. Several decrees have been issued focusing on different aspects of the transfer as part of the overall decentralization policy of the Government (Vermillion 2002).

Svendsen et al (1997) suggest possible new roles for irrigation agencies:

- River basin planning
- Water resources allocation & monitoring
- Development of new policies and regulations
- Environmental monitoring and enforcement
- Groundwater monitoring and control
- Project planning, design and construction
- Technology transfer to IA
- Advisory services to associations
- Monitoring of association performance
- Arbitrating disputes

#### **Empower Water user association:**

Unlike earlier approaches where water user associations were created without vesting adequate powers such as the case of outlet committees in India and Pakistan, present day strategies enable water user associations through well defined legal frameworks that specify clear roles and responsibilities among agencies, water user association and governments. Legal frameworks either as exclusive or a part of existing legislation are very important for the functioning of water user association. The legal framework gives WUAs a fair degree of freedom and power to exercise its authority. Water user association are legal entities, undertake O&M, contract works, collect taxes, resolve conflicts and function under elaborate rules. Mexico framed a new law in 1994 under which the modulus (WUAs) and societies or limited responsibility (federations) are registered. The APFMIS Act in Andhra Pradesh also specifies the irrigation agencies as competent authorities to water user associations. Albania framed a new law which enables the creation of WUAs, federations and the national union of water user associations. Where there is no legal framework some countries such as China have issued policy guidelines which enable the creation of water user association.

#### **Water Rights:**

For WUAs to be successful, they need to be vested with a clear water right to give the right incentives for improvement of the irrigation system. Secure water rights also protects the WUA from infringements of its allocation and share of water to other powerful interest such as industries and municipalities. The Mexico transfer provided a concession of water to each WUA for a period of twenty years. The French water companies were provided with a concession of thirty years to use the infrastructure and water. Such secure rights give right incentives for improvement and diversification of the resource. The workshop on second generation on PIM at Cali clearly identified the need for secure water rights to WUAs(Svendsen et. Al)

#### **New Strategies in financing:**

New strategies in financing have grown out of the realization that large investments create incentives and constraints that fail to promote local resource mobilization for operation and maintenance and improvement of the irrigation systems. A central challenge for irrigation reform

is to escape from being trapped in a cycle of deferred maintenance, poor performance and wasteful premature rehabilitation. Some of the new strategies are

- **Linking water charges to O&M:** In most countries water charges are rarely linked to O&M. The retention of the water charges by the WUAs and linking it to O&M enable greater control and flexibility by the WUA to undertake O&M.
- **Smart Subsidies:** Government subsidies provided can be linked to local mobilization of funds. This creates both incentives and stimulus to perform better when WUAs compete for the subsidies. Indonesia has piloted the irrigation improvement fund at the kabupaten level where WUAs compete for the subsidies based on a set of guidelines which identify the readiness of the WUA to undertake the works, the nature of the problems. The local contribution collected and the contribution of the WUA in terms of labor and materials.
- **Sinking Fund/Reserve funds:** the promotion of a sinking fund or a reserve fund to undertake long term repairs can enable WUAs to plan for repair and replacement. Initially WUAs may focus on annual maintenance, which if regularly done can provide for surpluses which can be put in the sinking fund or reserve fund.
- **Incremental Approach to Rehabilitation:** An incremental approach to rehabilitation could be well within the reach of WUAs. Repairs taken in increments over a long period of time enable the strengthening of the WUA in terms of its capacity to execute. In Australia, the Murray irrigation company was given a rehabilitation package coupled with the transfer of the irrigation scheme over a period of fifteen years. Similarly in France, Irrigation management concessions given to companies had a rehabilitation package spread over a few years
- **Building Creditworthy WUAs:** One of the most important features that affect the sustainability of the WUAs is financial sustainability. Strengthening WUAs to borrow funds from banks and credit institutions calls for appropriate legal changes coupled with sound financial management with accountability. Collecting water charges, maintaining bank accounts and getting accounts regularly audited can go a long way in building the credit worthiness of WUA to access credit from local institutions.

#### **Improved Service Delivery:**

The sustainability of a WUA will to a large extent measure on the extent it makes available a reliable, equitable service to its members. Most of the irrigation systems are quite old and require rehabilitation and modernization. While rehabilitation is effected in almost all systems, it is unlikely whether rehabilitation will increase productivity. Modernization of irrigation systems that automate water distribution will certainly influence the efficiency of the system. In paddy systems, diversification of crops holds promise as prices of paddy are often low which require physical improvements to the systems, adequate training and financing. PIM and IMT provide adequate opportunities for addressing the issue of underinvestment and upgrading of irrigation systems.

**Promote Farmer Networks and federations:**

Farmer networks and federations could provide a platform for debate on water sector and irrigation reform issues. Very rarely, farmers are provided with an opportunity to take part in policy formulation. Farmer networks could offer opportunities for intense consultation, feedback and policy formulation as they relate directly to the users and hence have stronger incentives to cooperate. In large irrigation systems ---

INPIM is currently promoting farmer networks in three South Indian States on a pilot basis. The program takes the general advocacy of the participatory approach to its logical conclusion by initiating networks of farmers in order to increase and strengthen their role in water sector policy formulation and implementation. Up scaling and strengthening of farmers networks in water issues is necessary to increase the momentum of water sector reforms. Farmers are generally excluded from the process of policy formulation and are mainly conceived as implementers of policy designed by others. An explicit Multistakeholder policy process and balanced representation of different interest groups will enhance the quality, acceptability and pace of water sector reform. The initiative is akin to some of the functions taken up by ANUR in Mexico, the Federregios in Colombia, and farmer networks of Thailand.

**Regional Cooperation:**

Since most Asian countries have a similar context in irrigation, regional cooperation by sharing of experiences and study tours could prove invaluable. Reforms in Andhra Pradesh, Paved the way for several states in the Indian Sub-Continent to follow. Countries in the river basin could be an excellent platform for cooperation. For example all countries under the Mekong basin could form an excellent platform to share experiences, information's and skill sets. Countries could cooperate under very well structured river basin commissions.

A powerful mechanism by which this could be achieved is the creation of farmer networks at the national level or through INPIM Chapters. INPIM chapters are non profit Organizations and comprise of membership of WUAs, Irrigation engineers, researchers, and farmers. India, Pakistan, China, Indonesia and Vietnam have a country chapter each. These chapters could undertake a large number of activities both at the national and the regional level. Some of the activities undertaken by IndiaNPIM are:

1. Developing a database of documents and relevant literature
2. Workshops at the local, state and national level.
3. Action research programs
4. Capacity building activities
5. Publication of a newsletters / email conference.
6. Documenting the experience of different states/ countries and WUAs
7. Organizing study tours.
8. Lobbying and advocacy.
9. Networking with the Nepal chapters and the National federation of water user associations of Nepal.
10. Participation in International Seminars etc
11. Information dissemination through the website

**Capacity building for PIM:**

Capacity building must not be merely viewed as a training program aimed at bridging gaps in knowledge and skills among farmers and agencies but also as facilitating the change process. A blend of skills and attitudes needs to be imparted at all levels which also includes policy makers (Peter 2003). Operating a water user association requires a lot of new skills to innovate the technical, administrative financial management of the WUA. So also irrigation agencies require new skills to tackle WUAs and farmer leaders. Collective action depends on a wide variety of internal and external factors as already mentioned. Carrying out actions in a transparent and accountable manner will define the sustainability of the WUA. A training needs assessment, followed by developing flexible training modules which could be adapted for a wide range of clientele would be required. Training will be required not only for the members of the WUA but also the irrigation, revenue, finance and agriculture agencies. The dialogue will have to be further widened through awareness campaigns amongst farmers. In the state of Andhra Pradesh campaigns through farmer conventions at the project, district and state levels were conducted in addition to structured training. In the initial stage the training may be introductory but as the WUAs go along, training will become more specific for example quality control, measurements of works, arbitration, contract management, negotiation and conflict resolution. Some of the common skills that would be required are:

- **Technical:** O&M, Inventory and asset management, preparation of estimates, procurement, quality control, water management, crop water requirement, water scheduling and budgeting.
- **Legal** - Awareness of the law and legal provisions and procedures, Dispute resolution.
- **Financial management:** Accounting, audit and social audit, raising resources, levy and assessment etc.
- **Administrative** - Conducting of meetings, recording proceedings, communication and negotiating skills, conflict resolution and conjunctive management with the irrigation agency/Government.

Research on WUAs has shown significant positive benefits both to local farmers and to the irrigation system as a whole. These include equity in distribution of water, increased collection of water charges, greater water use efficiency due to increased participation of users, cropping and management decisions. PIM has provided opportunities for wider networking among farmers at the system and the national levels such as the case of ANUR in Mexico, the Federregios of Colombia, the National Union of water user associations in Albania and the Farmers networks in South India and Nepal. Sheer communication has been able to mitigate a variety of conflicts.

Water user associations are not perfect, there is growing realization of capture of water user associations by the elites, the non-inclusion of all water users, corruption and inefficiency. Like any other organizations, WUAs are bound to have weaknesses, the role of the government would be to constantly regulate and remedy through appropriate measures. Government oversight on PIM is critical to the success of the water user associations. Finally to conclude participatory irrigation management is not a panacea but yet a strategy for irrigation management.

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