Pakistan’s Water Economy: Running Dry

With an average rainfall of under 240 millimeters a year, Pakistan is one of the world’s most arid countries. The population and the economy are heavily dependent on an annual influx of water into the Indus River system that emanates from the neighboring countries and is mostly derived from rainfall and snow-melt in the Himalayas. Throughout history, people have adapted to the low and poorly distributed rainfall by either living along river banks or carefully husbanding and managing local water resources. In the nineteenth century, the advent of large-scale irrigation technology decisively shifted the balance between man and water. In the twentieth century, Pakistan faced several political and natural challenges to its water economy. These were successfully managed through the Indus Water Treaty with India and the shrewd application of science, technology and economics, but Pakistan is once again facing a number of very serious water-related threats to its survival.

Sobering Facts

The facts are stark. Pakistan is one of the most water-stressed countries in the world, and the per capita availability of water (about 1600 cubic meters in 2003) is declining. There are no additional water resources to be exploited and agricultural water use must decline to enable adequate flows into the degrading Indus River Delta. Pakistan’s dependence on a single river system makes its water economy highly risky.

The natural resource base is being degraded on a large scale by salinity, uncontrolled pollution and inadequate levels of water and silt to sustain the delta. Groundwater is now being overexploited in many areas, and its quality is deteriorating; yet tens of thousands of additional wells are being put into service every year. Flooding and drainage problems will get worse, especially in the lower Indus Basin, as silt builds up and narrow embankments force the rivers to flow within relatively narrow beds above the level of the land. Climate change is causing the glaciers of the Western Himalayas to melt and retreat. This is likely to exacerbate the already serious problems of flooding and draining during the next decades. When the glacial reservoirs are empty, there are likely to be dramatic decreases in river flows.

Pakistan has done little in recent years to build and maintain the knowledge base and the accompanying institutional and human systems required to manage the massive and highly complex Indus Basin. Much of the water infrastructure is in poor repair, and there are no modern Asset Management Plans for any of the major infrastructure. The implementation of capital investment projects is characterized by inefficiencies, completion delays, and time and cost overruns.

The system is not financially sustainable. As a result of low user charges and inefficient bureaucracies, insufficient funds are available for maintenance and operation of services. As a result, service quality declines and users are even less willing to pay, and so on. The task of moving water to users...
is poorly managed, and corruption is common. The result is an inequitable distribution of water and a pervasive environment of mistrust and conflict. The water bureaucracy has yet to make the vital mental transition from builder to manager. Water productivity is low. Crop yields, both per hectare and per cubic meter of water, are much lower than international benchmarks, and even much lower than in neighboring areas of India.

When river flow is variable, storage is required to match supply with demand: Pakistan has very little water storage capacity, and its two large reservoirs are silting relatively rapidly. Pakistan must invest very soon in costly and contentious new large dams.

**Four Major Challenges**

**Building a Knowledge-Based Capacity:** The sustainable management of a huge, inter-linked and very complex natural resource base is probably the single most challenging long-term task for Pakistan and requires the development of world-class capacity in three related areas: the natural sciences, the engineering sciences, and the social sciences. Pakistan needs to build a strong cadre capable of working with all users in defining problems, developing solutions, monitoring progress, assessing results, and adjusting as needed. This is a capacity which requires a wide range of disciplines—those necessary for understanding climate, river geomorphology, hydraulic structures, surface water and groundwater hydrology, limnology, water chemistry, sediment management, hydrodynamics, soil sciences, terrestrial and coastal ecosystems, agronomy, plant physiology, industrial organization, conflict management, politics, economics, and financing. In the past Pakistan has relied heavily on outside knowledge, especially in the sciences. Now Pakistan needs to develop its indigenous capacity and make a major push to establish and nurture a new set of institutions that will provide scientific, technical, and policy support for the management of increasingly scarce water.

**Maintaining, Rehabilitating and Expanding Infrastructure:** Many elements of the vast hydraulic system are now reaching the end of their design lives, and must be rebuilt. There is an enormous backlog of deferred maintenance. Asset Management Plans must be developed at both the federal and provincial levels. Such plans need to describe the condition of the assets; the requirements for replacement, rehabilitation (or retirement), operations and maintenance; the associated costs; and proposals for financing these costs. On the investment side, there is an urgent need for construction of major new storage on the Indus—a highly contentious issue in Pakistan today. To make progress, the government will have to implement the 1991 Water Accord in a transparent and verifiable manner, so that all provinces get their entitlements, and guarantee and deliver reasonable quantities of water to the delta. Large investments are also required to extend water and sanitation services to the unserved population in cities, towns and villages and for previously neglected municipal and industrial wastewater treatment and disposal.

**Hopeful Facts**

On the positive side, Pakistan can call on considerable strengths. Pakistan has overcome major water challenges in the past and has enormous potential human capacity to confront the next round of challenges. Over the last 50 years, major progress has been made in managing the seemingly-intractable problem of waterlogging and salinity.

There is a well-established tradition of water entitlements and rules for distribution in large areas of the system. These provide a basis for establishing entitlements for the remaining surface systems, formalizing entitlements for environmental flows, moving towards a similar definition of entitlements for groundwater—and managing the system in a more transparent, participatory manner.

The federal and provincial governments have thus far avoided the trap of subsidizing electricity for groundwater pumping and they should continue to strongly resist pressures to move towards free power for irrigation in the future.

Given the current low productivity, it is quite possible to substantially increase production with existing supplies of water. A new class of progressive farmers is shifting to high-value crops and putting unprecedented pressures on the irrigation departments to become more accountable and efficient.

Finally, in the past Pakistan has enjoyed higher than expected returns from the major Indus Basin water projects and the poor have probably been the greatest beneficiaries of these investments.
The resource requirements for all of these critical investments are very large. Government will have to set priorities, adopt a viable plan for paying for these investments, including cost-recovery policies, and ensure that limited financial resources are used efficiently.

Creation of a Modern Institutional Framework, and Mechanisms to Motivate Sustainability, Flexibility and Productivity: To improve and modernize water management, a very different type of state machinery will be required at both the federal and provincial levels—the focus of which will be on instruments to govern the relationships of users with water and with each other. It must introduce accountability, efficiency, transparency and competition into the surface water supply business by unbundling bulk transmission and distribution enterprises and introducing contracts between the various parties. This will mean moving away from a monolithic service model below the distributaries to one in which a variety of forms of public-private partnerships can provide an alternative to the irrigation department. While bulk business will probably remain in state hands, many major functions could be concessioned out to private operators. Under such scenarios, the government would begin to play a very different role, emphasizing regulatory functions. It would also be far more active in groundwater management and the development of a sophisticated natural resource management capacity for water and land systems. The improved administration of water entitlements for both surface water and groundwater would be a centerpiece of these systems. Over the past two years the Government of Punjab has made major progress in this direction—providing precedents to build on.

Adoption of a Principled and Pragmatic Path: The experience of other countries provides a set of proven “rules for reform” that should be applied in this effort. A few relevant examples are: initiate reform where there is a powerful need and demonstrated demand for change; involve those affected and address their concerns; develop a prioritized sequenced list of reforms; and understand that all water is local and each place is different—one size will not fit all.

How the World Bank Can be a More Effective Partner

The federal and provincial governments and the World Bank all agree that water management is one of the central development challenges facing Pakistan, and that it is an area where the Bank has a long history and a strong comparative advantage. The World Bank’s water-related lending for Pakistan is expected to increase dramatically and account for about US$1 billion over 2006–2010. These resources would support four key objectives or “pillars”.

Asset Development and Management: Bank-funded projects will finance major investments in rehabilitation, the formulation of Asset Manage-
ment Plans, and creation of efficient institutional arrangements for asset management. The Bank will continue to support the development and implementation of a strategy for drainage and salt management and other investments such as small dams, minor irrigation schemes and groundwater management. The Bank could also be involved in the development of a new dam on the Indus River and the implementation of appropriate institutional reforms and investments that would ensure better use of water.

Water Resources Management: The Bank expects to support development of water resources management capacity at the provincial and federal levels—with an emphasis on incorporating environmental considerations. The training of a new generation of multidisciplinary water resources specialists and the establishment of multidisciplinary centers of excellence will be important objectives.

Service Delivery: The Bank plans to provide significant support for provincial- and city-level efforts to improve the quality, efficiency, and accountability of water supply, sanitation and irrigation services through innovative service delivery models and the modernization of infrastructure.

On-farm Productivity: The Bank will continue to invest in on-farm services (land leveling, watercourse lining and new technologies) which are essential for agricultural diversification and improvements in productivity.