



## **PIM, POVERTY AND MODERNIZATION OF FO MANAGED IRRIGATION CHANNELS IN SINDH- PAKISTAN**

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### **ABSTRACT**

The concern of this paper is to assess the role of FOs in managing and implementing the investment and modernization schemes of their own managed channels under Participatory Irrigation Management in Sindh province of Pakistan. The paper would also seek the contribution of PIM modernization intervention in reducing the poverty, equity in delivery of water service and sustainability of FOs. The paper will focus on the current PIM concepts, reform, and its process. The paper will address the issues of rehabilitation works, contract management. At present at least 180 irrigation channels have been transferred to FOs for management and operation followed by assessment and collection of water service charges. The FOs have also been given an opportunity to implement and undertake the rehabilitation and modernization schemes for improving channels maintenance and operation.

### **1. INTRODUCTION**

Under the water and poverty initiative (WPI) there has been many papers presented by various forums including Global Water Management (GWP). These initiatives have been instigated by the major donors under the co-ordination of the Asian Development Bank. In recent years there has been an increased focus on reducing poverty as a key responsibility of government and objective of donor support. This was reinforced at the UN Millennium General Assembly when the Millennium Development Goal of halving the proportion of the world's population living in extreme poverty by 2015 was agreed by all member countries of the United Nations. Other goals and targets specific to water and poverty were agreed at the Millennium Assembly and at the World Summit on Sustainable Development.

At present about 68% of Pakistan's population living in rural areas is directly or indirectly linked with agriculture for their livelihood. The poverty assessment indicates that about one-third of the Pakistan population is poor, and two-thirds are found in rural areas. Poverty in rural Pakistan is deeper and more severe than in urban areas. The low

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agricultural productivity has been reported a major cause for poverty. The agriculture productivity depends importantly on the availability of water for irrigation.

The paper is to review the overall status of reform and poverty in Sindh. With the passage of time it has been witnessed that the PIM and water-related services can help reduce poverty in the contexts of public health, land use, food production, livelihoods, agricultural development, rural planning and environmental protection. Based on such presumption, the PIM has been recognized as main tool in poverty reduction, especially in the countries where agriculture is a key mean for livelihood.

## **2. DEFINING PIM: PROCESS AND APPROACH**

Participation is a process through which stakeholders influence and share control over development initiatives and the decisions and resources which affect them. Participatory Irrigation Management refers to the involvement of farmers/irrigation users in all aspects of irrigation management. The intensity of participatory management may range from minimal user involvement to the transfer of nearly all management functions. There are various aspects of PIM that include planning, design, construction, operation & maintenance, financing and policy matters. Similarly PIM can be implemented at various levels i.e. quaternary, tertiary, secondary, main system, project and sectors.

## **3. WATER MANAGEMENT NET WORK OF SINDH**

Sindh province has almost 13 million acres of irrigated lands in its three barrage command areas, built between 1932 and 1962. Sukkur barrage was the major irrigation achievement with a command area of 7.6 million acres. The barrage was built at a strategic location, some 600 kilometres upstream from the deltaic regions in the Arabian Sea. The other two barrages in the province are the Kotri barrage (with CCA 3 million acres) and the Guddu barrage (2.1 million acres), built in 1955 and 1962, respectively, with the former being upstream from the Sukkur barrage and the latter being roughly 150 kilometres away from the coastal and deltaic communities. The irrigation system of Sindh province has total gross command area (GCA) of 14.391 million acres (5.8 million hectares), out of which 3.211 million acres is classified as cultivable waste, which can be brought under cultivation if irrigation water is available. In 1999 the total waterlogged area was calculated as 5.434 million acres which appears to be more than 30% of the total command area of the province.

The irrigation system of the province below the barrages comprises 14 feeders and main canals, 1462 branch canals, distributaries and minors. More than 95% of the irrigation is from canal water. The water withdrawal capacity of the barrages totals as 125,625 cusecs (designed) and 150,931 cusecs (maximum). The controlled irrigation system installed during the colonial years was a vast network of waterways that carried irrigation supplies from the river source to the farmlands. The system runs 13234 miles in form of main canals, branch canals, distributor canals and minor canals. The main canal draw water from rivers at the barrage points and delivers water into the branch canals. Water reaches the farm through distributaries or minor canals, which take water from the branch canal, the lower middle tier of the irrigation system. Around 78% of the area in Sindh province is underlain by saline groundwater, which is unsuitable for

irrigation. Close to the edges of the irrigated lands, fresh groundwater can be found. Refer below the map of irrigation system of Sindh:

A part from irrigation system, Sindh has drainage system which as such is not contiguous and integrated. There are 13 existing surface drainage systems in Sindh, which serve a total area of over 6.2 Million acres (2.5 M ha) and have an aggregate length of about 2,981 miles (4,800 Km). In addition there are two sub-surface drainage systems, which serve an area of 0.10 Million acres (0.04 M ha).

#### **4. MAGNITUDE OF CRISIS**

It is estimated, however, that out of the 13 million acres comprising the greater canal area in the province, at least one million acres—mostly owned by small and poor land-owning families—do not receive sufficient irrigation supplies. The situation is extremely distressing to the communities or settlements that are dependent on the surface irrigation flows for drinking and other domestic uses. The Sindh Government's annual expenditure on O&M is more than 3000 million rupees against its annual revenue (water charges) of less than 1000 million rupees. An example of financial year 2001-02 is given in below. As stated earlier, the Sindh Irrigation System is part of the Indus Basin irrigation system, the world's largest irrigation system. The size of the system is enormous by any standard. The area in the Province irrigated by the fourteen main canals from the three barrages on the Indus River is 5.5 M ha. To give a measure of the size of the irrigated system in the Province of Sindh: it is twice the irrigated area in Mexico and almost equal to the area under irrigation in Egypt. The movements towards participatory irrigation management in Sindh has its background in problems encountered in irrigation systems elsewhere – though probably in an amplified form: the inability to subsidize irrigation and drainage operations with public resources, the difficulty to maintain performance standards and the increased unwillingness of water users to contribute in cash or in kind. The irrigation system of Pakistan is the largest irrigation system in the world. Its construction was begun long before partition and it was expanded after independence. In Sindh alone, the system has 3 barrages and over 20,000 km of larger and smaller canals. Today the system is in danger since there is not enough money to maintain and operate the system.

#### **5. THE STATE OF PIM AND POVERTY IN SINDH**

Sindh has a total population of over 30 million, majority of which (51%) lives in rural areas. The total geographical area is 14 million ha, constituting 17.5 percent of Pakistan. About 5.8 million ha is commanded by canals. Net area sown is about 3 million ha, with about 1 million ha sown twice a year.

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The Sindh Government's annual expenditure on O&M is more than 4000 million rupees against its annual revenue (water charges) of approximately 600 million rupees. The

irrigation and drainage system has its institutional weaknesses in terms of management. The continuous centralized management has deteriorated the water management system in Sindh and as a result of that system's efficiency has reduced miserably to 30% only. The environmental issues caused due to inefficient management have never been looked into which resulted in destruction of wetlands, Indus delta and marine life, poor water quality, sea intrusion and disappearance of fresh water in the down stream part of Indus River. The waterlogging and salinity has affected more than 40% of the total cultivable command area of Sindh.

The poor water management service directly affects socio-economic condition of the people of Sindh province especially rural people who have direct stake in water-the main source of their livelihood. The index of Poverty in rural Sindh is deep and alarming. About 37% population lives below the poverty line compared to 33% in Pakistan on an overall basis. Over 70% of the rural population is landless. Rural households, including the landless, derive 56% of their income from agriculture, directly or indirectly. The rural poor tend to be employed mostly as agriculture wage workers. The concentration of poor is the highest among categories of households where the head is an unpaid family worker, sharecropper, or owner-cultivator owning less than 2 hectares of land. The poverty headcounts in these categories are 60%, 50% and 40% respectively. Rural Sindh is highly dependent on public services with little role of the private sector. Thus reforms to improve public service delivery and stimulate rural growth that raise agricultural and nonagricultural wages are fundamental for reducing poverty in rural Sindh.

## **6. GOSINDH STRATEGY FOR PIM - A TOOL FOR POVERTY REDUCTION**

A holistic water resources management strategy encompassing policy and institutional improvements, improved management of storages, infrastructure improvement, environmental sustainability, productivity enhancement, and poverty alleviation, is required to address the water resources management issues. While realizing the need for such a holistic strategy and initiating its preparation, GOSindh has evolved an interim strategy that would yield quick dividends, within the broader constraints mentioned above, while building the foundation for the longer term strategy. This interim strategy has three inter-related elements: (a) fostering an institutional, policy and operational framework conducive to efficient and self-sustaining operation and maintenance of the irrigation system; (b) supporting WCAs in implementing high payoff infrastructure improvements needed for improved water management, particularly at the tertiary level of the irrigation system, at a much accelerated pace, than in the past; and (c) enhancing agricultural productivity and incomes by introducing improved technology, agronomic practices, and information knowledge systems.

**The first element** of the strategy is predicated upon the implementation of fundamental and far reaching institutional reforms that are being supported under the World Bank funded projects. These reforms involve decentralization and transfer of management of the irrigation and drainage system from the Sindh Irrigation Department to a multi-tier system of autonomous institutions, with clearly defined roles and responsibilities within the system, with a firm commitment to rationalize O&M subsidies. The key elements of the reforms, the hierarchy of the new institutions and their roles and responsibilities are as follows:

(i) conversion of the Irrigation Department into an autonomous Sindh Irrigation and Drainage Authority (SIDA), with responsibility for intra-provincial aspects of the system, including O&M of barrages and main canal head-works, and management of intra-province bulk water transfers, including water deliveries at the head of main canals and management of drainage effluent in main drains that extend across canal commands;

(ii) establishment of self-accounting, commercially oriented, client responsive and financially sustainable area water boards (AWBs) --public utilities-- on each main canal, responsible for operating and maintaining the irrigation and drainage system within the main canal command up to the head of the distributary canals; and

(iii) establishment of FOs, owned and managed by farmers, and responsible for O&M of the irrigation and drainage system within the command area of distributary and minor canals and collection of *abiana* (water charges). FOs would have representation on the AWBs.

The long term vision is that once the new institutions become operational, SIDA would enter into contracts with AWBs for bulk supply of irrigation water and receipt of the drainage effluent generated within the limits of the AWBs. The AWBs would enter into similar contracts with FOs for bulk supply of water at the head of the distributary canals. The FOs will collect *abiana*, retain a part of it and pass on the remaining proceeds to AWBs for maintenance of the main canals. The AWBs would in return pass on a portion of the amounts received to SIDA for the O&M of the system under the latter's jurisdiction. It is expected that the reforms would lead to SIDA and AWBs developing into vibrant autonomous bodies capable of improved management and O&M of the upper tiers of the irrigation system that would result in improved and sustainable operations, higher water delivery efficiency and better scheduling of canal deliveries reflecting more closely the irrigation requirements in canal commands. Establishment of FOs would lead to more equitable distribution of water amongst watercourses, improved and cost effective maintenance and more efficient collection of *abiana*.

**The second element** of GOSindh's interim strategy --supporting communities to carryout

accelerated high payoff infrastructure improvements at the tertiary level-- complements the first element of the strategy, but stands on its own merit. It involves, establishing effective community organizations/user groups at the watercourse, and distributary canal levels to provide a solid foundation for the upper tier reforms. Also, investments to make the irrigation infrastructure functional and efficient are essential to enable the fledgling institutions (WCAs, FOs) to perform and yield intended outcomes. Overall progress on establishing WCAs and infrastructure improvements at the tertiary level has been slow, primarily due to lack of capacity for social mobilization and capacity building. GOSindh wishes to improve the speed and effectiveness of this program through greater participation by WCAs. In addition, GOP is considering a country wide watercourse improvement program that would include improvement of the remaining 29,000 watercourses in Sindh

**The third element** of the strategy -- supporting productivity and income enhancement

measures- is critical to reap the full benefits of institutional and infrastructure improvements in terms of higher productivity, and to help translate higher productivity into higher incomes. Past interventions in this regard have been limited to a few demonstration centers, routine training & visit (T&V) type extension activities and some efforts at information dissemination. Few attempts have been made to introduce improved technology (land leveling, improved farm layout, zero-tillage, sprinkler drip, etc.) and information systems. The impact has been modest. GOSindh is exploring new and more efficient ways of improving and scaling up delivery mechanisms for new technologies, extension, input supplies, storage and processing, market marketing information, and modern information systems, including access to internet. Current thinking is that these activities would be developed around the new institutional setup, primarily at the AWBs, FOs, and WCA levels.

## 7. INSTITUTIONS CREATED AS A RESULT OF PIM IN SINDH

In Sindh, following bodies are to be fully established:

Sindh Irrigation and Drainage Authority (SIDA)

- 13 Area Water Boards
- About 1400 Farmers' Organisations.

Sindh is proud of being ahead of other provinces in implementing these reforms and offering investment implementation opportunity to FOs. The overall status of establishment of new institution is as under:

- SIDA- fully established and functioning
- AWBs- Three AWBs on four main canals (Nara, Ghotki, Phuleli and Akram Wah) are functional
- FOs- more than 220 FOs established- mostly in Nara Canal AWB command area

## 8. IMPLEMENTATION OF MODERNIZATION SCHEMES

Under Sindh On Farm Water Management (SOFWM) Project, 100 distributaries / minors managed by Farmers Organizations (FOs) are being rehabilitated / improved in three Area Water Boards i.e. Nara Canal Area Water Board (NCAWB), Left Bank Canal Area Water Board (LBCAWB) and Ghotki Feeder Canal Area Water Board (GFCAWB). The rehabilitation / improvement works include:

- Restoration of outlets, weak sections of channel banks & berms
- De-silting
- Repair of regulator gates, cross regulators and diversion structures
- Protection works upstream and downstream of structures and channel sides
- Construction of cattle crossings and cattle *ghats* (cattle drinking water points)
- Installation of gauges and control structures for flow measurement at the Distributary head and each *Mogha* (watercourse off take outlets).

At present around 175 irrigation channels have been transferred to FOs and about 100 distributary/ minor canals, that are managed by FOs, are planned to be rehabilitated through a project of Sindh On farm Water Management funded mainly by the World Bank. FOs are responsible to act as contractor for the rehabilitation of their own distributary/ minor canal in case of less than US\$ 100,000 contract amount through Community Based Contract (CBC). On the other hand, if amount exceeds US\$ 100,000, the contract could be awarded to the private contractors through National Competitive Bidding (NCB) and FO becomes employer of the contractor. The works are identified and proposed by FOs on the basis of joint walk-through surveys along with AWB staff,, consultants and social mobilization teams of Social Development Cell SIDA.

In first year 10 contracts were awarded of which 09 were NCB and one was CBC. In first year the maximum limit of CBC work was US\$ 30,000 and based on the first year performance, environmental compliance and work quality review, the GoSindh and World Bank agreed to extend upper limit of CBC up to US\$100,000. This directly resulted in a greater opportunity to many FOs to undertake investment activity directly under their management and execution.

### **8.1. PARTICIPATION IN JOINT WALK THROUGH**

In order to identify the work a joint walk through is carried out. The joint walk through largely helps in determining the scope of rehabilitation work for FO. At the end of walk through, a format is jointly signed by all the parties incorporating all the technical requirements, repair needs and necessary irrigation structures. At the same time, environmental impacts of the rehabilitation works are also assessed jointly along with any resettlement impact of the works. In addition through the survey identification of community infrastructures like washing bays, buffalo baths, and foot bridges are proposed on appropriate places with consultation of FO members.

Some committees are formed by FOs to manage the rehabilitation work, monitor the work, and implement the CBC works.

### **8.2. PARTICIPATION IN CONTRACT BIDDING AND AWARD**

After joint walkthrough and detail designing, tender documents are prepared and based on the cost estimation bids are invited for NCB works (costing more than US 100,000) and evaluated in presence of the FO representatives. The contracts are awarded by the FO in capacity of employer and FO Chairman Signs the agreement with selected contractor. This process creates ownership of FOs and ensures sustainability.

As stated earlier, under the rehabilitation works program of irrigation channels, initially it was decided that contracts worth less then US\$ 30,000 will be awarded to FO as part of institutional strengthening measure. And later on this limit was enhanced to US\$ 100,000. In the first year of program of works, only one contract was awarded as CBC contract (FO Bagi minor in NAWB). Whereas in second year, out of 35 contracts, 21 were classified as CBCs. This enhancement in the upper limit for contract amount was appreciated by the FO community at large. By and large, the performance of CBC has been satisfactory as local labor and local machinery like tractors and excavators are hired, generating employment opportunities at local level. The contractors on the

contrary largely bring their manpower and machinery from their own pool of resources, mostly located outside of the project area. Community appreciated the donor and govt. efforts for awarding the contract to FOs.

### 8.3. PARTICIPATORY MONITORING

Generally there is a strict monitoring by FOs on the rehabilitation works at most places. FOs generally form a committee to address the quality work and ensure work is completed as per scope. The contractors' exerted political pressures to obtain the bills in advance but the FOs withstand the pressure and forced contractor to complete the work. For example contractor of Mir Minor exerted pressure on FO chairman to release his final bill before the completion of work. But chairman took stand and described to contractor clearly that bill could not be signed before the work was completed.

## 9. PIM IN SINDH: - ACHIEVEMENTS AT GLANCE

- **Community Participation:** farming community through participatory irrigation management has effectively been involved in management and distribution of water at minor and canal level. More than 100,000 farmers have taken part in the social mobilization process and promoted institutional reforms.
- **Control of Water Theft:** After implementation of PIM, the AWBs have been some how succeeded to control the theft and closing the illegal direct outlets. The World Bank Aide Memoire (Feb 2005) further recognizes improvement in the water management due to irrigation reforms. It mentions that *“The left Bank Canal AWB with the support of SIDA and IPD closed several illegal outlets in the lined canal which served an area of about 20,000 ha. For the first time in 3 years the tail end farmers received water”*.
- **Better and reliable service delivery:** The water service delivery has also been improved under reform programe. The DPR value has been observed more for the area which is managed by FOs. An other World Bank Implementation review mission on SOFWM project (refer Aide Memoire May 27, 2005) maintains that *“the mission observations during field visits that in distributary canals where farmer organizations are functional and physical and hydraulic improvements are being implemented, water is now reaching the tail-end farmers who had reportedly never received their due share in the past”*.
- **Better management of investment and modernization schemes:** A world Bank mission on same project while visiting one FO Channel (Bagi minor that is undertaking rehabilitation work by them) maintains in their Aide Memoire (Dec 2005) that *“This is the first community based contract and the quality of work observed was good. The management committee was exemplary and seemed to be working well together in a participatory and democratic manner”*. The M&E consultants (M/s MMP) of SOFWM project has recently concluded that out of 10 rehabilitation works on FO channels, work under undertaken by FO Bagi (under community contract) was more environmental friendly than other 9 contracts being implemented through contractors. This is remarkable finding in term of quality work and sustainability of the irrigation and drainage system due to reforms.



- **Reduction in Poverty and socio-eco distress:** It has also been witnessed that in many areas where people migrated earlier from tail area due to water shortage have returned back to cultivate their lands as they can now receive water which was being stolen through direct outlets at head reach. This happened mainly in the Left Bank Area Water Board. This all has happened due to reforms in irrigation sector. The recent report published by World Bank on Pakistan Water Economy running dry also appreciates Sindh and recognizes that Sindh has made commendable progress in institutional reforms in irrigation (refer page 103 of the report).
- **Water Distribution equity:** unauthorized discharges from direct outlets are controlled. This has resulted in availability of water in the tail end area of Nara and Left Bank canal AWB
- **Institutional Development and Governance:** The WCAs and FOs have been acting as water management bodies. All investment works on watercourse and minors are being carried out/managed by the farmers. Te FO Bagi Minor under community contract has been awarded contract for rehabilitation of minor. This will improve operation and maintenance of irrigation system and ensure water availability at tail and reduction in water losses.
- **Increased Agricultural Productivity and land use:** with the good governance of water at AWB and FO level, many people who migrated from tail area have returned back in Left Bank Canal area. The land has again come under cultivation and the yield as improved due to reliable water supply.
- **Reduced water losses:** with the improvement of watercourses and effective O&M by FOs the losses have decreased
- **Reduced Environmental degradation:** the industrial units especially sugar mills used to pollute drains and water ways by putting their effluent. The mills have agreed to install treatment plants.
- **Change in cropping pattern/water use efficiency:** farmers have started growing water resistant crops (sunflowers) especially in Left Bank AWB area where sugarcane and rice used to dominate.

## 10. CONCLUSION

PIM has evolved and become generally accepted as a necessary aspect of productive and sustainable irrigation. The schemes of modernization of irrigation channels are an excellent opportunity to address the issues of sustainability of FOs, sustainable water resource management. The FO managed investment schemes have not only addressed the local employment issues of landless agriculture and rural worker but also has addressed the water equity and efficiency as well. The increased farm productivity and income has reduced poverty from the rural poor. In Sindh PIM has proved to be successful model. But it is long way to go and government still needs to support and create support services for sustainability of reforms in Sindh. An empowerment model has to be followed and enabling environment for these new institutions has to be created.

There is a need to maintain the transparency and create support service for institutions created under reforms, particularly FOs and AWBs.

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