INSTITUTIONAL REFORMS IN THE WATER SECTOR OF PAKISTAN

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ABSTRACT

Water is becoming increasingly scarce all over the world. Indicators of water availability show that per capita supplies will continue to decline in the years ahead. The situation for Pakistan is even more critical as irrigated agriculture plays a very vital role in Pakistan's economy; the sector accounts for 24.5% of country's Gross Domestic Product (GDP), employs 55% of the labor force and accounts for 80% of the total export earnings of the country. Unlike population, water availability per capita is persistently decreasing in Pakistan, which would presumably affect food sufficiency for the projected population of 250 million in year 2025. Scarcity of irrigation water is a main concern for policy makers and planners in Pakistan. Prospects for increasing water supplies through construction of new storage reservoirs are not encouraging, as development of water resources has approached its limit. Construction of new reservoirs may not be economically, nor environmentally realistic for Pakistan. Therefore, Pakistan needs to explore alternative solutions to meet the increasing demand for water.

This paper is based on the proposition that water scarcity results from ineffective and inefficient water resources management in Pakistan, which is partially due to the inadequacies of regulatory and planning structure, and slow implementation response to the proposed changes in institutional structure. Water institutions and water management are undergoing enormous changes world wide. It is assumed that the government of Pakistan will not be able to manage water resources efficiently without removing impediments to planning and management as part of this reform process. This paper describes the reform process, and the ensuing institutional change sought by the reforms in the irrigation sector of Pakistan.

INTRODUCTION

Water is essential for sustaining the quality of life on Earth. This finite commodity has a direct bearing on almost all sectors of the economy. In Pakistan its importance is more than ordinary due to the significance of the agrarian nature of the economy. The share of the agricultural sector in the GDP of Pakistan is 24.5 % (Pakistan Agricultural Statistics, 2003). Agriculture is the major water user, consuming about 82% for irrigation (Pakistan Agricultural Statistics, 2003);

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therefore sustainability of agriculture depends on the timely and adequate availability of water. The increasing pressure of population and industrialization has already placed greater demands on water, with an ever-increasing number and intensity of local and regional conflicts over its availability and use.

Historically, the high aridity index of the country has also added further to the significance of water in developmental activities in Pakistan. Though, once a water-surplus country with huge water-resources of the Indus River System, Pakistan is now a water-deficit country. At present, the annual per capita water-availability in Pakistan is about 1100 cubic meter (m^3); below 1,000 m^3 countries begin experiencing chronic water stress (Population Action International, 1993). The situation in Pakistan indicates that the country is nearing conditions of absolute water scarcity (World Bank, 2005). Meanwhile, the gap between demand and supply is increasing, requiring the government of Pakistan to explore alternative water resources. One alternative to meet this demand is through more efficient delivery, which might result from timely institutional reforms in the water planning and management sector.

Water institutions and water management are undergoing remarkable changes world wide. The era of water abundance is long over, but unfortunately policy makers are still stuck with the supply oriented approach of 1940s to 80s, when engineering solutions were considered the only panacea to solving global problems of water scarcity. Perception of those revolved around expanding supply through enlarging physical and technical infrastructure mainly financed from public sources. The Dublin Principles (1992) and subsequent international events paved the way for water sector reforms and pointed out institutional weaknesses that were causing institutional inefficiencies in the water management (Neubert, et. al., 2002).

This paper is based on the proposition that water scarcity results from ineffective water resources planning and management in Pakistan, which is partially due to the inadequacies of regulatory and planning structure, and slow implementation response to the proposed changes in the institutional structure. The government of Pakistan will not be able to effectively manage water resources without removing the impediments to planning and management as part of an overall reform process. This is needed to be able to feed its projected population of 250 million in year 2025. The paper aims to explore the causes of institutional deterioration in water sector of Pakistan and seeks to answer the question; why there has been slow implementation response to the proposed changes in the institutional structure?

WATER RESOURCES AND THE ISSUE OF WATER SCARCITY

Pakistan contained six rivers within its geographic boundaries in 1947. Under the World Bank brokered Indus Basin Treaty between India and Pakistan in 1960 Pakistan gave up three eastern rivers; Ravi, Beas and Sutlej. Pakistan's availability of water was then limited to three western rivers, namely Indus,

Jhelum and Chenab. The World Bank provided funds for the construction of a number of link canals, barrages and dams on the Indus and its two tributaries, Jhelum and Chenab, transferring at least 20 MAF of water for the irrigation of areas that were cut off from irrigation-systems of eastern rivers (Kahlown and Mujeed, 2001).

The Indus River alone provides 65% of total river flows to Pakistan, while the share of Jhelum and Chenab is 17 and 19 %, respectively. Table 1 shows the maximum and minimum inflow of western rivers for summer and winter seasons, that is highly erratic. Besides, those three major rivers Pakistan has numerous small rivers and streams, which are only seasonal, with flow depending largely on timing and distribution of rainfall. These smaller streams practically run dry during the winter months. Table 2 presents the water requirement and availability situation for year 2000 and projected figures for year 2025. The important thing to notice here is that water availability will remain the same (if no new water resources were developed), however the shortfall will increase from 12.61 MAF in year 2000 to 30.26 MAF in year 2025.

Table 1. Inflows in Western Rivers (in MAF)

	Kharif (summer)	**Rabi (winter)**	**Total**
Maximum (Year)	154.7 (1959-60)	35.1 (1990-91)	186.8 (1959-60)
Minimum (Year)	71.5 (1999-2000)	15.7 (1971-72)	97.7 (1971-72)
Mean (77 Years)	115.9	22.8	138.7

Source: Water and Power Development Authority (WAPDA), and Indus River System Authority (IRSA) Reports, and Kahlown and Mujeed, 2001.

Table. 2: Water Requirements and Availability

Requirement / Availability	**Year**	
	2000 (MAF)	2025 (MAF)
Surface Water requirements	116.42	134.07
Average water availability without additional storages	103.81	103.81
Shortfall	12.61	30.26
Percentages (%)	10.83%	22.56%

Source: WAPDA, 2003 'Pakistan's Vision of Water Resources Management.'

Rainfall

June to September are the peak precipitation months when about 70 percent of the annual rainfall occurs. The mean annual rainfall distribution in Pakistan has a broad regional variation. It ranges between 125 mm in Balochistan to 750 mm in

the Northwest (Kahlown and Mujeed, 2001). Rainfall is neither sufficient nor regular. In the Sindh Plains, high-intensity rainfall occurs during July and August, and its intensity continues to decrease from coastal areas towards central parts of Sindh.

Southern Punjab and northern Sindh are the areas of very low annual rainfall-less than 152 mm, and the winter rains are generally widespread. Northern and northwestern area of North West Frontier Province (NWFP) and the northern areas of Balochistan receive comparatively higher rainfall during winter. The magnitude of the annual rainfall over nearly 21 million hectares (Mha) of the Indus Plains averages about 26 MAF. The present contribution of rain to crops in the irrigated areas is estimated at about 6 MAF.

Groundwater Resources

Alluvial deposits of the Indus Plain that store most of the groundwater resources of Pakistan stretching from the Himalayas to the Arabian Sea (Kahlown and Mujeed, 2001). The Plain which is about 1,600 km long, and covers an area of 21 Mha is fast becoming a supplemental source of water for irrigation in Pakistan. The aquifer has the potential for about 50 MAF. According to some conservative estimates, about 562,000 private tube-wells and 10,000 public tube-wells in the region are currently exploiting the aquifer to an extent of about 38 MAF (Kahlown and Mujeed, 2001).

There are about 837,000 ha in production in Balochistan province of Pakistan. About 96% of these 837,000 ha are irrigated, while the remainder is dryland agriculture. The province is badly short of irrigation water, only 0.8 M.Ha of irrigation supply is deverted in the entire province (ICID, 2005). The main sources of irrigation are government and private canals, wells and tubewells, karezes and springs that irrigate orchards and other cash crops. Rivers and natural streams run temporarily and remain dry for most part of the year. Consequently groundwater is being overexploited beyond its recharge potential especially in Pishin-Lora and Nari basins (ICID, 2005).

INSTITUTIONAL SETTING

According to North (1990) institutions are the rules of the game in a society or, more formally, are humanly devised constraints that shape human interaction. As a result of this they structure incentives in human exchange, whether political, social, or economical. Saleth and Dinar (1995) note “water institutions entail rules that describe action situations, delineate action sets, provide incentives and determine outcomes both in individual and collective decisions related to water development, allocation, use and management.”

Pakistan is a federal system country and water is mainly the federal government’s business. Provinces are mainly the managers of the water sector, with constitutional power to modify irrigation management. There are several laws and

regulations[3] for water management and administration that are administered by the federal and the provincial institutions involved in water management.

In 1958 the Water and Power Development Authority was established at the Federal level through the WAPDA[4] Act (PWSS, 2002). Since then its mandate has been to undertake construction of large irrigation, drainage and hydropower projects. WAPDA is also responsible for generation, transmission and distribution of power in the country, except Karachi[5].

In 1982 Water User Ordinances were promulgated to form the Water User Associations (WUAs) to encourage farmer participation in water management at the watershed level. The underlying objective behind creation of WUAs was to collect contributions to civil works from water users. According to some government estimates WUAs in some areas contributed up to 55% of the cost of civil works for improvement of watercourses both in cash and in-kind services, and in the form of labor (PWSS, 2002). Since there was no vision to further involve WUAs in works greater than just contributions, almost all WUAs became dormant soon after the works were completed**.**

In order to introduce institutional reforms in the irrigation and drainage sector, the provinces enacted new Acts in 1997 (PWSS, 2002). These Acts provide the legal framework for establishment of Provincial Irrigation and Drainage Authorities (PIDAs), Area Water Boards and Farmer Organizations. The Pakistan Environmental Protection Ordinance was issued in 1983. It has been replaced with the Pakistan Environmental Protection Act, 1997. The Act is directed to provide a basic environmental policy and set up a management structure for pollution control.

The National Environmental Quality Standards (NEQS), enacted in 1993, delineates allowable limits for 32 pollutants in effluents and industrial discharges

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[3] The Canal and Drainage Act of 1873 is the main legislation that regulates the irrigation and drainage systems and has been adapted by various provinces. Other important piece of legislation is the Punjab Soil Reclamation (PSR) Act of 1952, which was later extended to cover the entire country. The PSR Act of 1952 governs the preparation of drainage and other related schemes.

[4] Water and Power Development Authority (WAPDA) is a federal institution under the ministry of water and power. Through recent decentralization reforms introduced by President Pervez Mushraf WAPDA has decentralized power distribution through creation of subsidiary companies, which undertake power distribution and collect the revenues.

[5] Karachi Electric Supply Company (KESC) is also a federal entity under the ministry of Water and Power that is responsible for operation and supply of electricity to Karachi.

along with other limits related to industrial and vehicular air emissions. Provincial EPAs / EPD are responsible for monitoring and implementing the NEQS (PWSS, 2002). Proper implementation and enforcement of the NEQS is poor due to lack of resources, equipment, and skilled staff, as well as insufficient training and monitoring programs. In 2000, the Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) Regulations[6] were enacted which elaborate the modalities and implementation mechanism of EIAs and IEEs.

WATER MANAGEMENT STRATEGY IN TIMES OF SCARCITY

The need to use scarce water equitably not only among various societal sectors, but also among farmers has been a main concern since the early days of irrigation development in Pakistan. It is assumed the water situation will further worsen as Pakistan adds 4 million people a year. It is likely that one out of three people in Pakistan will face critical water shortages, "threatening their very survival".

In order to cope with water scarcity the government of Pakistan is considering several strategies. First and foremost the strategy has been to develop new water resources. The present government, is forcefully pursuing the building of reservoirs and dams without regard for provincial consent. Despite protest of smaller provinces, President Mushraf's recently inaugurated the Bhasha dam project[7]. If the project moves ahead successfully, it is expected to be completed in 2016. The second strategy, to use water more efficiently without adequate awareness and training has also been a failure. The third available water management strategy, to make better use of available water, is pursued to the extent that more water-efficient crops are considered. The major cause of failure for two latter strategies, however, has been absence of economic incentives or disincentives to promote more efficient water use and a different use of water.

At the tertiary (watercourse) level government encourages warabandi[8] system to manage the scarce water. Warabandi is an "integrated water management system"

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[6] EPA provides the policy and procedures for the filing, review and approval of environmental assessments. It defines the jurisdiction of federal and provincial EPAs and P&Ds, and also provides schedules for proposals the require IEE or EIA.

[7] India has conveyed an official protest to Pakistan against the construction of Basha Dam on the Indus River in Pakistan's Northern Areas. Protest has been made on the grounds that 'the dam is being constructed in territory that is part of the State of Jammu and Kashmir, which is an integral part of India by virtue of its accession to it in 1947'. According to media reports the reservoir of the dam, will inundate large parts of land in the "northern part of the State of Jammu and Kashmir".

[8] Bandaragoda and Rehman (1995) define "Warabandi as a time-based rotational method, which is designed to achieve equitable distribution of water available for

that aims to achieve efficiency, and equity in water use (Malhotra, 1982). Water use efficiency is to be achieved through the imposition of water scarcity on each and every user, and equity in distribution through enforced equal share of scarce water per unit area among all users by self monitoring rotation system.

In the beginning the rigidity of the fixed schedule was designed to prevent the exploitation of water rights. However, since then much has changed i.e. cropping intensities, and cropping pattern. Consequently, the water allocation per unit of land has become inadequate. Generally, the warabandi schedules have not been able to provide sufficient irrigation per unit area for the average cropping intensity (Bhatti and Kijne 1990, Bandragoda, 1996). Bandragoda (1996) notes "due to the increasing demand for water, some users have started to develop following strategies to overcome supply inadequacy through flexibility in water turns":

- Rotations of turns - two or more farmers, rotate their water turns to improve equity, and concurrently the flexibility of using the sanctioned supplies. This way, each week, a farmer will share the effects of lapses of water that may apply to a number of individual water turns.
- Merger of turns - in this arrangement two or more farmers use water during a single water turn. However, this often happens only when farmers belong to the same family.
- Substitution of turns. This type of operation is prevalent in instances where a farmer has a small landholding with a short-duration water turn. This farmer gives up his turn in favor of nearby large landowner. After two or three turns, the large landowner gives sufficient water to irrigate the entire plot of the small landowner.
- Exchange of turns. Farmers have the practice of increasing the flexibility of water supply by lending and borrowing canal turns.
- Trading of turns. When farmers cannot meet their water requirements for any reason, they buy canal water turns.

DRIVING FORCES BEHIND IRRIGATION REFORMS

There are several endogenous and exogenous factors that can cause institutional change (Saleth and Dinar, 1995). High subsidies and thus the burden on national and provincial treasuries, poor performance of irrigated agriculture, and economic

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a watercourse. The rotation is by water turns fixed according to a predetermined schedule specifying the day, time, and duration of supply to each irrigator in proportion to the size of the irrigator's landholding. For each watercourse, there is a Warabandi list giving the names of actual water users taking water from the sanctioned farm outlets along the watercourse, and the corresponding time turns allocated to each water user."

losses due to resource depletion were some of the driving forces behind institutional change in the irrigation sector of Pakistan. Since inception, the development of water resources in Pakistan has been dominated by the state and Federal government, which often used infrastructure financing to stimulate economic development. It was a common perception that the state bureaucracies would best be able to administer water allocation, maintain the infrastructure and limit free-riding behavior (Neubert, et. al., 2002).

State control of this type is not very typical in Pakistan. However, the situation is more or less the same in many other developing countries[9] (Neubert, et. al., 2002). State controlled irrigation systems in Pakistan failed to validate the assumptions that the government can better manage the water resources. Gross misallocation of resources, poor performance in supplying water in terms of time and place, and abysmal condition of infrastructure has seriously challenged the government role in the irrigation sector.

The World Bank and ADB, as in many other countries, have played an important role in initiating institutional change in Pakistan. The World Bank document; Pakistan: Irrigation and Drainage: Issues and Options (1993) pointed to poor irrigation performance that together with the lack of an efficient drainage system would have caused widespread water logging and salinity on irrigated land, inefficient water delivery and use, inequitable water distribution, and overexploitation of good-quality groundwater. The World Bank called on the government of Pakistan to reduce its public expenditure in the irrigated agriculture sector, to reorient the functions and organizations of state agencies, and to enhance farmers' participation and strengthen the role of the private sector. It also advocated strengthening of federal water agencies and provincial water authorities.

The World Bank emphasized the implementation of pilot projects at the tertiary level that include lining of watercourses and remodeling of outlets. However, whether the World Bank induced initiative for public sector reforms will achieve the intended objectives largely depends on the agenda of state bureaucracies (Neubert et. al. 2002). Bureaucracy in the case of Pakistan has been very critical, and has affected the design and implementation of reforms as observed in many other social sector programs; i.e. Ayub khan's Basic Democracy program, Mohammad Khan Junijo's Nai Roshni Schools and Benazir Bhutto's Peoples Program.

[9] The large-scale irrigation system in Turkey for example is operated and maintained (O&M) by financially dependent state agencies that receive O&M budgets from national and provincial treasuries (Neubert, et. al., 2002).

PAKISTAN'S EXPERIMENT WITH WATER SECTOR REFORMS

The disappointing results of the International Water and Sanitation Decade (1981-1990) (Neubert et. al. 2002) compelled water experts to devise management plans that included institutional and socio-economic aspects of water management. Even more so, the Dublin Principles (1992) and subsequent international events pointed to institutional weaknesses as major causes of ineffective, inefficient, and unsustainable water services, and called for urgent attention to be paid to institutional reforms and capacity-building (Neubert et. al., 2002). Water institutions in order to be more effective need to evolve and change their focus, and methods of addressing challenges.

Policy-makers recognized the need for 'soft' solutions such as improved institutions, better management, and use of incentives to avert the water crisis. While the relationship between state agency and farmers was still asymmetrical, with the state controlling the technical expertise and subsidizing maintenance, a second approach was developed in Mexico at the beginning of the 1990s. Since then, governments in many developing countries have transferred the management of irrigation systems to user organizations, largely driven by their inability to raise sufficient revenues.

Contemplation and discourse on water sector reforms became serious and intense during the early 1990s. However, it is worth mentioning that the poor performance of SCARP[10] tube wells had already triggered the reforms in the water sector long before 1990. SCARP tube wells had been highly successful at lowering the water table and reducing soil salinity. However, operation and maintenance costs of the wells were enormous. The government did not recover these expenditures from the farmers. With the passage of time, tube wells began to deteriorate and service grew less reliable (World Bank, 2001). The transition pilot project was designed to resolve these problems by eliminating public tube wells in areas with plentiful fresh groundwater and enabling farmers to construct their own tube wells.

SCARP transition projects (1987) encouraged farmer participation in good-quality groundwater areas by transferring them to tube well owners (Vander and Edward, 1998). A second institutional shift came with the On-Farm Water Management Projects that addressed the significant water losses, up to 40 %, at the watercourse level. These projects were implemented by the newly established On-Farm Water Management Directorates of the Provincial Agriculture Departments. Farmers were to participate in project implementation through Water Users Associations

[10] Salinity Control and Reclamation Project (SCARP) of Pakistan, was financed with local resources and a variety of external financing, including IDA funds. The IDA has made 27 irrigation loans or credits to Pakistan for a total of US$1,305 million. Nine of these, or US$457 million, were principally for drainage to control Stalinization and water logging (World Bank, 2001).

that would replace informal farmer activities in the project areas. However, the radical change in institutional reform process came about on the initiative of the World Bank as discussed in the earlier section.

In 1995, the Government of Pakistan agreed to the World Bank proposal and envisaged a strategy under which Provincial Irrigation Departments (PIDs) would be transformed into autonomous Provincial Irrigation and Drainage Authorities (PIDAs) with regulatory functions, with canal commands managed by Area Water Boards and Farmers Organizations operating and maintaining irrigation and drainage systems at the distributary's level as well as at the minor and watercourse levels (Vander and Edward, 1998). Due to the great number of farmers involved, Farmers Organizations were to be tested in pilot areas. According to Rinaudo and Tahir, "the Government of Pakistan did not explicitly rule out the possibility of privatization, neither did it exclude the possibility to create tradable water rights that would be de-linked with the land."

In negotiations between the donors and the Government of Pakistan over a draft of the new legislation, the Provincial Irrigation Departments flatly rejected the privatization of the canal system and the separation of water from the land so that the former could be sold or traded as a commodity. Even after the then President of Pakistan declared that there would be no such privatization, the criticism continued because "It was evident by this time that opposition to the reforms was now wide-spread and deeply rooted among the national farmers' organizations dominated by large and influential landowners, provincial and national politicians, the officials of the provincial irrigation departments, and professional societies".

A coalition against privatization emerged between large influential farmers and many small subsistence farmers; the latter joined the protest in the absence of any organized effort to inform them about the content and objectives of the proposed reform. The Government of Pakistan in response to the protests modified the PIDA draft legislation that gave rise to disagreements between the donors and the Federal Government. While the latter perceived the draft legislation, was the best under such circumstances, the multilateral lenders criticized it as too narrow because it focused only on the transformation of PIDs into PIDAs, not on the irrigation sector as a whole.

Ultimately, the Government of Pakistan was confronted with the conditionality set by the World Bank and the Asian Development Bank that far-reaching legislation had to be adopted before the loans were finalized. In the end, an agreement was endorsed by the Government of Pakistan, including the President, the Prime Minister, the four Provincial Chief Ministers, Cabinet officials and the lenders, at the highest political level. However, the commitment of the Provinces was crucial because according to the constitution, only the Provincial Governments and Assemblies are entitled to modify irrigation management, not the Federal Government. In June 1997, the Punjab Irrigation and Drainage

Authority Act was enacted by the Provincial Government of Punjab; other provinces followed. While the Punjab ordinance specifies the powers and duties of PIDA, it requires the Government of Punjab to establish Area Water Boards and Farmers Organizations, and to assign such power and functions to them as it may deem fit. The selection of pilot areas for initial reform implementation and the powers assigned to Farmers Organizations were a matter of continuous contention, as was the cooperation between PID's staff and Farmers Organizations in the pilot areas.

Although there has been strong commitment to the reform at the highest political levels, including the first appointed Managing Directors of PIDA, implementation of the reform has progressed only slowly. There are several reasons that can be attributed to delayed implementation including; supply-oriented mentality of policy makers, fragmented administrative structures and lack of coordination among the administrative entities. Potential corruption among the irrigation officials is also possible as there is no transparency or accountability in the system. Moreover, institutional reforms pose a threat to the status quo of elites, making significant reforms even more difficult. This is why the means for enhancing water use efficiency and sustainable water development and management still await implementation.

CONCLUDING REMARKS

In Pakistan, institutional reform has affected several participants, who perceived the World Bank-proposed reform package as a threat to their established interests. The most pronounced opposition to the modified reform package came from large and powerful landlords, as well as from irrigation department officials. While the former were reluctant to share water and saw the perceived reform as a threat to their economic and political power, irrigation bureaucrats with financial ties to these interests had benefited from the anti-reform status. The PIDs as a whole has to change: staff from Irrigation Departments are faced with financial constraints, transparency and accountability, thus losing power, authority and rent-seeking opportunities.

Although there has been strong commitment to the reform at the highest political levels, nevertheless, implementation has been slow. Supply-oriented mentality of policy makers, fragmented administrative structures, lack of coordination among the administrative entities and potential corruption in the water sector are the main reasons for the delay in implementation.

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