

# PRO-POOR IRRIGATION MANAGEMENT INTERVENTIONS IN PUNJAB, PAKISTAN: ISSUES AND OPTIONS

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## Abstract

The paper discusses the pro-poor irrigation management issues and options in Pakistan in the context of global research and thematic framework. It highlights the irrigation sector strategies and interventions under consideration and implementation in Punjab for addressing the challenges of poverty alleviation.

Despite the expansion of irrigated agriculture that brought significant increases in food production in the past three decades, there remain vast areas in the established irrigation systems where productivity and income of farmers remain quite poor. This is attributed to inequitable distribution of surface water and groundwater caused by inadequate management and a range of other physical, socio-economic and institutional constraints. The global research identifies the need for proactive policies and actions, and that how the economic, institutional, governance, and technical interventions can address poverty-related constraints.

The ‘Mission’ of irrigation management recently developed is to provide equitable and sustained irrigation to the culturable land of the Punjab for increased productivity, social security, poverty alleviation, and rural development, thus, ensuring that the food security of the Punjab province and food deficit of other provinces is met. In this context, the most important objective is to provide irrigation water in an equitable manner to large and small farmers alike as per their allocations. The paper also highlights other pro-poor strategies and interventions undertaken in the province, which include institutional reforms, development of water resources in *barani* (rainfed) areas, environmental protection strategies, alternate rate mechanism, and groundwater management.

## The Global Context

The global population is projected to grow from 6.1 billion in 2000 to 7.9 billion by 2025. The impact of this growth will be focused mainly in the developing countries, where currently some 1.2 billion people are living in extreme poverty. The bulk of the population growth will be in the regions of the world least able to absorb large increments of people. This would result in build-up of poverty and increased migration as well as threatening social order, quality of life and sustainable development (UNFPA, 2003).

Water is essential for all aspects of life. Apart from its life-sustaining qualities, water strongly influences economic activity and social roles. Fresh water is distributed unevenly. It has been estimated that two-thirds of the world’s population may be subjected to moderate to high water stress by 2025. It is also expected that the world

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will need 17 percent more water to grow food for the increasing population in developing countries, and that total water use will increase by some 40 percent (UN 2002).

Both the shortage and the uncontrolled excess of water can be life-threatening and the essential balance must look to achieve appropriate priorities, equity and economy in managing this vital resource. There is growing recognition that the urgent and deepening crisis in water management is a particularly acute problem in developing countries and especially among the poorest communities. Depletion of water resources increases poverty through declining employment and income opportunities for the poor. The combination of rural poverty, population pressures and dwindling water supplies is set in the vicious circle of frustration, urban migration, development of slums in cities, which result in aggravation of poverty, water pollution and health problems (Hunter 2001).

Increasingly, there is an emerging recognition that a new approach is required for convergence in thinking and practice to align the efforts of the governments, development organizations and the civil societies at all levels to address the poverty issues and achieve the common goal of sustainable development. The strategies in this regard envisage more realistic planning, integrated action, community and multi stakeholder participation and greater equity in water resources development and management (INWEH 2001).

### **The Millennium Development Goals (MDG)**

At the Millennium Summit in September 2000, the 189 states of the United Nations reaffirmed their commitment to working towards a world in which sustainable development for present and future populations would be assured. At that summit, political leaders from around the world took the unprecedented step of deciding to adopt eight mutually reinforcing goals through a global development partnership aimed at substantially resolving the major issues of our time with particular emphasis on eradicating poverty. The member developing governments (MGDs) targets include reducing the incidence of poverty and hunger by half; ensuring universal access to primary education; eliminating gender disparity at all levels of education; reducing the under-five mortality rate by two-third and maternal mortality by three-quarter; reversing the spread of HIV/AIDS, malaria and other diseases; and concurrently promoting environmental sustainability; all in the context of a global partnership for development. Each MDG target is important in itself, but for their effective achievements and ameliorating poverty, all the MDGs must be viewed as interlinked and mutually reinforcing.

The central role of water linked with food as a basic human need and an essential resource with major role in production and consumption was fully recognized. The major water-related MDGs highlighting targets and critical linkages to water are presented in Box-1 (DFID et al. 2002).

Box-1: MDG Targets and Critical Linkages to Water.

Millennium Development Goal	MDG Target for 2015	Examples of Critical Linkages to Water
Eradicate extreme poverty	<ul style="list-style-type: none"> <li>• Reduce by half the proportion of people living on less than a dollar a day</li> <li>• Reduce by half the proportion of people who suffer from hunger</li> </ul>	<ul style="list-style-type: none"> <li>• Rural livelihoods and incomes of the poor often depend on availability and access to water for agriculture.</li> <li>• Increased productivity of crop production, livestock and fisheries through efficient water use would contribute to lower food prices. Urban poor would benefit from reduced food expenditure.</li> <li>• Reduction of water-borne diseases through safe water supply would contribute to better health and increased human productivity for livelihood earning opportunities.</li> </ul>
Ensure environmental sustainability	<ul style="list-style-type: none"> <li>• Integrate the principles of sustainable development into country policies and programs; reverse loss of environmental resources</li> <li>• Reduce by half the proportion of people without sustainable access to safe drinking water</li> <li>• Achieve significant improvement in lives of at least 100 million slum dwellers by 2025</li> </ul>	<ul style="list-style-type: none"> <li>• Sustainable and efficient groundwater, river basin resources use, protection of ecologically important wetlands, productive agriculture, clean local hydropower development where feasible, especially to meet energy needs of the urban and peri-urban poor, reduction in solid fuels, reduced land degradation from water erosion, reduced incidence of water-born diseases, would all contribute to environmental sustainability and reduction of poverty.</li> </ul>
Develop a global partnership for development	<ul style="list-style-type: none"> <li>• Good governance, development and poverty reduction, and fair-trading and effective financial systems</li> <li>• Special needs of least developed and land locked countries and small island states</li> <li>• National and international measures for debt sustainability</li> <li>• Productive and decent youth development</li> <li>• Access to technological innovations, particularly the private sector information and communication technologies</li> </ul>	<ul style="list-style-type: none"> <li>• Resolution of local and international water conflicts</li> <li>• Availability and access to safe water resources would result in improved productivity and higher incomes.</li> <li>• International cooperation and development aid and investments for urban water supplies (including role of private sector), hydropower for clean energy, agricultural development and livelihood of the rural poor, etc., would lead to reduction in global poverty and income disparities.</li> <li>• Access to knowledge and world-wide experiences, both scientific and traditional, of water resources management technologies for development and environmental sustainability</li> </ul>

## The Asian Experience

Agriculture in Asia has made tremendous progress over the past three decades when cereal production more than doubled, due to increased irrigation coupled with increased availability of yield enhancing inputs, credits and other supporting services. Despite impressive achievements, the productivity of a large part of irrigation systems remains severely constrained by insufficiency of some or all of these inputs. Such low-productivity areas are characterized by persistent rural poverty, often exacerbated by other physical, economic and socio-cultural constraints. Poverty is increasingly viewed as a multidimensional condition typified by lack of access to resources, assets and opportunities. This multidimensional approach is reflected in a wide array of poverty reduction strategies, policies and papers (ADB, 1999; World Bank, 2000; IWMI, 2003).

The on going research linking access to irrigation water and poverty alleviation by IWMI and other research institutes appear to suggest that poverty along the irrigation system exhibits both spatial and temporal patterns. Tail portions of the irrigation systems suffer increasing water shortage creating difficult situation for farmers. The lessons learned and key issues identified from the on going research are depicted in Box-2 (IWMI 2003; Hussain et al. 2002).

### Box-2: The Asian Research: Preliminary Findings and Issues.

(Research in six ADB developing member countries: Bangladesh, China, India, Indonesia, Pakistan and Vietnam)

- Poverty is still viewed largely as an income/production deficiency and poverty dimensions are largely ignored in planning.
- Indicative spatial patterns of poverty are correlated with water scarcity and poor management.
- In the selected irrigation systems, the incidence of rural poverty is highest in Pakistan and Bangladesh, and lowest in China. Estimates also suggest that the incidence of rural poverty is decreasing over time in all study countries except Pakistan.
- In rural settings, land and water resources are important determinants of poverty. Past development of land and agricultural water resources in all the six countries (indicated above) have played an important role in improving household, community and regional food security and reducing the incidence of chronic poverty through increased productivity, employment, wages and income and by increasing consumption of both food and non-food items.
- Inequity in the distribution of land and water resources is highest in the selected systems of South Asia.
- Crop and water productivity levels in China, Vietnam and Indonesia, where landholdings are generally small, are fairly high. On the other hand, crop productivity levels are generally low in the selected systems in South Asia, particularly in Pakistan and India, with substantial variations in productivity across households, communities and systems. There is considerable scope to increase both the physical and economic productivity of land and water through interventions in the water and non-water sectors.
- There is significant inequity in the distribution of water across head, middle and tail reaches of the systems. Inequity in water distribution translates into productivity differences, which in turn translates into higher incidences of poverty.
- The problem of tail reach poverty exists mostly in situations where there are neither alternative water sources (e.g. groundwater) nor non-alternative sources of employment (e.g. non-agricultural enterprises and market towns).

## The Pakistan Scenario

Pakistan is faced with serious problems of slow growth, heavy debt, social gap and widespread poverty. These problems have their roots in economic and social policies as well as institutional weaknesses. A recent study by the World Bank (2003) brings out that Pakistan's social gap is quite well known. Not only did social indicators not improve in line with the growth in GDP, but also, the gap between Pakistan and comparable low-income countries has tended to widen as below:

- Poverty headcount fell in Pakistan during the 1980s but stopped falling in 1990s leaving 45 million people below the poverty line.
- Pakistan's overall spending on education has decreased as compared to other countries in the region.
- Most social indicators for Pakistan, especially Pakistani women, are much worse than other countries in the region.
- Fertility ratio has begun to fall in Pakistan, but it is still among the highest in Asia.

A study for Participatory Poverty Assessment conducted by Punjab Planning and Development (P&D) Department (2003) identified lack of livelihood assets; vulnerability to adverse shocks and trends; inadequate basic services; social exclusion and gender inequality; and lack of access to justice as the main causes of poverty. A synthesis conducted during the study revealed various common factors that were said to define the poorest localities and the people living within them. These factors largely relate to community level characteristics of poverty and are summarized following:

- landlessness, together with status as a tenant and size of landholdings
- lack of access to irrigation water, particularly in the vulnerable tail reaches of the system and in the saline groundwater areas
- lack of facilities and basic services
- lack of access to main roads
- salinity and waterlogging
- desert or drought affected areas
- poor flood and rainwater drainage

The policy recommendations made for addressing the poverty issue include increasing access to key livelihood assets, reducing vulnerability, making public institutions pro-poor, tackling social exclusion and gender inequities, and improving access to justice. In view of the limited access of the poor to the basic public services, it has been brought out that a determined effort is required to focus the public services towards the poor through enhanced outreach and better targeting of these services. Improving the effectiveness of public expenditure is, therefore, crucial for achieving the objectives of the government's poverty reduction strategy, which requires streamlining the budgetary and planning processes and procedures, rethinking the role of the government, improving governance and accelerating and deepening financial management reforms.

## **Pro-poor Irrigation Management Interventions in Punjab**

### ***The Backdrop***

Pakistan has the distinction of having the largest contiguous gravity flow irrigation network in the world. It has been estimated that the present value of the Indus irrigation system is around US \$ 300-500 billion, while the present value of Punjab's irrigation infrastructure is estimated around US \$ 200-300 billion. The system serves as lifeline for sustaining the present level of agriculture. In fact, agriculture without irrigation is impossible in the arid to semi-arid climate of the country. Irrigated lands supply more than 90 percent of the total agricultural production, account for about 25 percent of GDP, and employ around 50 percent of the labor force. These lands supply most of the country's needed food-grain and also are the source of raw materials for major domestic industries and exports.

Water resources development and management has assumed new dimensions in Pakistan due to a number of factors, which are reflecting on the irrigated agriculture. In the past, it was possible to keep the agricultural production in pace with population growth by progressively improving the irrigation water availability. The future prospects are, however, not very promising and the sustainability of irrigated agriculture appears to be jeopardized due to rapidly escalating water demands, limited water resources and environmental concerns. The deteriorating health of the aging irrigation infrastructure and lack of financial resources to address the rehabilitation and modernization needs of the system is emerging as a major issue that is increasingly assuming serious dimensions (Haq 1998).

The existing Indus Basin Irrigation System (IBIS) is gigantic and integrated with limited flexibility. The length of the main distributary canals exceeds 60,000 kilometers. It serves over 14 million hectares of culturable commanded area through about 100,000 outlets in 43 main canal systems in the four provinces of Pakistan. The irrigation system was designed as a gravity flow, run-of-the river system to support subsistence agriculture at low cropping intensities of 50 to 75 percent. The existing storage capacity of reservoirs, constructed sequel to Indus Water Treaty, is rather small, being less than 10 percent of mean annual river flows. Further, the time distribution of river flows is highly uneven, as more than 70 percent of the flows occur during three monsoon months.

### **Irrigation Mission and Objectives**

The 'Mission' of the Punjab Irrigation Department (PID) is to provide adequate, equitable and sustained irrigation to the culturable land of the Punjab, for increased productivity, social security, poverty alleviation and rural development, thus, ensuring that the food security of Punjab and food deficit of other provinces is met. In this context, the following objectives have been outlined for planning and implementing action plans:

1. *Adequate Irrigation Supplies.* This is required as a minimum supply to provide sufficient water, which supports cultivation of crops, required for food security.
2. *Equitable Supplies.* Ensuring that in all circumstances especially in water shortage situation, large and small farmers alike, as per scientific requirements, share water equitably.

3. *A Sustainable System.* To operate and maintain the irrigation system in a manner that pure irrigation supplies are always provided to healthy cultivable lands of the Punjab province.
4. *Protecting Productivity.* Due to droughts and drying of rivers, some 500,000 tubewells pump 33 MAF from underground aquifers. Deeper layers of the aquifers contain salts, which are harmful to the soil. Too much pumping can permanently damage aquifers.
5. *Improved Food Security.* Ensuring that the basic food needs of the population are met, now and in the future.

### ***The Pro-poor Strategies***

The pro-poor irrigation management strategies and interventions undertaken in the Punjab province are summarized in Box-3. The most significant of these strategies include institutional reforms, improved canal operations for equitable distribution, development of water resources in *barani* areas and environmental protection strategies.

Participatory irrigation management is being implemented in a phased manner in keeping with the local socio-economic and technical setting. This involves establishment of *Khal* and *Nehri Panchayats* to resolve the water disputes at local level, and to progressively take over the distributary system management. The pro-poor strategies, which need special mention, are that the membership of the *Panchayats* is based on the principle of one farmer – one vote and not on the basis of land ownership. The other significant point is that the rules and regulations stipulate that three out of five members of the *Khal Panchayat* should be small farmers possessing five hectares or less agricultural land. Similarly, it has been provided that majority of the members of the management committee of *Nehri Panchayat* should be from the tail portions of the system.

Improved irrigation management for ensuring equitable distribution of canal water has also been a major pro-poor intervention which is accomplished by planned water allocations, proper maintenance and desilting of canals, control of water theft, and stakeholders' participation in planning and monitoring of canal operations. Groundwater management is another important intervention that is being planned at the provincial level for its sustainable use. This is important because groundwater is contributing significantly to the present level of the irrigated agriculture in the province. In addition, a comprehensive program for providing irrigation and drinking water facilities to the most deprived and less-deprived *barani* areas is being planned through construction of new small dams, management of D.G. Khan hill torrents by construction of dispersion structures on the flashy streams, and pilot construction of village reservoirs in the Cholistan area.

Box-3: Pro-poor Irrigation Management Interventions.

Policy / Strategic Interventions	Main Thrust	Status	Expected Pro-Poor Outcome
Institutional reforms	Improving the governance and management of water/irrigation sector with focus on holistic planning, participatory management and sustainability	On-going	++ (-)
Canal water operation planning for equitable distribution	To improve canal water operation plans through input of Agriculture Department / WACs	Being implemented	+++
Emergent system rehabilitation and modernization	Rehabilitation and up-gradation of irrigation canals and barrages to ensure sustained operations, and to meet the future demands	Being planned	++ (-)
Irrigation and drinking water supplies to <i>barani</i> area	To reduce the vulnerability of the most deprived areas during droughts <ul style="list-style-type: none"> <li>▪ Small dams</li> <li>▪ Hill torrent Management</li> <li>▪ Village ponds in Cholistan</li> </ul>	Being planned / implemented	+++
Dis-investment of public FGW tubewells	Relieving the public sector of the O&M costs for the FGW SCARP tubewells	Being implemented	+ (--)
Groundwater management framework	Developing a comprehensive management regulatory and framework for optimizing the sustainable use of groundwater	Being designed	++ (-)
Alternative rate mechanisms	Review of various modes of assessment to bring about transparency, economy and ease in assessment. Redefine assessment and collection procedures	The flat rate system of water rates based on land acreage in the culturable commanded area has been approved by the Government and is being implemented.	++ (-)
Environmental protection strategies	To adopt legal and institutional measures for maintaining the quality of provincial water resources at environmentally acceptable levels	Being planned	+++



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