A PLAN FOR ALL SEASONS

by Khalid Mohtadullah

Pakistan's recently published Water Sector Investment Planning Study (WSIPS), steered by the World Bank and backed by UNDP, has proposed specific ways and means to upgrade the nation's water sector planning capacity. Improved criteria and procedures for screening water sector projects have also been proposed and both elements supply the context for a medium-term (1990-2000) investment plan for the sector.

The resulting plan is intended to be the first in a series of rolling plans that will be developed at intervals, in step with Pakistan's evolving circumstances and priorities. An important spinoff of the study has been the development of a computer-assisted methodology which federal and provincial planning institutions can conveniently use to update and refine the Plan at routine intervals. Control of the computer model used in this work, the Indus Basin Model Revised, was transferred at the end of the study to the Water and Power Development Authority (WAPDA) and key users in the provinces.

The authors of the study identified constraints that can crucially undermine water sector investments. A searching evaluation was made of the capacity of existing water sector planning institutions, at federal and provincial levels, to overcome these constraints. A new infrastructure of Provincial Planning Cells (PPCs) was developed with a view to rationalizing water sector investment programs countrywide. Both PPCs and WAPDA were provided with data processing technology and staff training appropriate to the enhanced planning task.

This article examines the main findings of the study regarding investment performance over the past decade, future targets in relation to imperative growth needs, constraints on water sector development planning and proposed corrective measures that will be put to practical test as the measures proposed in the WSIP study unroll.

Pakistan's water sector investment track record presents a mixed picture of achievements. The 1979 Revised Action Plan (RAP) for Irrigated Agriculture proposed a strategy of maximizing growth through investment in private tubewells, watercourse improvements, soil reclamation and improved utilization of irrigation systems, to be followed by major investment to boost existing assets.

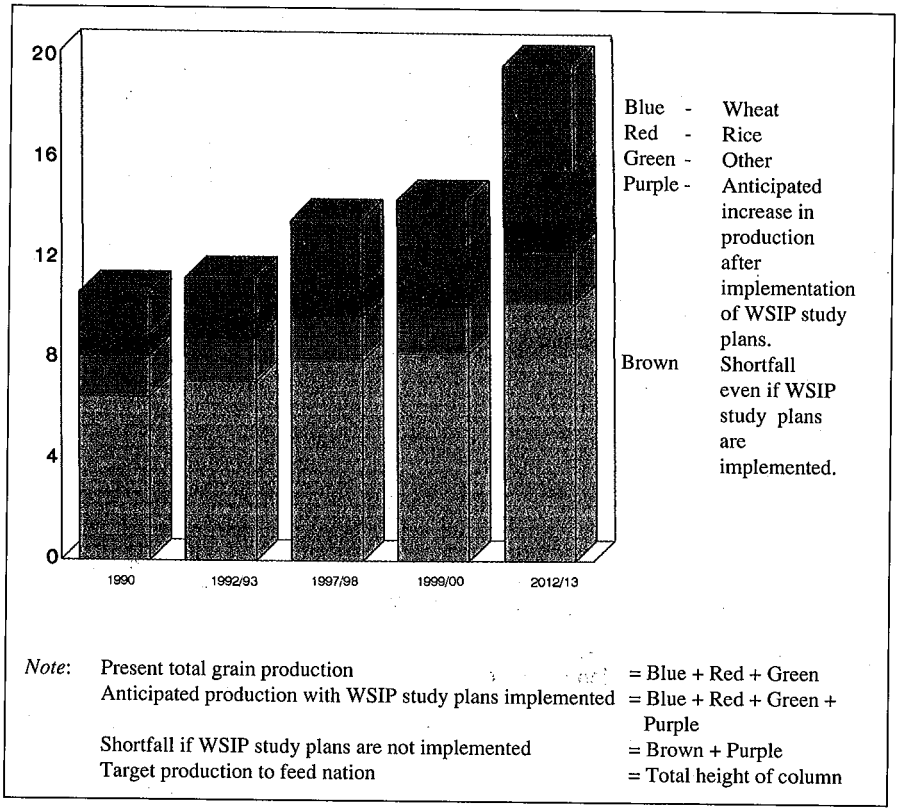
In fact, overall investment in the water sector under the national Sixth Five Year Plan (1983-1988) was 17 percent below RAP recommendations. The RAP recommended priority attention be given to investments of short gestation offering high returns but the recommendations could not be put into effect because of the continuing dominance of large drainage and canal extension projects.

No action was taken on the RAP recommendations aimed at bringing together institutions concerned with water and agriculture; progress in this direction has consequently been very limited. The underlying objectives nonetheless have many supporters and may yet be realized in particular provinces.

With the deferment of new storage facilities and the continuation of massive subsidies for inefficient projects, the need for better management and financial policies is every bit as great as it was when RAP was formulated. The undoubted success of private tubewell development gives new reason to accelerate the ongoing privatization of public tubewell facilities and redirect public subsidy for on-farm water management to areas of saline groundwater, while all programs need to put more emphasis on cost-effective management.

Mr A. R. Mahsud, Secretary of Pakistan's Ministry of Water and Power, presents a set of the WSIP study volumes to Senator Sartaj Aziz, Minister of Finance and Economic Affairs, at the Islamabad Consultative Meeting.

Future agricultural production will have to be stepped up sharply if it is to keep pace with an expected jump in population levels from 107 million (1987) to 148 million by the year 2000, or 207 million by AD 2013. Although yields of most crops have risen over the past 10 years, average annual growth has dropped mostly below 2 percent and it is doubtful if yield increases above 1.5 percent a year could be sustained in the future. With the investments foreseen in the WSIP study, an expected shortfall of 24 percent by AD 2000 could be cut to 10 percent. A still greater (36%) deficit by AD 2013 could be forestalled only by an annual 4 percent increase in average yields or net cropped area: neither target could be achieved without significant investments in improved irrigation water deliveries and protection from waterlogging, salinity and flooding.

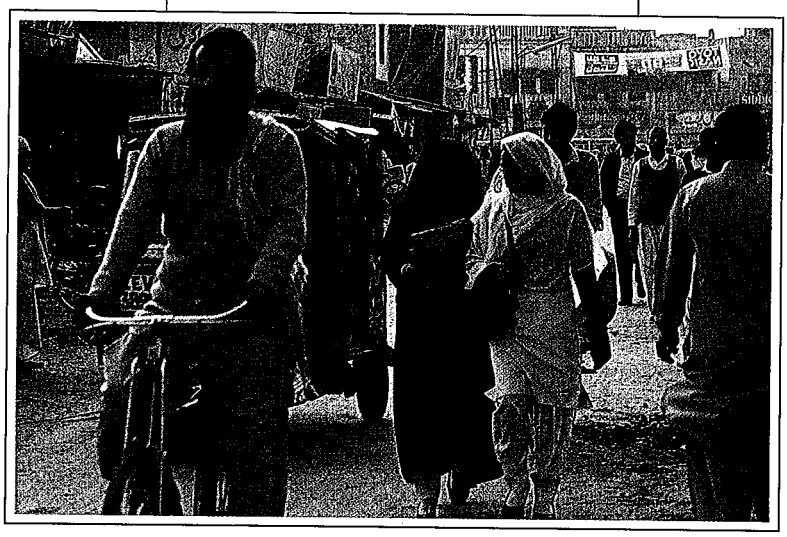


Present and anticipated grain production, Pakistan.

Constraints identified and taken into account in the WSIP study can be grouped under three categories — physical, institutional and financial constraints. Water availability remains foremost among the physical constraints. The system as a whole is short of water and irrigation is based on distribution of the supply over the largest area that can feasibly be watered.

Cropping intensities are therefore low but not, however, as low as might be expected because farmers throughout the basin have found a way to maximize production by partially irrigating a larger area during *kharif*, and in northern Punjab during *rabi*, too. This is a rational strategy for farmers who have more land than water and who face uncertainties of future supply and rainfall. Farmers who have access to supplementary supplies from tubewells or who somehow get extra canal water, tend to use the surplus on further increases in crop area.

The supply side of irrigation management will plainly have to be much improved to make canal operation more responsive to farming objectives and ease supply constraints on farmers by allowing better use of groundwater and rainfall, and by ensuring more reliable canal water supplies. Better communication between Canal Officers and farmers and more effective operation of canals will be essential. At present, general improvement of operation appears more relevant than emphasis on full demand systems or expansion into new areas.



Population increase in Pakistan's crowded urban centers is fast overtaking agricultural production.

While land is not an overall constraint, there are many areas where irrigated agriculture has been beggared by waterlogging, increased salinity and sodicity, and panning. The extent of the waterlogging problem is due almost entirely to methods of irrigation practiced. Proper water

management should make waterlogging a rare occurrence except in depressions or in farms close to canals. Unequal distribution of irrigation water leads, however, to excessive use in many other areas — especially during the rabi season when the evaporation rate is lower.

The direct impact of salinity on yield appears secondary to waterlogging, mainly because farmers have learnt to keep salinity at bay by continuous irrigation of the same fields. However, this practice raises new problems when crops with differing water requirements are rotated. More research into the effect of high water tables on farm systems, as well as on individual crops, is needed before these problems can be tackled conclusively.

Drainage of the Indus Plains is slow. Flow paths often run to ground in interfluve depressions or are impeded by roads, railways and other built-up infrastructure. The spread of irrigation and its attendant spillage have greatly increased the volume of water which can only escape the land by being consumed or evaporated.

Subsurface drainage is now badly needed in those virtual disaster areas where the pre-monsoon water table has consequently risen to within 1.5 meters of the surface of land supporting dry-foot crops, bringing in its wake huge volumes of resident salinity towards the surface. Surface drainage alone should offer adequate return for protection of dry-foot crops from stormwater flooding. To be economic, drain capacities have to be kept to a minimum by better managing irrigation supplies to reduce the volume of waste water. Good design and operation of drainage systems can in turn help irrigation by keeping the water table at such a level that it maintains beneficial sub-irrigation and enables useable waste water to be returned to the irrigation system.

Disposal of saline drainage effluent poses special problems which can only be solved conclusively by passing as much of it as possible to the sea, either diluted in summer flood flows or, preferably, through the Left Bank Outfall Drain (LBOD) now under construction. At the same time, amounts of salinity mobilized by "vertical" drainage using tubewells should be kept to a minimum in rice lands or dry-foot crop areas that are not "disaster areas."

Here, horizontal drains, better water management and local reuse should suffice. The WSIP study recommendation is that tubewell drainage of saline water should be confined mainly to areas with access to the LBOD and the latter should be extended with this need in mind.

Flood control investment has tended to lag behind expectations in the past, though floods have claimed an estimated 6,350 lives since 1947 and have caused direct damage estimated at Rs 22 billion. The problem, however, is now being tackled under the National Flood Protection Plan II. Land-use zoning is also needed, to avoid flood damage on the scale experienced in 1988, when two floods caused damage costing nearly two billion rupees.

Flood protection and drainage can be categorized as environmental protection measures but the most pressing need under this heading is for watershed management. As experience in the Mangla Catchment has shown, such management can be highly cost-effective in reducing reservoir sedimentation, besides bringing benefits in terms of groundwater recharge and flood protection.

Other areas of environmental concern include the fate of new wetlands created by lack of proper drainage, which have assumed importance as feeding grounds for migratory birds, as fisheries and as sources of lift irrigation. Drainage of these areas is bound to have some adverse impacts but these can be minimized by proper planning and design and will be counterbalanced to some extent by environmental benefits.

Increased upstream development will also affect forestry and other activities in riverine and delta areas. In the delta, the problem is not so much seawater intrusion (already at its upper limit) as the threat of reduced flows in mangrove forests and associated fisheries. More studies are needed to guide work to stem further harm in these quarters.

Most of the problems highlighted in the WSIP study are numbered among the institutional constraints revealed in the course of reviewing ongoing projects. They include inadequate preparation of projects, inordinate delays in approving projects and underestimated costs. The latter problem stems partly from the former compounded by an incomplete understanding of the hampering effects of inflation and the levying of interest during construction. These problems at the initial stages of projects are later aggravated by further delays and oversights involved in obtaining high-level approval for every stage of procurement, lengthy land acquisition wrangles and funding shortfalls.

Events have overtaken the WSIP study observations on water apportionment disputes as a major planning snag, with settlement of the question at federal level at the end of March 1991 (see page 35). System operation in its institutional aspects, project preparation and project implementation assume renewed importance as areas for improvement, following this development.

A rise in system operation standards can offer considerable potential for all-round improvement but not until more reliable monitoring

of flows, better communications and freedom to ease critical equity constraints come into play, along with advances in conjunctive use of surface water and groundwater.

Enhanced rewards and statuses for project designers could help get planning out of its present rut, where standard or type designs are too commonly relied on. Reliable feasibility studies and pricing procedures which allow adequate contingency margins are badly needed: hardly any of the projects submitted for inclusion in the WSIP study were adequately prepared. Guidelines for project preparation and approval are, therefore, a priority need.

Improvements in project implementation pinpointed by the WSIP study center on bidding procedures used by both Provincial Irrigation Departments (PIDs) and counterpart Provincial Agriculture Departments. Contracts handled by the PIDs tend to be for smaller, lower-cost (Rs 0.5 million or less) projects of short duration; these tend repeatedly to overrun their term, often by 100 percent or more. Larger (Rs 1 million plus) projects tend to meet their deadlines but have to be referred to higher authority for approval.

International competitive bidding for larger projects takes at least two years to pass all the stages involved, from prequalification through document preparation, tendering and award. Failure to take account of this time-lag is a frequent cause of miscalculations. Prequalification procedures tend to be anything but selective, offering no protection against unrealistic bids, unqualified contractors and time and cost overruns. The format of contract documents should, says the WSIP study, be improved to bind contractor and client to standard conditions, specifications, weights and measures, arbitration procedures and rates of interest on late payments. Tendering contractors should be required to submit a workplan and stick to it.

Many of the institutional problems affecting the sector can be addressed, ultimately, only by human resources development, particularly in the field of training. Most particularly, there is a need to overlap the teaching of irrigation and agriculture and to offer "sandwich courses in irrigated agriculture," to cater to the drive called for in the WSIP study toward increased agricultural production through system improvement.

More emphasis also has to be placed on pre-service and in-service training, for diploma-holders and graduates alike. Schemes started up under the Irrigation System Management project have given training a boost, but this must be sustained and extended to include training of technicians.

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Interactions between institutions and farmers over such matters as delivery and disposal of irrigation inputs and outputs, farm management as a business, farmer support and advisory activities, must be recognized as an obligation upon irrigation departments, no less than the straightforward delivery of water to the canal outlet. Although the Water Users' Association Ordinances provide some basis for communal self-help efforts to improve, operate and maintain watercourses, it is the irrigation department in the person of the Canal Officer that retains institutional control over public water supply and drainage.

The role of agriculture departments in relation to that of irrigation departments requires clarification of a kind that will encourage Canal Officers to recognize the agricultural aspects and objectives of their duties, concerning themselves with water management problems above and below the canal outlet. This should allow the agriculture departments to concentrate more resources on involving farmers and Water Users' Associations (WUAs) in management of problem-solving, in addition to offering general advice and support in such areas as watercourse improvement.

On-farm water management appears best left in the hands of agriculture departments, within which it should be recognized as a development activity akin to Canal Water Management. The extension role of agriculture departments should be strengthened in its irrigation aspects by the formation of water use and soil reclamation units. The long-term goal of the Canal Water Management project should be farmer joint management — farmers advised by agriculture departments and sharing with irrigation departments — the job of managing the canal and drain system.

In this scenario, the irrigation department would provide executive control over the big picture of delivery and disposal of inputs and outputs. Outside the official sphere, farmers require successful interaction with other farmers, traders and credit institutions. Much more support for WUAs is required before they can participate fully in long-term institutional development.

Research into irrigated agriculture is presently carried out by many agencies, academic institutions and project bodies. Though parts of the research enterprise are coordinated, this is not true of much work done in a project context. Many topics urgently need researching but there

are too many gaps in today's effort. The greatest unfulfilled need is probably in the realm of whole farm operation; top priority should be given to adaptive research in this area.

There is a wasteful tendency for model research farms and allied institutions to live on long after their original experimental function ceases: here, too, the WSIP study suggests, some rationalization is long overdue.

Finally, financial constraints arise mainly as a result of inconsistencies between budgeting assumptions applied at different levels of planning. Present funding of investment through federal and provincial Agricultural Development Plans (ADPs) is based on an overall budget for the sector set by federal government officials.

Individual provinces plan their investment finance within this estimated budget, but then usually have to cut them pro rata to fit real fiscal circumstances. Longer-term planning of investment is effected through the five-year national plan cycle and there have been changes in this process where the handling of inflation is concerned. The Sixth (1983-1988) Plan was expressed in both constant (1982-1987) price levels and current prices (including inflation) but the Seventh Plan was expressed only in constant price (1987-1988) levels.

As in the case of the Agricultural Development Plans, the Five Year Plan is based on the federal government's estimate of available resources and several reiterations of the process whereby investment put up by provincial and federal agencies is fitted within real resources. It is hard under these circumstances to maintain a steady supply of funding to each project, or even to ensure project costs have been fully updated. Project funding is consequently often overstretched, incurring additional time-related costs and interest during construction and inflation.

These constraints can cause net losses to the economy approaching almost a quarter of the investment allocated to projects in the first place, in many cases entirely robbing them of their cost-effectiveness. There is a pressing need to find rational ways to avoid this trap if the nation is to continue to provide for itself beyond the present decade.

FMIS WORKSHOP IN ARGENTINA

Mendoza, a city in west-central Argentina in the foothills of the Andes will be the venue for an international workshop on performance measurement in farmer-managed irrigation systems from 12 to 15 November this year, organized jointly by the International Irrigation Management Institute (IIMI) and the Institute Nacional de Ciencia y Tecnica Hidricas (INCYTH).

More than 30 per cent of the irrigated area of Argentina is in the province of Mendoza. The name of the province and its capital city both derive from Pedro de Mendoza, the Spanish soldier and explorer who founded the first European colony in Buenos Aires around 1536. When the first Spanish conquerors arrived in Mendoza they found an already irrigated area of some 5,000 ha in the province, whose climate was arid, with an average annual rainfall of about 300 mm. Today all the available surface water and groundwater in the province is used to irrigate some 360,000 ha.

Farmer-managed irrigation systems (FMIS) also classified as small-scale irrigation or minor irrigation systems may be found with command areas of 15,000 to 20,000 ha. FMIS are also popularly described as traditional, indigenous, communal or people's systems. In these systems most management activities are carried out and decisions made by the farmers themselves. FMIS cover a wide range of environments and technologies and in many countries they contribute to the production of a significant portion of the subsistence food supply. Some FMIS are hundreds of years old, well-managed and very productive while others perform far below their potential. In many developing countries FMIS cover large areas with a great number of beneficiaries, not only in relative terms, but also in absolute terms. FMIS represent a sector in which there is much scope for performance improvement with a relatively low level of investment.

As many FMIS do not perform as well as they should, there is a need to identify the areas in which they fall short of their potential. It is therefore important to measure and evaluate their success or failure objectively and identify specific areas in need of improvement.

The specific workshop objectives will be to exchange experiences and ideas on criteria best suited to achieve distinct goals and objectives and to come up with a set of indicators based on them, which are manageable within the existing framework and data constraints for assessing FMIS performance; to discuss and develop appropriate cost-effective methodologies for the collection of data relevant to the proposed performance indicators; to review case studies of the performance of different FMIS and synthesize their findings to draw general conclusions and recommendations; to create the awareness that performance evaluation is an important factor in ensuring goals of economic viability, social equity and sustainability and to discuss the possibilities of generating future programs for action in performance and evaluation of FMIS.