Water Institutional Arrangements Under Water Scarcity

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THE VALUE OF WATER

Water means life. If we take a historical view of use of water, we can see that water was always connected to the religion – it "came from God" and its use was free. Anybody had a right to water and could use as much of it as needed if it was available. Individuals in communities were taking turns and used river water as a run of the river for irrigation, sharing the high and low flows in rotation. This took place without any written rules or laws.

With technological and economic development towards the end of 20th century water started to change its value, often leading to competition between different sectors of the economy that used water as well as amongst water users in agriculture. As such, water had changed its value and became a commodity, with an economic value and a price attached to it. Societies started to develop rules and laws for different types of water use, assigning priorities for its allocation. During the nineties, and somewhat under pressure of the multilateral donors for privatization, water became a tradable, profitable economic good, to be marketed, exploited (and at times overexploited) by those who could afford to pay for it. The trend towards privatization in water and irrigation sector increased the price of water, therefore, making fresh drinking water less accessible to the world poor, causing the poverty levels dramatically increased. Globally, the projections show that by 2010 there will be 2.5 billion of people lacking access to safe drinking water. .

With the world population growing, industrialization increasing and areas of irrigated agriculture expanding, water sources in many countries have become polluted affecting millions of people's lives. Water resources have become scarce and quality of both groundwater and surface water seriously impacted. Competition for water between uses and users has led in some areas of the world to disputes and conflicts, making water definitely a matter of political choices and debates. This is markedly evident in basins concerning trans-boundary waters, where water needs for economic development of each country must be harmonized with the environmental needs of the region or basin.

WATER SCARCITY AND CONJUNCTIVE WATER MANAGEMENT

Water scarcity, either permanent or seasonal, exists when the country water resources base cannot satisfy the multiple needs of the population for domestic use, industry and agriculture as well as the environment. The scarcity can be caused not only by natural phenomena, such as an inadequate

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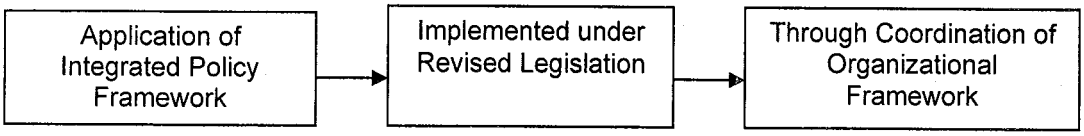
rainfall, low snowfall and snowmelt, but could also be induced by human activities and actions resulting from institutional problems and mismanagement. Therefore, from time to time, the link between water demands and the country water resources base spawns a need for changes and reforms in the water institutional arrangements even in the well-developed countries. Such changes embody the necessary institutional adjustments, so that an adequate amount of water is made available for agriculture to produce food for growing population and for sustaining of quality environment.

Problems with water quantity and quality have become the key global issues in water management during the last decade and they are expected to continue for decades to come. Countries are finding their own ways of how to cope with the scarcity of water resources, resorting to different strategies for changes in their water institutions[3], applying innovative technologies and techniques, adopting new laws and regulations, privatizing services and making organizational changes. There are no blue prints for perfect institutional arrangements, but there are guiding principles that are applicable to make the regulation and operation of the water sector most effective for each particular situation.

One of the best ways to address the needs of the ever-increasing population and associated demand for food is to utilize all available sources that are acceptable in water quality, and practice conjunctive[4] water management for irrigation (CWM). The CWM refers to the management of water resources and water sources, generally at the basin scale. The water sources may include all types of water sources - rivers, dams, canals, groundwater, surface runoff, agricultural drainage, municipal sewage, and industrial effluent. Naturally, such an approach places high demand on the legal and regulatory framework for water allocation, development of planning and operational policies and design of suitable organizational arrangements. In other words, the CWM or integrated water resource management (IWRM) should support a prudent use of all water sources and water resources to secure food and enhance environmental sustainability. The basic tenet germane to the IWRM or CWM can be described below as:



The principle of CWM lies in adopting institutional changes coupled with technical innovations, to minimize the negative impacts (e.g., salinity, water logging, pollution of aquifers) by utilizing research methods, new approaches and concepts for management. It can be said that the conjunctive water management is relatively simple in theory but difficult in practice.

REFORMS IN INSTITUTIONAL ARRANGEMENTS

The major institutional changes in water resource management envisaged would be leading towards IWRM or CWM and would constitute reforms in sectoral allocation of surface and groundwater,

[3]Under water institutions, in the broad sense, we understand not only organizations, agencies, and entities involved in some way in water resources management, but also formal arrangements and instruments such as laws, rules, regulations, written agreements, as well as informal mechanisms (traditions, religious or ethnic, or community customs), as they all comprehensively contribute to the way water is managed.

[4]The term 'conjunctive' water management can also be understood in a broader context as integrated or comprehensive water resources management and in this paper it will be used interchangeably.

which is generally embodied in the supporting legal and regulatory framework. The reforms would also include the setting up of an effective water rights system that is equitable and flexible and encompasses all water sources. Reforms are also needed when the infrastructure is deteriorated and gaps in the organizational aspects for water use planning, delivery, and distribution exist. The problems with infrastructure and water quality and quantity, as well as minimizing negative impacts of soil salinity and water logging present enormous challenges for the water users, managers and indirectly for all water stakeholders.

Besides the formal institutional arrangements concerning primarily the legal and regulatory framework and policies, there are the informal arrangements that help to accomplish various water management processes; these can be traditions, religious customs and cultural norms – being often a strong catalyst for program implementation. Similar to the outcome of informal arrangements, the concept of participation of key water stakeholders has been regarded as an effective means for making changes more sustainable. Such a participatory process may take on a variety of forms – meetings, workshops, informal gatherings, committees, and public media. For the best, it should be considered at all levels of the system – local, regional (basin), and national (federal).

The integrated framework of policies and legislative instruments need to reflect the growing demand for water, securing the water supply from variety of sources, meeting the operational demand and the costs of water delivery, distribution and maintenance, and assuring equity in water distribution.

PAKISTANI SYSTEM – RECHNA DOAB

Implementation process of the ongoing water reforms in Pakistan is confirming the complexity of the Pakistani irrigation system. From the total irrigated 16 Mln ha of land, Rechna Doab represents about 1/7 with its 2.3 Mln ha. The area is home to about 14 Mln people, of which about half is living in rural areas. The majority of farmers (about 85%) have relatively (for Pakistan) small land holdings, approximately 5 ha. The authority and responsibility for the irrigation water management is fragmented and it is distributed amongst different departments and agencies, which is a paradigm that is not easily dealt with. The water supply for irrigation at the federal level rests with the Indus River System Authority (IRSA) and its regulatory arm - Water and Power Authority (WAPDA), which has two wings - power and water. WAPDA is responsible for the construction of large infrastructure and operation of dams, head works, and large primary and link canals. In Rechna Doab area the WAPDA was also made responsible for tile drainage projects and planning and installation of tube wells, drilled under various salinity control and reclamation projects (SCARPS), starting during the sixties. The basic aim of these projects was to reduce waterlogging and salinity problems, by engaging vertical drainage and augmenting water supplies with good quality of groundwater through deep tube wells. Some of the SCARPs were successful, but some have caused damage to the groundwater.

Considering the need of irrigated agriculture within the Indus River Basin, an increase of productivity of land and water are the key issues to be addressed by combination of technological advances and institutional arrangements. The Rechna Doab area was marked as a suitable study area to identify combinations of technological and institutional strategies to manage conjunctively surface and groundwater at a regional scale and promote an environmental sustainability, while maximizing the yield per unit of water.

REFORMS TO STREAMLINE ORGANIZATION OF WATER MANAGEMENT

In Pakistan the land is abundant and water resources are scarce. The irrigated agriculture is the backbone of the country's economy. The government has embarked on various reforms in irrigated agriculture during the eighties, more followed in 1997 and during the last few years. First, reforms were proposed at the regional - provincial level to affect the system at top and bottom. At the higher level of the system the changes addressed primarily some legal and regulatory aspects towards streamlining of the irrigation and drainage system and changes in administrative aspects - replacement of the set up and procedures with more transparent arrangements. At the lower level the changes were of operational nature, to achieve more economical and effective operation and maintenance of the irrigation, drainage and flood control in the province. These changes also introduced participation of beneficiaries in the operation and management of the systems.

It has been recognized that within the Indus River Basin, apart from the surface irrigation system, a sizeable reservoir of groundwater is formed that can be used to supplement the canal water. Good groundwater water quality can be found in the upper reaches, and slightly more saline in the center and lower parts of the Doab. Shallow aquifer has generally good water quality because of being recharged by the canal water; water at depths, more than 30 m, is more saline. Many public and private tube wells have been dug under several Salinity Control and Reclamation Projects (SCARPs), which were started during 1960s. The numbers of private wells were estimated as over 193,000 in 1997 (Rehman et al). The annual pumping volume was estimated as 1.173 Mln ha-m from the private wells and 0.303 Mln ha-m from public wells, respectively. The use of private tube wells proved to have good results in lowering the water table and reclaiming the land, as well as increasing cropping intensity. Seven SCARP projects were initiated, some of them achieving good results in alleviating or reducing waterlogging and helping to replenish canal water supplies. Others became a failure and caused undesirable effect on groundwater quality and groundwater over-use, resulting in serious environmental problems.

In conditions of impaired quality of groundwater the tube wells can only worsen the environmental situation. When the groundwater quality is good, the tube wells can indeed help to reduce water logging and increase irrigation water supply. However, in maintaining good groundwater quality, monitoring and regulation play an important role. Due to the lack of control of drilling, licensing, and other aspects of groundwater management, the number of private tube wells has increased and the groundwater have been mined and over exploited, resulting in up-coning of saline water in many areas.

A number of legal instruments were adopted in all four provinces (Punjab, Sindh, Baluchistan, and Northwest Frontier Province), but the implementation has progressed most in Punjab, where also a number of land and water reclamation projects were organized. Initially, the legal reform consisted of passing of a bill for creating a Provincial Irrigation and Drainage Authority (PIDA), transformed from Provincial Irrigation Departments in each province; they became autonomous bodies responsible for policy formulation and supervision of the entire management of irrigation and drainage network. Therefore PIDAs became responsible for the operation and maintenance of the system from the head works via the main and distributaries canals to the outlets of watercourses. Under the reforms and hierarchy for operation and maintenance (O&M), some responsibilities

would be passed on to farmers that were to be organized into Water Users Associations (WUAs)[5] at the water course level and Farmers organizations (FOs) - to take over the operation and maintenance of the minor canals and distributaries at the level of minors and distributaries.

The Punjab On Farm Water Management (OFWM) Department became active in establishing informally WUAs in the late seventies, and later - providing subsidies and training in the on-farm water management. However, this development of WUAs has not taken root very well over the entire province, perhaps because the farms are small (less than 5 ha) and the area serviced by a watercourse is also small (average about 250 ha)[6]. The OFWM program is now focused more on creating FOs. The establishment of FOs has progressed relatively well so far, taking into account that it is a lengthy process requiring many meetings and consultations with farmers. The size covered by an FO can range from 5,000 to 20,000 ha.

Additionally, under the reform activities, specific arrangements were made to create Area Water Boards (AWB), receiving water from PIDA as an intermediate level entity. In Punjab, a pilot AWB has been established covering about 400 000 ha, and supplying about 100 distributaries where FOs are in the process of creation. The AWB should operate through management board, on which also farmers should participate. This process of developing AWBs, however, seems to be stagnating, and therefore can be rated only as being in its infancy, needing reinforcement and stronger government commitment and support.

During the late nineties the Punjab PIDA enacted different Acts to address rules and regulations concerning PIDA farmers' organizations - in terms of organization, elections, registration, financial regulation, conduct of business, management, and transfer of irrigation schemes. Apart from these legislative instruments, a few administrative instruments were prepared; these relate to notification of AWB and Agreements between PIDA and Revenue Department for Collection of the revenues as well as PIDA and Punjab Irrigation Department (PID) for O&M of the infrastructure. Additional administrative instruments include guidelines and standards for the FOs and procedure for collecting water charges. For the purpose of Irrigation Management Transfer (IMT), the FOs must sign an agreement with the PIDA.

The arrangements for water management and O&M in the provinces and therefore also in Rechna Doab, are still somewhat fragmented and do not respond to the needs required for utilization of surface and groundwater and other sources with more marginal water quality to fully institutionalize the CWM. Typically, the technical solutions call for evolution of the institutions and dictate the needs for the adjustments and changes in scope of the managing entities, as well as the devising of new legal and supporting regulatory framework.

The only law dealing with groundwater stems from 1952 and was intended merely for land reclamation purpose - improvement of waterlogged areas, controlling operation of state tube wells and monitor boring of private tube wells. The Punjab Soil Water Reclamation Board was formed, but dissolved twenty years later to merge with the Provincial Irrigation Department. Some functions, especially for controlling the groundwater have become convoluted when the board was absorbed

[5] WUA ordinance in Punjab was issued in 1981, however, providing only opportunity to farmers to join into a WUA, with no powers to the organization itself.

[6] The literature and experience tells us that only WUAs large enough, approximately 2000 ha and larger can be sustained financially as farmers' water managing organizations.

into the department and others became cumbersome to execute; some rules for water supply seemed redundant, complicated by the former, somewhat ambiguous power of the board.

TARGETING GROUNDWATER UNDER IRRIGATION SECTOR REFORMS

The basic and urgent need for improvement of the legal and regulatory framework in Punjab is groundwater management and view of the water use and management in a conjunctive manner. With the introduction of a participatory process into the reform process the chance for improving the land and productivity and preventing soil degradation is much increased. The participation of relevant stakeholders is a supporting element for the sustaining of the environment, resulting in better O&M and improvement of rural livelihoods and socio-economic situation. This can further be strengthened by establishing farmers support services, such as agricultural and water management extension.

In general, water institutional reforms in agriculture are connected to changes in governance of rural development. The broader framework of integrated policies for planning and management of water resources aims to assure that environmental features do not deteriorate and integrated surface and groundwater use and management is adopted. This relates to permitting of groundwater withdrawals, licensing of wells and well drillers, and enforcing the rules. Further, monitoring and data base development, research development and research management would be an integral part of the local and/or basin governance.

Within the context of groundwater development policies the protection of certain aquifers or prohibition of abstraction, associated with organizational powers and legal framework, should be addressed. Water rights and regulations for groundwater development and its use must be clear and equitable. Moreover, implementing entities and organizational linkages must be assigned so that decentralization of administration and decision-making processes can offer substitutes for centralized structures. An impact of this kind has been felt in Sindh and in Hakra 4 in Punjab at the lower level of the system, but referring mainly to surface water management.

SHORT TERM PROSPECTS FOR BETTER CONTROL OF GROUNDWATER

In regard to better control of groundwater use a five-year project called Punjab Private Sector Groundwater Development Project (PPSGDP) was initiated in 1997. The project, covering both fresh and saline groundwater areas, intended to redefine the Government's role in groundwater development, and provide assistance to facilitate changes, as well as develop regulatory framework to ensure sustainable use of groundwater resources.

Additional progress in groundwater management can be expected from the Framework for Action according to the vision of 2025, derived by the Pakistan Water Partnership. In the least, the action for groundwater calls for the enforcement of legislation at the provincial level, defining rights to groundwater and limiting its extraction, as well as introducing administrative arrangements for effective enforcement of groundwater laws - in three years from 2002.

The Framework for Action includes another significant aspect of water management - criteria for allocation of the available water resources for different uses. It can be envisaged that under the relevant studies for the most productive use more studies would be undertaken to evaluate a problem with disposal of drainage and use of the marginal water quality, making it pertinent for adjusting

and devising the appropriate infrastructure as well as institutional arrangements. Such step would further aid in the efforts to adopt Conjunctive Water Management.

IMPROVEMENT OF GOVERNANCE FOR WATER MANAGEMENT IN AGRICULTURE

To achieve effective O&M of irrigation and drainage systems in all provinces and step up the water management towards more integrated and conjunctive water resources management, the objectives of an institutional development program have to be clearly defined and country's commitment shall be secured.

Particularly important in the context of improving governance of water and institutions is the time dimension. It involves the staff at all levels of the implementing body as well as staff of the other relevant agencies and entities. Therefore, full commitment to the institutional development is necessary, behind which, of course is a host of political and social factors, as well as complex interplay of different political and social elements, that are endemic to each situation.

In countries with successful management of water resources the guiding element is a National Water Resources Policy, that addresses management of fresh and brackish water, applies to surface and groundwater and takes a comprehensive approach of CWM, recognizing the needs of different water uses as well as different sectors' needs.

The following principles can guide successfully water resource management: (i) ownership (covering surface and groundwater; (ii) sustainable management (covering economic, social, financial, and environmental considerations; (iii) openness and participation; (iv) assurance and flexibility of water allocation (water rights); (v) equitable cost sharing; (vi) sectoral emphasis; (vii) management of information and sharing amongst agencies; and (viii) gender (low income, female headed households).

PROCESS OF CHANGE

The change of water institutional arrangements is a process that needs to be advocated, championed and managed, as well as planned, designed, and implemented. Therefore, leadership and roles of individuals and organizations in such a process need to be assigned and the process monitored. Given that the government is supportive and committed to make the changes happen, an advocate and champion of the reform have to come from a higher government level. Then the agents of the reform process execute activities and implement different tasks at the lower level of the system. Managing and monitoring of the process is essential. Also, collaborating of all organizations (including scientific and research institutes) having a special interest in water resources management is imperative for any reform to succeed, because it will create and reinforce broad-based partnerships in rural institutional development.