THEME II: WATER MANAGEMENT BELOW THE MOGHA

ISSUES PAPER: ISSUES RELATED TO FARMERS' MANAGED IRRIGATION SYSTEM

by

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Productivity and sustainability of irrigated agriculture in Pakistan mainly depends on the performance of the Indus Basin Irrigation System. As the contribution of the irrigated sector to the national economy plays a crucial role, the knowledge about the status of present system performance is immensely important for the managers and policy-makers of the country.

The phenomenon of either stagnant or declining yields of rice, sugarcane and coarse grains (Shahid et al., **1996)** has prompted many national and international agencies and experts to question the present performance of the system. Many researchers have listed a number of issues and constraints which cause a decline in the performance (Shahid et al., **1996;** Shafique, **1996;** and Asrar-ul-Haq, **1995).** This paper, however, presents only six most important issues (as viewed by the authors) along with options for deliberations by the participants of the National Conference to be held in Islamabad from 5 to **7** November **1996.**

EQUITY OF WATER DISTRIBUTION

Equity indicates the ability of a system to uniformly deliver water over space (Mohamed, **1987).** This issue **is** concerned with the uniformity of spatial distribution of water which is usually influenced by a number of potential factors.

Some of the factors which cause a non-uniform spatial water distribution along a parent channel (e.g., distributary or minor canal) may include (Asrar-ul-Haq, **1995):** (i) deferred maintenance; (ii) sedimentation; (iii) excessive withdrawals by outlets; and (iv) illegal water abstractions. At the tertiary level, the distribution is skewed mainly due to the operational spills and seepage caused by the lack of maintenance, weak and porous banks of watercourses, non-uniform topography of service areas, intermittent wetting and drying of delivery channels, etc.

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As the distribuataries or minor canals are still agency-operated, the equity concern is confined to watercourses only. While addressing the issue at the watercourse command level, possible considerations for discussion may include: (i) water allowances for avoidable or unavoidable losses; (ii) discrepancies in warabandi; and (iii) measures to curb rent-seeking for illegal water withdrawals.

Points for Consideration

Policy, Planning & Legislation:

(i) existing warabandi mechanism;
(ii) current basis for water charge assessment;
(iii) pricing policies for high-delta crops (e.g., sugarcane) which encourage illegal withdrawals from parent channels; and
(iv) volume vis-a-vis time based equity;

Technical:

(i) water **loss** rates in the formulation of warabandi.

Socio-economic & Political

(i) acceptance of water **loss** rates in **the** formulation *of* warabandi.

RELIABILITY OF WATER DISTRIBUTION

Reliability of water distribution indicates the ability of a system to deliver expected/ planned / designed water supplies in a given time span. In the context of Pakistan, a system that achieves steady state is considered reliable. However, if farmers are informed in advance about periods of canal closures or reduced flows, and those events occur as scheduled, the resulting water distribution will still be termed as reliable in spite of water deliveries being variable.

The issue of reliability of water distribution within farmers' managed (directly or indirectly) system will have to be considered at two levels: (i) the canal-outlet; and (ii) the farm level below the canal-outlet. In most cases, the last level is mainly influenced by the degree of certainty associated with the first level.

Points **for** Consideration

Policy, **Planning** and **Legislation:**

(i) change in the mandate of PIDs / user-orientation; and
(ii) seasonal planning by the managers of the main system and other relevant agencies, along with communication to users.

Technical:

(i) seasonality in river flows during winter and summer; and
(ii) information (regarding outlet and below canal-outlet) management for water users.

Socio-economic & Political:

(i) internal and external influences on distributary operations through priority setting.

ADEQUACY OF WATER DISTRIBUTION

In general, adequacy of water distribution indicates the ability of a system to deliver the right amount of water as required by crops. However, the irrigation system in Pakistan is not designed for an adequate water distribution as defined above. Asrar-ul-Haq (1995) reported that the canal supplies fell short 38% at 105% cropping intensity. In this context, ground water use is an important factor for consideration.

Points **for** Consideration

Policy, **Planning and Legislation:**

(i) resource & design limitations;
(ii) conjunctive use of surface and ground water; and
(iii) consideration for marginal benefits and costs associated with water supplies.

Technical:

(i) conjunctive use of different water resources (e.g., canal, rain, ground water, drainage & sewage water); and
(ii) substitution of water efficient crops (Rs./m^3 of water).

Socio-economic and Political:

(i) Regional influences and excessive / reasonable water allocation.

PRODUCTIVITY

The productivity issue may include concerns about low ratios of actual and target productivity on the basis of: (i) per unit of land; (ii) per unit of water; and (iii) per unit of time (seasons). The availability **of** water, as described above, affects the resulting productivity of irrigated agriculture. The productivity ratios will be different with various combinations of the water and non-water inputs.

Even if all concerns related to water availability are addressed, the overall productivity will also depend on the availability and level of access for different groups of water users to non-water inputs. As the water related issues are already presented, the discussion about implications and opportunities corresponding to non-water inputs will contribute in addressing the issue in a more comprehensive manner.

In addition to water, the current status of adequate, reliable and equitable access and availability of non-water inputs such as seeds, fertilizers and chemicals have a direct effect on the productivity of irrigated agriculture. In the absence of the functional regulatory measures, quality of the inputs available is another serious concern to be addressed.

Points for Consideration

Policy, Planning & Legislation:

(i) equitable access to non-water inputs; and
(ii) change in the role of line-agencies from authority to service.

Technical:

(i) regulatory role for timeliness and quality of inputs;
(ii) ground water regulatory framework vis-a-vis water rights; and
(iii) water control mechanisms (water pricing, water markets, etc.)

Socio-economic and Political:

(i) influence of a structured marketing system; and
(ii) acceptability of new water control mechanisms.

SUSTAINABILITY

Sustainability is concerned with the long-term aspects of irrigation system performance, which is *to* be accomplished with little or no adverse impacts on the physical, financial, institutional, health and other relevant conditions of the system. For example, a poorly managed physical irrigation subsystem is likely to have serious negative consequences such as waterlogging and salinity. Similarly, the on-going budgetary cuts due to the financial crisis in many countries are forcing'cutbacks on their O&M allocations to support increasing staff costs. This situation is expected to result in deterioration of the financial and physical conditions causing concern for the sustainability of many systems.

Points for Consideration

Policy, Planning and **Legislation:**

(i) balance between resource conservation and utilization;
(ii) financial sustainability of farmers' groups;
(iii) appropriate policy response towards waterlogging and salinity problems caused by high-delta crops such as rice and sugarcane: **(i)** pricing incentives; (ii) regulatory measures; and (iii) reclamation cess etc;
(iv) appropriate policy responses to waterlogging and salinity problems caused by localized excessive water ailowances; and
(v) control of groundwater extractions.

Technical:

(i) management of saline and sodic soils and waters;
(ii) conjunctive use of different water resources;
(iii) Farmers' contributions for O & M of irrigation and drainage systems; and
(iv) a sustainable water allocation per unit area (amount which prevents hazards like waterlogging and salinity) within each provincial water quota.

Socio-economic and Political:

(i) spatial distribution of farmers' social and economic power and knowledge about the management of saline and sodic soils, as well as water;
(ii) participatory irrigation and drainage management; and
(iii) regional influences on the water allocation within each province.

IRRIGATION EFFICIENCY

Irrigation efficiency of a system indicates the portion of water delivered from its source which is made available for the use of crops within the area served. In this context, a recent report published by the World Bank (1994) suggests that the overall irrigation efficiency of the Indus Basin Irrigation System ranges from 35 to 40%. The low efficiency results mainly due to the following factors (Asrar-ul-Haq, 1995): (i) uneven fields; (ii) inappropriate design of bunded units with reference to soils, discharge and crops grown; and (iii) excessive operational losses at the watercourse command level.

In this given context, the issues have to be addressed by discussing implications and opportunities associated with factors which lower the irrigation efficiency of the system. However, the concepts of local versus global efficiency, as well as sinks and non-sinks within an irrigation system, are to be considered.

Points for Consideration

Policy, Planning and Legislation:

(i) water rates based on water allocation instead of fields irrigated and crops matured;
(ii) water management improvements for brackish and fresh water zones in accordance with local and global efficiency scenarios;
(iii) commercialization of services such as farm design, precision land leveling, watercourse improvements with technical support from relevant agencies and irrigation advisory and technical services; and
(iv) role of water markets in the adoption of efficient water use technologies.

Technical:

(i) efficient water use methods; and
(ii) Integration of pressurized water application with surface irrigation methods and conjunctive water applications.

Socio-economic and Political:

(i) initial cost and energy requirements for efficient water use methods; and
(ii) acceptability of new water application methods.

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